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EDITORIAL

Dual pathology? Reviewing the conceptualization of comorbidity in addictions

¿Patología dual? Revisando la conceptualización de la comorbilidad en adicciones

SERGIO FERNÁNDEZ-ARTAMENDI, PhD*, GERARDO FLOREZ MENÉNDEZ**,***, MARÍA-TERESA CORTÉS-TOMÁS****, FRANCISCO SALVADOR PASCUAL PASTOR*****

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Recent years have witnessed an intense scientific debate in the field of addictions: is the joint presence of a substance use disorder (SUD) together with another mental disorder clinically important enough to be considered an entity in itself? Should this clinical scenario have a specific term? Is the use of the term dual pathology appropriate? What are the implications of this for the clinical care of people with addictions? This editorial aims to review the most recent scientific evidence and, above all, contribute constructively to the scientific debate on these issues.

Dual Pathology: what is it?

Comorbidity between addictions and other mental health problems has in recent years been conceptualized by some researchers and clinicians as 'dual pathology,' a term also chosen by the World Psychiatric Association (WPA, n.d.). The term refers to the existence of a clinical entity that combines substance use disorder (SUD) with another mental disorder (depression, anxiety, bipolar disorder,

psychotic spectrum disorders, etc.). The label 'dual pathology' can also, although less frequently, refer to two individual diagnoses together (Lehman et al., 1989) or a SUD secondary to a mental disorder (Sáiz Martínez et al., 2014). The main arguments of those defending the use of this label for the presence of a SUD and another mental disorder are summarized below (Szerman et al., 2022).

The first such argument is based on the fact that the relationship between SUDs and other mental disorders have a statistical power that far exceeds mere chance and, therefore, the term comorbidity, which only indicates the joint presence of two disorders in one person, would not be specific enough (Krueger & Markon, 2006). Various epidemiological studies and clinical and general population samples (adult and/or adolescent) support this view (Cowlshaw & Hakes, 2015; Grant et al., 2015; Pereiro et al., 2013). Although results vary depending on the methodology used in each study, it can be stated that more than 50% of people diagnosed with SUD also have another mental disorder and vice versa (Compton et al., 2007; Cowlshaw & Hakes, 2015; Grant et al., 2015; Merikangas et al., 2010;

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Pereiro et al., 2013; Szerman et al., 2022). Secondly, the prevalence of substance-induced mental disorders is very limited, and could therefore not explain the frequent co-occurrence of SUDs and other mental disorders on its own (Pereiro et al., 2013; Szerman et al., 2022). These authors further claim numerous studies have shown that in their evolution, many of these induced or secondary disorders were in fact primary. Moreover, substance-induced disorders share a pathophysiological basis and the same risk factors as their counterparts of primary origin (Pereiro et al., 2013; Szerman et al., 2022). Third, SUDs and other mental disorders share risk endophenotypes, such as impulsivity and emotional dysregulation (Szerman et al., 2022). Finally, the emphasis in a dual pathology perspective is placed on the fact that SUDs and other mental disorders have neurobiological bases in common since they share a genetic risk, and that toxic substances also impair the functioning of neurotransmission involved in the etiopathogenesis of other mental disorders (Szerman et al., 2022). This would explain why substance use disorders would favour the appearance of mental disorders and vice versa (Lev-Ran et al., 2013).

Theoretical and empirical weaknesses of the “dual pathology” model

In general terms, the basis for the conceptualization of comorbidity between addictions and other mental health problems as ‘dual pathology’ is based on a high joint prevalence of both disorders, on the existence of shared risk factors and neurological disorders, and on the existence of a distinct clinical entity. From our perspective, these approaches have some weaknesses.

About the concept of pathology

To begin with, we need to start with the concept of ‘pathology’ itself. Spain’s Royal National Academy of Medicine defines ‘pathology’ as the “*set of symptoms of a disease*” or, where appropriate, “*the area of medicine studying diseases*” (Real Academia Nacional de Medicina de España, n.d.), while also discouraging its use in specialized contexts as a synonym or ‘label’ for a disease. Moreover, the use of this term (‘pathology’) involves considering addiction as a brain disease and, therefore, the product of an impairment of neurological structures, ultimately seen as chronic. This view is based on a biological model that takes addiction to be a consequence of the impairment of different brain structures (Thompson et al., 2020), derived from the repeated use of addictive substances, which would generate a chronic disease (‘pathology’). This conception of addiction as a ‘brain disease’ would therefore be reductionist, to say the least. It is in line with other mental disorders being similarly considered brain diseases and, therefore, ultimately, a direct consequence of

the impairment of brain structures or neurotransmission mechanisms. Succinctly put, addiction is a consequence of the impairment of the reinforcement system (Volkow & Baler, 2019), in the same way that depression is a consequence of the impairment of serotonergic circuits (Albert et al., 2012), the latter being a hypothesis that lacks sufficient empirical support (Moncrieff et al. 2023).

This reductionist and biological view of addiction is at odds with existing scientific findings, has important theoretical weaknesses and poses a problem with practical and clinical implications. At a theoretical level, it equates addiction (and other mental problems) with diseases such as diabetes or hypertension (Heilig et al., 2021), with the biological factor prioritised over the social and psychological factors present at the origin of mental disorders in general, and in addictions in particular (Becona, 2018). According to Heilig et al. (2021), given the undeniable neurobiological impairment present in addiction, it must be a brain disease. Taking a similar reductionist perspective, Room (2021) responds that, given that the social component is also undeniable in addiction, it could then equally well be a ‘social disease.’

Furthermore, the practical consequences also fail to match the empirical evidence. If it were a biological disorder, addiction would be subject to remission (that is, the reduction of symptoms for a prolonged period of time), but not to the disappearance of symptoms. However, research shows that ‘recovery’ is most common among people with addictive disorders, such as alcohol use disorder, even in the absence of treatment (Fan et al., 2019; Kelly et al., 2017). This recovery is defined as “an individualized, intentional, dynamic and relational process involving sustained efforts to improve wellness” (Ashford et al., 2019, page 5), a definition based on the process of change and a global (biopsychosocial) view of wellness in the different areas of people’s lives (Carballo, 2023). Finally, and in the particular case of addiction, conceptualizing it as a disease can even have a negative impact for users, contributing to the medicalization of the problem, stigma and worse prognosis for recovery (Trujols & Allende, 2018).

On the specificity of the joint presentation of mental health and addiction problems

The ‘Dual Pathology’ concept assumes the coexistence of two different nosological ‘entities’ in the individual, as if they were two different, separate ‘diseases’ in the person’s brain. This approach further assumes that this coexistence of two nosological entities actually implies the existence of a third entity, a ‘disease’ that is qualitatively different from the sum of the other two. However, is this epidemiological and etiopathogenic relationship exclusive to SUDs or does it occur in all mental disorders? If this clinical phenomenon is common to all mental disorders, it would no longer be a special or particular situation, nor a specific entity.

Community epidemiological studies indicate that people with one mental disorder have greater than a 50% chance of having another (Plana-Ripoll et al., 2019). Furthermore, studies indicate that this relationship is not exclusive to SUDs, but rather a generalized phenomenon in all mental disorders (Plana-Ripoll et al., 2019). As ready examples, the presence in diagnostic manuals of conditions such as mixed anxious-depressive disorder, mixed personality disorder or schizoaffective disorder may be cited, underlining the very frequent clinical presentation of these comorbidities. Studies indicate that the comorbid presence of two or more mental disorders is the norm and not the exception reserved for SUDs (McGrath et al., 2020). In fact, the presence of a single mental disorder is a rare clinical situation (Caspi et al., 2020). These studies also point out that the relative risk of comorbidity appearing is independent of the temporal order in which mental disorders appear (McGrath et al., 2020; Plana-Ripoll et al., 2019), and that the transition of some disorders to others throughout patients' lives is very frequent (Caspi et al., 2020).

On the need for a specific 'diagnosis'

The need for diagnoses in the field of clinical practice is indisputable for establishing screening criteria, case management, and the referral and application of specific interventions. Additionally, in certain health systems, such as the United States, financing for health interventions depends on clear diagnoses on which insurance companies can base their decisions. Therefore, at a pragmatic level, 'conceptual' debates such as the one addressed in this editorial can have various practical implications, applicable, of course, to the field of addictions (Heilig et al., 2021). Nevertheless, for a clear scientific debate, the evident need and usefulness of establishing clear diagnoses and nosological classifications must not be confused with the proper analysis of the nature of the problems we are addressing. In fact, not a single mental disorder has yet been established as a distinct entity (Haslam et al., 2012). In this context, there are currently various proposals for understanding and conceptualizing comorbidity, with dimensional and hierarchical perspectives, thus making the need for diagnosis redundant (e.g. Forbes et al., 2016). The only possible strategy for improving the treatment of mental health problems is to obtain the best fit between their conceptualization and the existing scientific evidence.

Common risk factors

One of the bases of the dual pathology perspective is the existence of common neurobiological disorders in addictions and other mental health problems. Indeed, mental disorders present impairments in the neurotransmission systems of the brain, and the psychoactive effect of addictive substances usually works through these neurotransmission systems. However, it has not been shown that the presence

of a particular mental disorder exclusively favours the appearance of a SUD associated with a psychoactive agent which acts through the neurotransmission system impaired in said mental disorder. Nor has the reverse phenomenon been demonstrated, that a SUD favours the appearance of a mental disorder whose impaired neurotransmission system is exactly the one on which the substance exerts its psychoactive effect. The above-mentioned studies rather indicate a more non-specific correlation, seemingly linked to a common general vulnerability (Anttila et al., 2018; Caspi et al., 2020; Caspi & Moffitt, 2018; Compton et al., 2007; Grant et al., 2015; Lev-Ran et al., 2013; McGrath et al., 2020; Plana-Ripoll et al., 2019). Moreover, genetic studies indicate that all mental disorders, including substance use disorders, have a polygenic basis, meaning that they all share genetic risk factors (Smoller et al., 2019). Indeed, genetic studies contradict the current diagnostic paradigm based on categories, while once again supporting a dimensional distribution for all mental disorders, highlighting that this dimensional distribution includes the normality or absence of the disorder (Smoller et al., 2019). It is interesting that this shared polygenic risk is greater for mental disorders than for neurological disorders (Anttila et al., 2018). From a genetic point of view, the pathogenic process is shared for all mental disorders (Anttila et al., 2018).

With regard to environmental risk factors, it has also not been clearly demonstrated that there are factors which only influence the appearance of a single mental disorder or a specific combination of mental disorders (Arango et al., 2021). The most prominent environmental risk factors impair neurodevelopment in its earliest initial phases and are linked to a risk of the appearance of all psychopathology, although a single transdiagnostic environmental risk factor has not been identified (Arango et al., 2021).

These findings strengthen the idea of common etiopathogenic bases for all mental disorders, not only for SUDs with other mental disorders (McGrath et al., 2020; Plana-Ripoll et al., 2019).

Editorial proposal

Biopsychosocial model and individual-centred approach

Having reviewed all the scientific evidence, we conclude that comorbidity between SUDs and other mental disorders is not merely random, yet neither is it a unique and special clinical situation. Rather, it is part of a multi-comorbidity typical of mental disorders (Caspi et al., 2020; Caspi & Moffitt, 2018; Krueger & Markon, 2006; Plana-Ripoll et al., 2019). Therefore, comorbidity between addictions and other mental health problems must be conceptualized in at least the same way as coexistence between other mental health problems. Furthermore, the most appropriate and complete way to understand and conceptualize addiction

is on the basis of the biopsychosocial model (Engels, 1977; Becoña, 2018). Applying this model, the existence of mental problems must be understood as the product of the interaction of biological, psychological and social factors, without the need for the primary or necessary cause to be a biological disorder or brain disease. Therefore, returning to Room (2021), the restricted sense of addiction as a biological disease would be as valid (or invalid) as labelling it a 'social disease.' In this context, understanding the genesis and development of addictions and other mental disorders, as well as their possible comorbidity, must be undertaken from biopsychosocial models that cover the variety of elements involved. Saying that addiction is a 'biopsychosocial' problem is not an answer to the problem; however, it is an essential premise for properly framing the discussion. Thus, and as indicated above, addiction is a multi-causal health problem, the natural process of which, although subject to chronicity, is one of recovery, with or without treatment. This conceptualization of addiction, based on empirical evidence, requires an individualizing process of intervention based on each user's profile characteristics and their comorbidity.

Concept

If a special term were to be applied to refer to this clinical situation highlighting an association beyond random comorbidity, whether it be "dual disorder" or "dual diagnosis" or "dual pathology" or "concurrent disorders", the term should be used to refer to any comorbid situation with any combination of mental disorders: for example, the presence of two SUDs, or two non-addictive mental disorders, or one SUD together with a non-addictive mental disorder. Moreover, this refers only to clinical situations in which the user presents just two disorders, since it is not unusual to find users in clinical settings presenting three or more disorders (McGrath et al., 2020; Plana-Ripoll et al., 2019).

Which term would be most appropriate? 'Dual pathology' is unsuitable for the reasons discussed above. Mental disorders are not considered diseases even in current diagnostic manuals due to the limited diagnostic capacity currently available to differentiate them (McGrath et al., 2020; Plana-Ripoll et al., 2019). The World Health Organization's term 'dual diagnosis', which refers to this non-random multi-comorbidity (Szerman et al., 2022), would probably be appropriate. 'Dual disorder' could also serve, provided that its use goes beyond the binomial SUD – non-addictive mental disorder. However, the use of 'dual diagnosis/ disorder' would fail to include the very broad range of people with mental health problems and addictions who do not meet the criteria established by the main manuals, without at the same time eliminating the uneasiness related to the term. That is why, perhaps, there

seems to be a certain consensus in the scientific community regarding the use of the term 'comorbidity' to refer to the presence of various mental problems or disorders, either with or without addictions. A quick search in the PubMed database (without any claim to being exhaustive) for articles with 'dual pathology' in the title (and introducing various addiction-related keywords as additional search options: substance use OR substance use disorder) returned 338 publications. The same search with the term 'comorbidity', limited by the same keywords in the field, returned 23,009.

Dimensional/transdiagnostic perspective

Regarding the at-risk endophenotypes referred to above, studies carried out in the adult population, but also those studying the development of endophenotypes from childhood/adolescence to adulthood, indicate the presence of four dimensions which are highly intercorrelated and present dimensionally in all mental disorders: impulsivity, anxiety, fear and thought disorder (Caspi et al., 2020; Caspi & Moffitt, 2018; Krueger & Markon, 2006; Lahey et al., 2012). This high correlation has led some authors to suggest the existence of a single psychopathological dimension (Caspi et al., 2020; Caspi & Moffitt, 2018; Lahey et al., 2012).

From this perspective, it is understood that mental health symptoms present dimensionally (from normality to clinical problem) and not categorically, with certain symptoms presenting more commonly together with other specific symptoms, by maintaining some type of relationship in their origin or maintenance. Comorbidity between addictions (SUD) and other mental health problems or disorders would thus be of the same nature as the other comorbidities (among other mental health problems); these are nothing more than a joint expression of a series of symptoms belonging to different pre-established nosological entities. Taking into account the multitude of biological, psychological and social processes involved (impairments in the dopaminergic system, decision making, impulsivity, learning and conditioning, accessibility, etc.) in the development of an addiction (West & Brown, 2013), it is not surprising that SUD symptoms can occur together with those of other mental health disorders such as depression, bipolar disorder or psychotic spectrum disorders, among others. In fact, in the debate on the 'central' or defining elements of what an addiction is, elements as diverse as 'dysregulation of choice' (Strain, 2022) or compulsivity (Lüscher et al., 2020) have been proposed, both of which are present to different extents in various mental disorders. Furthermore, and as previously mentioned, addictive behaviours can be a cause but also a consequence of other mental health problems (National Institute on Drug Abuse, 2020), and the development of this comorbidity cannot be

understood without an interactive relationship between all the symptoms of both diagnoses.

Practical implications

As we have seen, the proposals for the conceptualization of comorbidity as an additional and differential nosological entity not only go against the principal evidence currently available in the field of psychopathology (Kotov et al., 2017; Cuthbert, 2014; Krueger & Markon, 2021), but also result in reductionism and can contribute to the stigma of users with addictions (Trujols & Allende, 2018). The use of concepts such as pathology or illness in the field of mental health problems does not necessarily help to reduce associated stigma. On the other hand, despite the multimorbidity present in all mental disorders, it could be useful for mental health professionals to know about the very frequent, but not exceptional, relationship between SUDs and other mental disorders, if these diagnostic binomials had a specific treatment. Unfortunately, research carried out so far, which is rather scarce for some of these comorbidities, has not shown that there are specific treatments for this clinical situation (Arranz et al., 2022; Cunill et al., 2022; González-Pinto et al., 2022; Sáiz et al., 2022; Torrens et al., 2022). As a general rule, the few clinical trials carried out only allow us to advise treating each disorder separately and with treatments that have proven effective for said disorder alone; the evidence of their effectiveness in comorbidity situations is weak in most cases (Arranz et al., 2022; Cunill et al., 2022; González-Pinto et al., 2022; Sáiz et al., 2022; Torrens et al., 2022). Therefore, the use of a specific treatment cannot be invoked to claim the need for a special term to refer to dual diagnoses between SUDs and other non-addictive mental disorders.

In this context, the dual pathology label does not refer to any specific and delimited nosological entity or brain disease that would help clarify the intervention process, but rather to a wide range of mental health problems commonly present in users with SUDs (already highly heterogeneous) that may include, for example, the phenomenology present in an alcohol use disorder with major depression but also a cannabis use disorder together with a psychotic spectrum disorder. Furthermore, its usefulness for users has not been demonstrated either on a personal or clinical level given that it does not offer additional solid explanations to patients nor specific treatment guidelines. On the contrary, the dual pathology label resurrects categorical nosological classifications without offering any specific practical contribution.

Ultimately, this conceptual debate means that the treatment of addictions and mental health problems must stop revolving around diagnostic categorization, the concept of 'disease' and the idea of 'chronicity' by necessity; it must instead incorporate a greater functional perspective,

both in understanding and addressing the problem, from a dimensional and individualized standpoint.

Conclusions

This editorial aimed to deepen the existing debate around the concept of dual pathology and its implications for the understanding of comorbidity and care for users with addictions. The use of the label 'dual pathology' is not based on empirical evidence, it resorts to reductionist concepts lacking a scientific basis such as that of addiction as a brain disease, and it does not offer best practices at a healthcare or clinical level for patients. Perhaps the urgency and need to coin this term are not so much linked to the etiopathogenesis, diagnosis, treatment and evolution of these disorders when they appear together in the patients, but are rather more likely to be a result of the stress generated by an aberrant healthcare situation occurring, with different intensity and presentation, in the treatment of mental disorders in our country. The existence of parallel networks for the treatment of SUDs on the one hand, and the rest of the mental disorders on the other, has given rise to two care networks unrelated to each other, focused on the diagnosis and treatment of one type of disorder and ignoring those they do not consider themselves competent to deal with. This generates nihilistic treatment situations, where neither network assumes responsibility for patients with this comorbidity, considering them to be beyond their remit and believing that their care is the responsibility of the other parallel network. What's more, the same patient can be treated in more than one healthcare network for each of their diagnoses, without adequate integration between centres. Furthermore, this attention focused on the pathology from a diagnostic point of view often ignores the necessary individualization of treatment, not to mention the social and community variables involved in the origin and recovery of addictions.

Notwithstanding the above, is the best solution for this healthcare phenomenon to agree on a term (new diagnosis) to describe the clinical situation which gains acceptance by both healthcare networks? Or rather, should real integration of both healthcare networks perhaps be achieved in order to focus on mental healthcare and the promotion of wellbeing as a whole with an integrated and multidisciplinary perspective, focused on the individual and with a community perspective, and not so much on diagnosis? For this approach to work, public health care systems still have a considerable task ahead involving the incorporation of psychology professionals into their services as well as the greater integration of said community approach. Ultimately, what seems clear is that the treatment of addictions, comorbidity, and also the population's mental health problems, may require a reconceptualization of health services that addresses these needs.

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ORIGINAL

Alcohol consumption and characterization of hazardous drinkers in Galicia

Consumo de alcohol y caracterización de los bebedores problemáticos en Galicia

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Abstract

Detailed knowledge of the epidemiology of alcohol consumption at the population level is essential to the design of effective public health programs. The objectives of this study were to estimate the prevalence of daily, sporadic, occasional, binge and hazardous alcohol consumption among the Galician population aged 16 years and over, and to characterize hazardous drinkers, taking into account the gender perspective. A cross-sectional study was conducted in 2017 among people aged over 15 years residing in Galicia in the framework of the Risk Behavior Information System (SICRI). In 2017, 7,841 adults were interviewed by stratified random sampling. Questions related to alcohol consumption in the last month were included and the prevalence of hazardous consumption was estimated using the AUDIT test. A multivariate logistic regression model was fitted to characterize hazardous drinkers. A total of 18.8% of the Galician population consumed alcohol daily and 3.4% had hazardous consumption. The prevalence of daily, occasional, sporadic, binge and hazardous drinking was higher among men and varied by age. The prevalence of daily-occasional and sporadic drinking was highest at middle age (45-64 years), and binge and hazardous drinking among those aged 16 to 24 years. The characteristics associated with hazardous drinking varied by gender, and are identified by common characteristics to both genders such as age or being a tobacco or cannabis smoker, and differential characteristics such as educational level. Typologies of consumption changed according to age and gender. Surveillance systems should regularly monitor alcohol consumption in order to adapt prevention measures to changes in drinking patterns.

Keywords: alcohol use, prevalence, cross-sectional, alcoholism, gender

Resumen

Conocer en detalle la epidemiología del consumo de alcohol a nivel poblacional es indispensable para diseñar programas de Salud Pública eficaces. Los objetivos de este estudio fueron estimar la prevalencia del consumo de alcohol diario, ocasional, esporádico, intensivo y problemático entre los gallegos de 16 y más años y caracterizar a los bebedores problemáticos teniendo en cuenta la perspectiva de género. Se realizó un estudio transversal en 2017 entre la población mayor de 15 años residente en Galicia en el marco del Sistema de Información sobre Conductas de Riesgo (SICRI). En 2017, se entrevistaron 7.841 adultos seleccionados mediante muestreo aleatorio estratificado. Se incluyeron preguntas relacionadas con el consumo de alcohol en el último mes y se estimó la prevalencia de consumo problemático empleando el test AUDIT. Para caracterizar a los bebedores problemáticos se ajustó un modelo de regresión logística multivariante. El 18,8% de la población gallega consumía alcohol a diario y el 3,4% tenían un consumo problemático. Las prevalencias de consumo de alcohol diario, ocasional, esporádico, intensivo o problemático fueron más altas entre los hombres y variaron por edad. La prevalencia de consumo diario-ocasional y esporádico fue más alta a edades medias (45-64 años), y el intensivo y problemático entre los 16 y 24 años. Las características asociadas a un consumo problemático de alcohol varían por sexo, identificándose características comunes como la edad o ser fumador de tabaco o cannabis, y diferenciales como el nivel de estudios. Las tipologías de consumo cambian en función de la edad y del sexo. Los sistemas de vigilancia deberían monitorizar de forma periódica el consumo de alcohol para adaptar las medidas de prevención a cambios en la tipología de consumo.

Palabras clave: consumo de alcohol, prevalencia, transversal, alcoholismo, sexo

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Approximately 5% of the burden of disease and mortality worldwide is due to alcohol use (World Health Organization, 2018; Peacock et al., 2018). In 2016, 6.8% of deaths in men and 2.2% in women were associated with drinking, globally (GBD 2016 Alcohol Collaborators, 2018). Alcohol use is related to more than 200 pathologies, raising the risk of diseases such as cirrhosis or liver cancer (World Health Organization, 2018; Rehm et al., 2017) and causing direct admissions and increased hospital stays due to indirect causes (Sánchez Sánchez, Redondo Martín, García Vicario & Velázquez Miranda, 2012). In addition, it is linked to traffic accidents, risky sexual behaviors, violence, abuse or loss of work productivity (Ministerio de Sanidad, Consumo y Bienestar Social, 2020; Pulido et al., 2014). The costs at health, economic and social levels are therefore high, making alcohol an important public health problem (Barrio, Reynolds, García-Altés, Gual & Anderson, 2017; Łyszcza, 2019).

The spectrum of alcohol use is wide and covers various types, from abstinence or non-use to alcohol dependence or alcoholism (Maisto & Saitz, 2003). The most detailed information on alcohol use in Spain is provided by the Survey on Alcohol and Other Drugs (EDADES), although it is limited to the population aged 15 to 64 years. The most recent survey, carried out in 2019-2020, estimated a prevalence of last-month alcohol use in Spain of 63.0% and a daily drinking prevalence of 8.8% (Observatorio Español de las Drogas y las Adicciones, 2021). The most recent data on the general adult population (aged 15 years and over) come from the National Health Survey carried out in 2017 (ENSE-2017). It estimated that the prevalence of daily drinking was 14.7% and that Galicia was the autonomous community with the sixth highest prevalence (17.3%) (Ministerio de Sanidad, Consumo y Bienestar Social, 2018).

As in other countries, regardless of the type of drinking (global, binge or hazardous), the ENSE-2017 data show gender differences in the prevalences of alcohol use for both Spain and Galicia, with consumption always being higher in men (Ministerio de Sanidad, Consumo y Bienestar Social, 2018).

Although information derived from the ENSE on the prevalence of alcohol use in the adult population of Galicia is available, the sample size does not allow precise estimates to be made when detailed analyses are carried out by region based on variables such as sex and age. This information is necessary for effective public health work in planning and assessing different interventions aimed at both primary, secondary and tertiary prevention of alcohol use. Such actions are defined by the different types of drinking, with hazardous drinkers constituting a group of particular interest, both from an epidemiological and clinical point of view (Carvalho, Heilig, Perez, Probst & Rehm, 2019). While hazardous alcohol use occurs more frequently in

men, recent years have seen a decrease in the differences in consumption between men and women (World Health Organization, 2018), thus making it essential to analyze this health problem from a gender perspective.

The objectives of this study were to estimate the prevalence of daily, sporadic, occasional, intensive and hazardous last-month alcohol use and to identify the sociodemographic variables, health status or behaviors linked to hazardous drinking in Galicia, taking into account the gender perspective.

Method

In 2005, the Health Risk Behavior Information System (SICRI) was introduced in Galicia. This involved carrying out cross-sectional studies using surveys among the population aged 16 and over living in Galicia. SICRI surveys are conducted at almost yearly intervals and are carried out by telephone using a CATI (Computed-assisted telephone interview) system. Among the aims of SICRI is the estimation of population prevalences of different risk factors for health.

The survey carried out in 2017 (SICRI-2017) was designed to guarantee the representativeness of the population defined by sex and in four age groups (16-24, 25-44, 45-64 and 65 years and over). Sample size was established taking into account a prevalence of 50% and an absolute error of 3.5%. For each sex and age group, a theoretical size of 980 interviews was estimated, representing a global sample size of 7,840 interviews. Stratified random sampling was employed using the Spanish health system registry (Tarjeta sanitaria) as the sampling frame, with an approximate coverage of 97% of the population resident in Galicia. Field work was carried out between January and December 2017.

A range of questions were included in the SICRI-2017 questionnaire to estimate the prevalence of alcohol use and characterize it at the population level. In relation to drinking in the last 4 weeks, daily drinkers are defined as people declaring that they have drunk alcohol on a daily basis, while sporadic drinkers are those who declare drinking alcohol every or almost every week, but not daily, and occasional drinkers claim to have drunk on one day in any of the weeks, with non-drinkers those declaring not to have drunk alcohol. The global use or alcohol user variable refers to the joint prevalence of daily, sporadic and occasional drinkers. People reporting to have drunk alcohol in the 4 weeks prior to the interview were asked about the frequency of drinking 6 or more alcoholic beverages on the same day, which is defined as heavy or binge drinking.

The ten questions comprising the *Alcohol Use Disorders Identification Test* (AUDIT) questionnaire were included. The total AUDIT score ranges from 0 to 40 points, with a score ≥ 8 (7 in women and in those over 64 years of age)

being considered indicative of hazardous drinking (Babor, Higgins-Biddle, Saunders & Monteiro, 2001; Saunders, Aasland, Babor, de la Fuente & Grant, 1993).

Two multivariate logistic regression models were fitted to characterize hazardous drinkers, one for men and one for women. The dependent variable was hazardous drinking and sociodemographic variables, health status and health-related behaviors were included as explanatory variables. The explanatory variables included were those that were significantly associated with the dependent variable ($p < 0.1$) in a previous bivariate analysis. The final model retained variables with $p < 0.05$, and from this model adjusted odds ratios (OR) of having hazardous drinking were calculated.

The sociodemographic variables analyzed were: age group (16-24, 25-44, 45-64, and 65 years and over); country of birth (Spain - other country); area of residence (rural, semi-urban and urban); employment status at the time of the survey (working, unemployed, household duties, pensioner, student, or other situation); educational level (basic: primary education or less, medium: secondary education, and higher: university); and living with a partner (yes-no). In terms of health status variables, the analysis included self-perception of health status at the time of the survey (very good, good, normal and bad), weight status (underweight, normal weight, overweight and obesity) assessed on the basis of self-reported weight and height information, and self-perception of weight (fat, adequate weight and thin). Finally, the behavioral variables were tobacco and cannabis smoking (smoker and non-smoker) at the time of the survey. The analysis was performed independently for men and women using Stata v14.2, and the sample design was taken into account in the calculations.

Ethical approval by the Galicia Ethics Committee was not necessary because this study was voluntary and anonymous, guaranteeing total confidentiality. The study was conducted through telephone interviews and the agreement to participate consequently implied consent.

Detailed information on the design and other results of SICRI-2017 are available on the Dirección General de Salud Pública website [<https://www.sergas.es/saude-publica/SICRI-Sistema-Información-sobre-Conductas-de-Risco>].

Results

Information was collected from 7,841 people aged 16 and over, with a study response rate of 78%. With regards to health status and lifestyles, 37.9% of the Galician population aged 16 and over self-perceived their health status as good, while 55.1% were overweight or obese, 19.7% were smokers and 0.9% had problematic internet use. The characteristics of men and women are presented separately in table 1.

Alcohol was drunk by 58.6% of the Galician population aged 16 and over in the last month, with 18.8% drinking daily and 23.4% occasionally (Table 2). Overall, the prevalence of alcohol use was estimated at 72.8% in men and 45.8% in women.

The prevalences of daily and occasional use were higher among men [the male/female prevalence ratios (PR) were 2.7 for daily use and 1.7 for occasional use] (Table 2).

In men, the prevalence of alcohol users increased with age up to 45-64 years, which is the group with the highest prevalence (77.4%). In women, the highest prevalence was observed in the group aged 16 to 24 years (59.6%). For daily drinking, prevalence rose with age in both men and women but was higher among men at all ages (Figure 1).

An average intake of 1.65 alcoholic beverages per day of consumption was estimated among Galicians who drink alcohol. Men consumed on average 0.5 more drinks than women on the days that they drank alcohol, with the average intake of alcoholic beverages being 1.85 in men and 1.35 in women. Regardless of gender, occasional drinkers reported drinking 3 or more drinks on any given day of consumption (Table 3).

The highest prevalence of intensive use was observed in the 16-24-year-old group, especially in men, and decreased with age in both sexes, although it was always higher in men at any age (Figure 2). Between 25 and 44 years, the prevalence in men tripled that of women (male/female PR: 3.0).

The prevalence of hazardous alcohol use was 3.4% in the population and 5.8% among alcohol users. The highest prevalence among drinkers was observed in men (8.0%) and, by age group, between 16 and 24 years (17.5%) (Table 4).

Being under 25 years old, not living with a partner, perceiving oneself as a “fat” person and being a tobacco or cannabis smoker are variables that increased the probability of hazardous alcohol use in both men and women. In the case of men, a basic or medium level of education and a self-assessment of health status as “very good” or “good/normal” are also variables that increased the probability of hazardous drinking. In women, no additional variables were identified (Figures 3 and 4).

Table 1
Characteristics of Galician men and women aged 16 and over

	MEN				WOMEN			
	n	%	95% CI		n	%	95% CI	
SOCIODEMOGRAPHIC								
Age group								
16-24	911	8.4	8.3	8.6	918	7.3	7.2	7.4
25-44	1,001	31.6	31.2	32.0	1,006	28.6	28.2	28.9
45-64	1,001	34.3	33.9	34.8	1,002	32.6	32.2	33.0
>=65	1,001	25.7	25.4	25.9	1,001	31.5	31.3	31.7
Country of birth								
Spain	3,613	92.4	91.5	93.3	3,639	93.0	92.2	93.8
Other	301	7.7	6.8	8.5	288	7.0	6.2	7.9
Area of residence								
Urban	2,315	59.2	57.6	60.9	2,392	60.6	59.0	62.3
Semi-urban	1,032	26.4	24.9	27.9	979	24.8	23.3	26.3
Rural	559	14.4	13.2	15.5	547	14.6	13.4	15.8
Employment								
In work	1,677	50.2	48.9	51.5	1,493	40.8	39.5	42.2
Unemployed	315	8.9	7.9	9.9	330	8.4	7.5	9.3
Household duties	2	0.1	0.0	0.1	499	15.4	14.2	16.6
Retired	1,240	33.8	32.9	34.8	936	29.5	28.5	30.5
Student	674	6.9	6.5	7.4	668	5.9	5.5	6.2
Other situation	6	0.1	0.0	0.2	1	0.0	0.0	0.1
Education level								
Basic	1,991	49.8	48.2	51.3	1,877	52.1	50.8	53.5
Medium	1,305	31.9	30.4	33.4	1,240	26.3	24.9	27.6
High	618	18.3	17.0	19.7	810	21.6	20.3	22.9
Living arrangements								
With partner	2,243	67.4	65.9	68.8	2,000	59.7	58.2	61.3
Without partner	1,671	32.6	31.2	34.1	1,927	40.3	38.7	41.9
STATE OF HEALTH								
Self-perceived state of health								
Very good	611	13.0	11.9	14.1	535	11.6	10.6	12.7
Good	1,644	41.0	39.3	42.6	1,480	35.2	33.6	36.7
Normal	1,278	35.2	33.6	36.8	1,382	37.0	35.3	38.6
Poor	381	10.9	9.9	11.9	530	16.3	15.0	17.5
Weight status								
Low weight	53	0.8	0.6	1.1	188	3.5	2.9	4.1
Normal weight	1,655	36.9	35.3	38.4	2,068	48.0	46.4	49.7
Overweight	1,594	44.5	42.8	46.1	1,159	33.3	31.8	34.9
Obese	612	17.9	16.6	19.2	512	15.1	13.9	16.4
Self-perception of weight								
Fat	1,463	41.3	39.7	43.0	1,519	42.9	41.2	44.5
Correct weight	2,019	49.6	47.9	51.2	1,996	47.0	45.3	48.6
Thin	432	9.1	8.2	10.0	412	10.2	9.2	11.2
BEHAVIORS								
Smoking tobacco								
No	3,011	76.2	74.8	77.7	3,248	84.0	82.9	85.2
Yes	903	23.8	22.4	25.2	679	16.0	14.8	17.2
Smoking cannabis								
No	3,717	96.0	95.4	96.7	3,835	98.6	98.3	99.0
Yes	197	4.0	3.3	4.6	92	1.4	1.1	1.7
Internet use								
Non-user	1,165	32.7	31.4	34.0	1,161	36.5	35.3	37.7
Normal use	2,685	66.4	65.1	67.7	2,702	62.6	61.4	63.8
Hazardous or at-risk use	64	0.9	0.6	1.2	64	0.9	0.6	1.2
Gambling spending behaviour								
Non-gambler	1,568	35.4	33.8	37.0	2,131	47.8	46.2	49.5
Normal gambling	2,312	63.8	62.2	65.4	1,795	52.1	50.5	53.8
Probable pathological gambler	34	0.8	0.5	1.1	1	0.0	0.0	0.1

Table 2
Prevalence of alcohol use in the Galician population aged 16 years and over

	TOTAL				MEN				WOMEN			
	n	%	95% CI		n	%	95% CI		n	%	95% CI	
Never	3,132	41.4	40.3	42.5	1,105	27.2	25.8	28.7	2,027	54.3	52.6	55.9
Sporadic	1,428	16.4	15.6	17.3	639	14.9	13.7	16.0	789	17.9	16.6	19.1
Occasional	1,998	23.4	22.4	24.4	1,214	29.8	28.3	31.3	784	17.6	16.3	18.8
Daily	1,283	18.8	17.9	19.7	956	28.2	26.7	29.6	327	10.3	9.3	11.3

Figure 1
Prevalence of alcohol use (daily, sporadic and occasional) and daily consumption of alcohol by sex (men and women) and age group (16-24, 25-44, 45-64, 65 years and over) in the Galician population

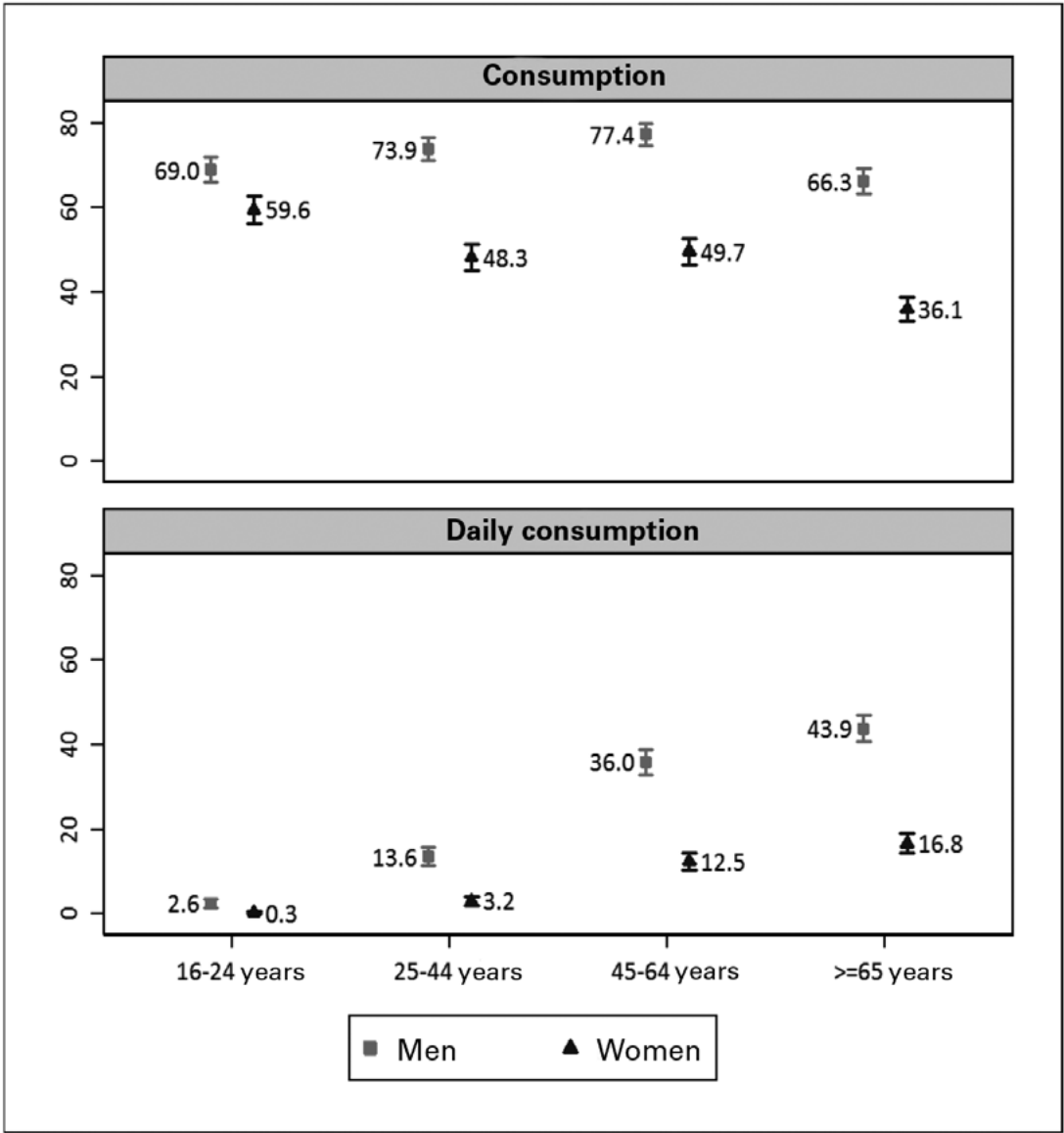
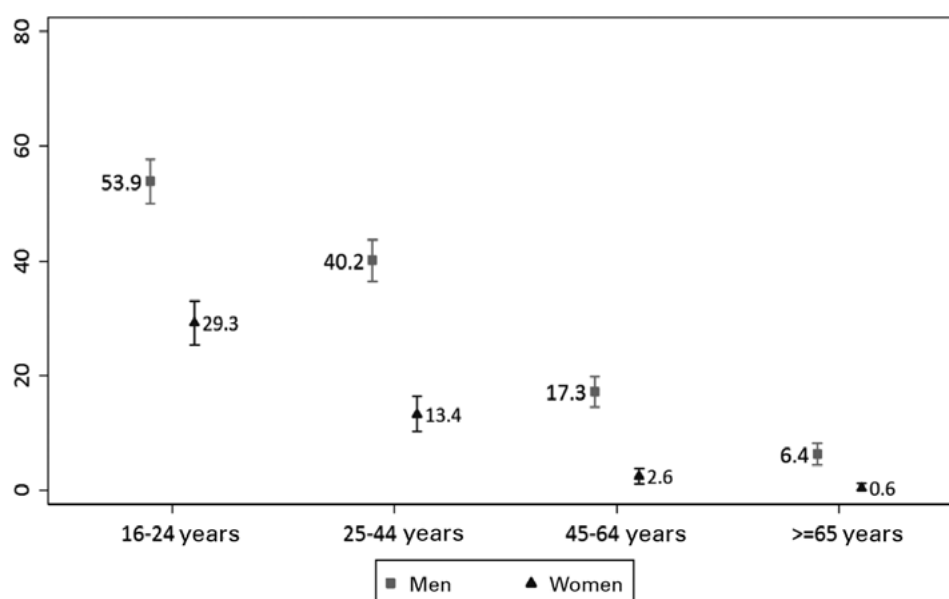


Table 3*Distribution of the number of beverages consumed by users on a given day*

	TOTAL				MEN				WOMEN			
	n	%	95% CI		n	%	95% CI		n	%	95% CI	
All users												
One or less	2,345	55.6	54.1	57.0	1,231	47.3	45.3	49.2	1,114	67.6	65.5	69.7
Two	1,504	30.9	29.5	32.3	975	35.6	33.7	37.5	529	24.1	22.1	26.1
Three or more	860	13.6	12.6	14.5	603	17.2	15.7	18.6	257	8.3	7.2	9.5
Sporadic												
One or less	794	63.8	61.1	66.5	331	58.2	54.0	62.4	463	68.0	64.5	71.4
Two	411	25.6	23.1	28.1	182	27.6	23.8	31.4	229	24.1	20.9	27.3
Three or more	223	10.7	9.0	12.3	126	14.2	11.4	17.0	97	8.0	6.1	9.8
Occasional												
One or less	814	47.7	45.3	50.1	431	40.5	37.5	43.5	383	58.7	55.0	62.5
Two	688	34.4	32.1	36.7	441	38.2	35.2	41.2	247	28.6	25.2	32.1
Three or more	496	17.9	16.2	19.7	342	21.4	19.0	23.7	154	12.6	10.3	15.0
Daily												
One or less	737	58.3	55.6	61.0	469	48.7	45.5	51.9	268	82.2	78.1	86.4
Two	405	31.1	28.5	33.6	352	37.0	33.9	40.1	53	16.2	12.2	20.3
Three or more	141	10.6	8.9	12.3	135	14.3	12.0	16.6	6	1.6	0.3	2.8

Figure 2*Prevalence of intense alcohol use, defined as drinking 6 or more alcoholic beverages on the same day, by sex (men and women) and age group (16-24, 25-44, 45-64, 65 years and over) in the Galician population***Table 4***Prevalence of hazardous drinking in the Galician population (in the population) and in the population of drinkers (in users) by age group (16-24, 25-44, 45-64, 65 years and over) in total, in men and women*

	TOTAL				MEN				WOMEN			
	n	%	95% CI		n	%	95% CI		n	%	95% CI	
In the population												
16-24	1,829	11.3	9.8	12.7	911	15.4	13.0	17.7	918	7.0	5.3	8.6
25-44	2,007	4.4	3.5	5.2	1,001	7.6	5.9	9.2	1,006	1.1	0.5	1.7
45-64	2,003	2.3	1.7	3.0	1,001	4.0	2.8	5.2	1,002	0.7	0.2	1.2
>=65	2,002	1.6	1.1	2.1	1,001	3.0	2.0	4.1	1,001	0.5	0.1	0.9
Total	7,841	3.4	3.0	3.8	3,914	5.8	5.1	6.6	3,927	1.2	0.9	1.5
In users												
16-24	1,176	17.5	15.3	19.7	629	22.3	19.0	25.5	547	11.7	9.0	14.4
25-44	1,236	7.1	5.7	8.6	742	10.3	8.1	12.5	494	2.3	0.9	3.6
45-64	1,273	3.6	2.6	4.7	775	5.2	3.6	6.7	498	1.4	0.4	2.4
>=65	1,024	3.2	2.2	4.3	663	4.5	3.0	6.1	361	1.4	0.2	2.6
Total	4,709	5.8	5.2	6.5	2,809	8.0	7.0	9.0	1,900	2.6	2.0	3.3

Figure 3
Characteristics associated with hazardous drinking in men

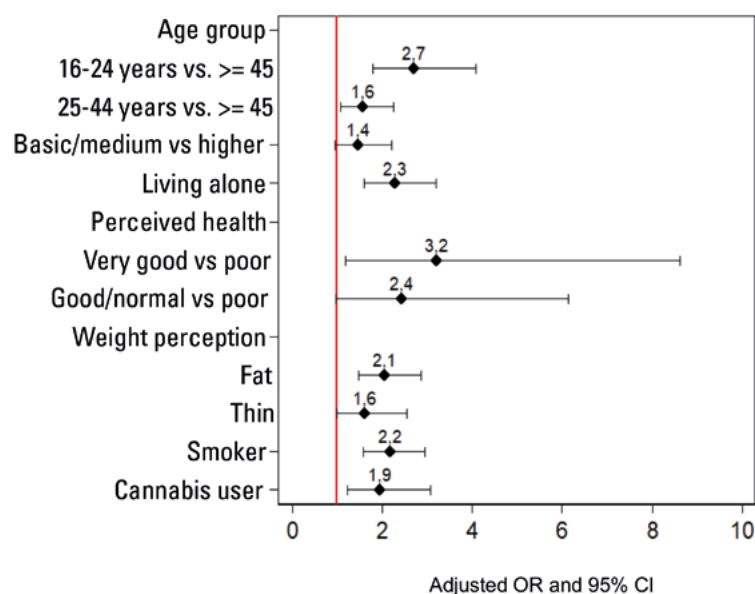
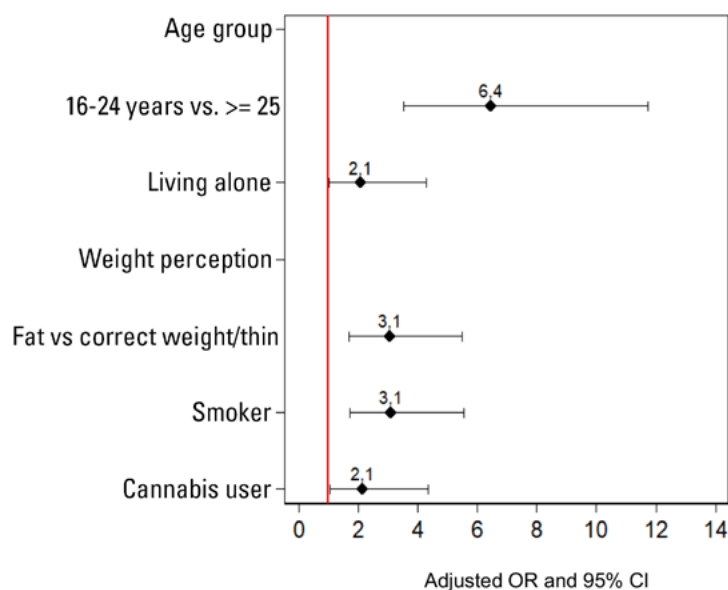


Figure 4
Characteristics associated with hazardous drinking in women



Discussion

There is a high prevalence of alcohol use in Galicia, with differences in consumption patterns by sex and age group. Men have higher prevalences than women, in all age groups and regardless of drinking pattern.

In general, the results obtained in this study are in line with the data published in the ENSE-2017 for the general Spanish population of comparable age. Both studies estimate similar prevalences and differences based on sex, with men consistently showing the highest prevalences. Differences by sex are consistent with those observed in other international studies, where the highest prevalences

are also found in men, although the level of difference varies depending on the country (World Health Organization, 2018). This variability may be explained by the influence of social and cultural factors in each country. In societies where there is a belief that women's drinking behaviour affects their social status have greater restrictions on alcohol use. On the other hand, in societies with growing gender equality, women are increasingly seen to adopt patterns of harmful behaviors that were traditionally common among men, such as alcohol use (Bosque-Prous et al., 2015; Galán, González & Valencia-Martín, 2014; White, 2020).

In relation to intensive alcohol use, also known as binge drinking, it is necessary to take into account the differences of definition across studies, both with reference to the number of alcoholic beverages ingested and the time frame. Nonetheless, the results of our study coincide with those of previous studies carried out in Spain, the United States or France, in identifying that intensive alcohol use occurs more frequently at the end of adolescence or the beginning of adult life and among men (Galán et al., 2020; Krieger, Young, Anthenien & Neighbors, 2018; Molina & Nelson, 2018; Rodríguez Muñoz, Carmona Torres, Hidalgo Lopezosa, Cobo Cuenca & Rodríguez Borrego, 2019; Soler-Vila et al., 2014; Tavalacci et al., 2016). Despite the fact that they drink alcohol less intensively than men, this type of drinking pattern is increasing among women, and differences between young men and young women are disappearing (Wilsnack, Wilsnack, Gmel & Kantor, 2018). One of the issues that may explain why younger people have higher intensive use of alcohol is the link shown between binge drinking and the “botellón” phenomenon, which can be described as groups of mostly young people getting together to drink alcohol in public outdoor spaces. In “botellón” a situation is created where factors such as peer pressure to drink alcohol, greater accessibility of cheaper drinks and the belief in positive effects, for example, that it will facilitate social relationships, can influence the practice of intensive drinking (Llamosas-Falcón, Manthey & Rehm, 2022; Teixidó-Compañó et al., 2019).

Hazardous drinking is a public health problem that has unequal effects on the world population (Carvalho et al., 2019). Spain is one of the European countries with the lowest prevalence (Carvalho et al., 2019), yet even so, it affects 5.6% of the population under 65 years of age (Observatorio Español de las Drogas y las Adicciones, 2021). In Galicia, this prevalence has been estimated at 3.4%, with greater prevalence observed, as in other studies, among men (Bosque-Prous et al., 2015). In addition, it is worrying that the age group with the highest prevalence of hazardous use in Galicia is between 16 and 24 years old, and that it is in this group where the prevalence ratio by sex is the lowest of those observed in the different age groups. In a study analyzing gender differences between European countries with regard to hazardous drinking, it was seen that this type of drinking is predominant among men and especially in Eastern European countries. However, it was observed that, in countries with greater gender equality, the differences in this type of pattern were smaller due to a higher prevalence of hazardous drinking in women (Bosque-Prous et al., 2015).

Few studies have analyzed the characteristics associated with hazardous alcohol use in the adult population based on sex. Our study has observed that Galician men and women with hazardous drinking present common characteristics in terms of age, living with a partner, weight perception and

addictive behaviors linked to tobacco and cannabis use. However, educational level, a variable linked to hazardous drinking by other authors, seems to be a factor only in men.

In line with a previous study, it was observed that young men and women are more prone to hazardous alcohol use (Skinner & Veilleux, 2016). Being aged between 16 and 24 years was the biggest factor for hazardous use in women. As in other studies, we observed that risk behaviors are related to one another; hence the probability of hazardous drinking is higher among tobacco or cannabis smokers (Berge, Håkansson & Berglund, 2014; Bosque-Prous et al., 2017; Park & Kim, 2019), especially among women. In our study, the probability of hazardous drinking rises among people who live without a partner. Previous studies have identified this relationship in men (Bosque-Prous et al., 2017; Park et al., 2019), while there are discrepancies with regard to women (Bosque-Prous et al., 2017; Teixidó-Compañó et al., 2018). While educational level is a variable traditionally related to hazardous alcohol use (Bosque-Prous et al., 2017; Park et al., 2019; Teixidó-Compañó et al., 2018), the relationship observed between educational level and hazardous drinking differs between men and women. In men, this pattern is associated with a low level of education, but this link has not been firmly established in women, with some authors pointing to a relationship between hazardous use and higher levels of education (Bosque-Prous et al., 2017; Devaux & Sassi, 2016; Park et al. 2019). In our work, as in a further study carried out in Spain (Teixidó-Compañó et al., 2018), no relationship was found between educational level and hazardous drinking in women.

To our knowledge, this is the first time that the influence of self-perception of weight has been assessed in relation to hazardous alcohol use. Both men and women who perceive themselves as “fat” are more prone to hazardous alcohol use. With men, thinking of themselves as “thin” also increases the likelihood of hazardous use, while in women it decreases it. In relation to self-perceived health status, previous results had already shown that, among men, perceiving their health status as good or very good increases the probability of hazardous alcohol use (Bosque-Prous et al., 2017).

The most notable limitation of this study is the telephone self-report of alcohol use as it does not allow detailed measurement of the units of drink consumed by the population. Self-reporting of behaviors with negative social connotations is prone to social desirability bias, leading to concealment of the behavior and therefore an underestimation of the real prevalence of use. In this case, such bias could especially affect the prevalence of hazardous drinking, so the estimates presented here should be read with caution (Staudt et al., 2019; Valencia-Martín, González & Galán, 2014). The greatest strength of the study is its sample size, making it possible to carry out a detailed analysis of the type of alcohol use at the

autonomous community level with representative data by sex and age group, something that surveys carried out at national level are unable to perform. Another of the strengths is that the sample is evenly distributed across the 12 months of the year, thus avoiding the influence of seasonality on alcohol use.

This study substantiates the reality of alcohol use among Galician adults, estimating high prevalences of a behavior that entails health risks and has consequences at personal, family, work and social levels. Preventive actions by the health system should be prioritized and aimed at all levels, whether primary, secondary and tertiary prevention. At the same time, it is important to continue monitoring alcohol use to detect changes in patterns, behaviors and trends in the population.

Conflict of interests

All authors declare no conflicts of interest.

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ORIGINAL

Learning and verbal memory: A comparison between patients with alcohol use disorder and major depressive disorder

Aprendizaje y memoria verbal: Comparación entre pacientes con trastorno por consumo de alcohol y trastorno de depresión mayor

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Abstract

Brain damage related to alcohol consumption is associated with impairments in cognitive functions, among which memory and verbal learning stand out. The main objective is to evaluate memory and verbal learning in a sample of 111 patients with alcohol use disorder (AUD) versus 78 with major depressive disorder (MDD) and 100 healthy controls. The evaluation included sociodemographic and clinical variables, the Hamilton Depression Scale (HDRS) and the California Verbal Learning Test (CVLT). One-way ANOVA was used for comparisons between the 3 groups and two-way ANCOVAs including different covariates. The one-way ANOVA shows that patients with AUD and MDD had scores similar to each other and lower than those of the control group ($p < 0.001$), with the exception of the Cued CVLT (worse scores in MDD vs AUD, $p < 0.001$). After including age, sex and years of completed studies as covariates, the differences between the AUD and MDD groups persisted compared to the control group ($p \leq 0.003$) in all indices except for the Immediate Free CVLT and the Cued CVLT (worse performance in MDD vs AUD, $p = 0.022$ and $p = 0.035$, respectively). In the second ANCOVA, after controlling for depression severity, differences were only detected between AUD patients and healthy controls ($p \leq 0.007$). Patients with AUD present a significant impairment in learning and verbal memory when compared with patients with MDD and with healthy people.

Keywords: alcohol use disorder, California Verbal Learning Test, major depressive disorder, verbal learning, verbal memory

Resumen

El daño cerebral relacionado con el consumo de alcohol se asocia a alteraciones de las funciones cognitivas, entre las que destacan memoria y aprendizaje verbal. El objetivo principal es evaluar memoria y aprendizaje verbal en una muestra de 111 pacientes con trastorno por consumo de alcohol (TCA) versus 78 con trastorno de depresión mayor (TDM) y 100 controles sanos. La evaluación incluyó variables sociodemográficas y clínicas, la Escala de Hamilton para la Depresión (HDRS) y el Test de Aprendizaje Verbal de California (CVLT). Se utilizó ANOVA de un factor para comparaciones entre los 3 grupos y ANCOVAS bidireccionales incluyendo diferentes covariables. El ANOVA de un factor muestra que los pacientes con TCA y TDM obtienen puntuaciones similares entre sí e inferiores a las del grupo control ($p < 0,001$), con excepción del CVLT Guiado (peores puntuaciones en TDM vs TCA, $p < 0,001$). Tras incluir como covariables la edad, sexo y los años de estudios completados, persisten las diferencias entre los grupos de TCA y TDM frente al grupo control ($p \leq 0,003$) en todos los índices con excepción del CVLT Libre Inmediato y del CVLT Guiado (peor rendimiento en TDM vs TCA, $p = 0,022$ y $p = 0,035$, respectivamente). En el segundo ANCOVA, tras controlar por gravedad de la depresión, únicamente se detectan diferencias entre los pacientes con TCA y los controles sanos ($p \leq 0,007$). Los pacientes con TCA presentan una importante alteración en aprendizaje y memoria verbal al compararlos con pacientes con TDM y con personas sanas.

Palabras clave: aprendizaje verbal, California Verbal Learning Test, memoria verbal, trastorno de depresión mayor, trastorno por consumo de alcohol

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Most studies in patients with mental disorders in general and with substance use disorder in particular focus on psychopathological aspects. However, little attention has been paid to the cognitive deficits linked to such disorders, despite their importance and the impact they have on patients' quality of life and their social and professional integration (Millan et al., 2012).

There is ample evidence that prolonged and excessive alcohol use can cause structural and functional brain damage (Crowe, Cammisuli & Stranks, 2019; Le Berre, Fama & Sullivan, 2017; Stavro, Pelletier & Potvin, 2013; Toledo-Nunes, Kipp, Reitz & Savage, 2019) with potential effects ranging from subtle impairments to more serious and lasting cognitive disorders such as dementia (Brust, 2010; Hayes, Demirkol, Ridley, Withall & Draper, 2016; Svanberg & Evans, 2013; Toledo-Nunes et al., 2019). Such brain dysfunction linked to alcohol is caused by two toxic mechanisms acting in combination (Moretti, Caruso, Dal Ben, Gazzin & Tiribelli, 2017). On the one hand, the direct neurotoxic effect of ethanol (Stavro et al., 2013; Wollenweber et al., 2014) and, on the other hand, that associated with thiamine deficiency that gives rise to Wernicke/Korsakoff Syndrome, the core symptom of which is serious memory disorder (Kuzma, Llewellyn, Langa, Wallace & Lang, 2014; Maharasingam, Macniven & Mason, 2013; Sachdeva, Chandra, Choudhary, Dayal & Anand, 2016). Moreover, the belief that moderate alcohol consumption has a neuroprotective effect has recently been called into question, with evidence of harm in moderate drinkers compared to abstainers (Topiwala et al., 2017).

It should be noted that brain damage related to drinking alcohol is a frequently underdiagnosed health problem (Sachdeva et al., 2016; Hayes et al., 2016), one that is associated with impairment in the following cognitive functions: attention, processing speed, visuospatial tasks, anterograde memory, working memory and executive function (verbal fluency, resistance to interference, abstract reasoning and cognitive flexibility) (Erdozain et al., 2014; Spear, 2018; Stavro et al., 2013; Villa et al., 2021).

The degree of deterioration is influenced not only by the amount of alcohol but also by the drinking pattern (Florez, Espandian, Villa & Saiz, 2019; Hayes et al., 2016). It is noteworthy, for example, that binge drinking can produce more intense neuronal effects in the hippocampus, hypothalamus and cerebellum, which would interfere with learning and memory capacity (Ridley, Draper & Withall, 2013).

Similarly, cognitive dysfunction in major depression disorder (MDD) affects different domains, including, among others, executive function, verbal memory and attention (Bortolato et al., 2016; Fossatti, Coyette, Ergis & Allilaire, 2002; Marazziti, Consoli, Picchetti, Carlini & Faravelli, 2010; Roca, Vives, López-Navarro, García-Campayo & Gili,

2015). Previous studies suggest that cognitive impairment in MDD may be an independent symptom domain, rather than an epiphenomenon of mood-related symptoms (Gregory et al., 2020; Rock, Roiser, Riedel & Blackwell, 2014). The deterioration of memory and verbal learning that is found both in patients with unipolar and bipolar depression, is usually interpreted as a reflection of the inability to transfer information from short-term storage to long-term storage (Marazziti et al., 2010).

Previous data in patients with alcohol use disorder (AUD) has shown impairment in the different indices of the California Verbal Learning Test (CVLT) (Ros-Cucurull et al., 2018; Van Geldorp, Bergman, Robertson, Wester & Kessels, 2012; Villa et al., 2021; Villa et al., 2022; Wester, Roelofs, Egger & Kessels, 2014). Although some studies have analyzed cognitive function in alcohol and depression comorbidity (Hunt, Baker, Michie, & Kavanagh, 2009; Hunt, Kay-Lambkin, Baker & Michie, 2015; Lee et al., 2015), there is no research to date comparing memory and verbal learning impairment in patients with AUD compared to patients with MDD and healthy controls, which represents the main innovation of this study.

The main objective of the present study is to evaluate memory and verbal learning in a sample of AUD patients compared to MDD patients and healthy controls. Based on the literature, our working hypothesis is that patients with AUD disorders will present a greater degree of deterioration in these functions than the rest of the sample (MDD and healthy controls).

Material and methods

Participants

The final sample comprised 111 patients with active AUD (DSM-5 criteria) (American Psychiatric Association, 2013) at the time of recruitment, 78 patients with MDD (DSM-5 criteria) (American Psychiatric Association, 2013) and 100 healthy controls. Participants with AUD were recruited from three health facilities: the La Calzada mental health centre in Gijón, the addictive behaviours unit of the psychiatry department at the Ourense Hospital Complex, and the Institute of Neuropsychiatry and Addictions, Parc de Salut Mar, in Barcelona. Patients with an MDD diagnosis were recruited at the Mental Health Centre II, La Corredoria, in Oviedo.

The AUD patients met DSM-5 criteria for moderate or severe alcohol use disorder, quantified as active consumption of > 60 grams of ethanol/day in men and > 40 grams of ethanol/day in women over the past month, and expressed a clear desire to control their drinking. Noteworthy among the inclusion criteria for patients with AUD was having no previous history of depressive episodes and scoring < 5 on the 17-item Hamilton Depression Scale (HDRS) (Hamilton, 1960). The main inclusion criterion for the

group of patients with MDD was a score of ≥ 15 points on the HDRS scale, while key exclusion criteria for both groups of patients (AUD and MDD) were comorbidity with another psychiatric disorder according to DSM-5 criteria, (except tobacco use disorder), intellectual disability or any serious physical illness.

The control group included people with no current or past history of mental disorder and no family history of AUD or MDD. In addition, it was required that alcohol consumption did not exceed 30 grams of ethanol/day during the previous month.

All study participants were aged over 18 years, agreed to participate in the study and signed the corresponding informed consent. The study was approved by the following Research Ethics Committees: Pontevedra - Vigo - Ourense (2016-313), Principado de Asturias (61/14, 06/17 and 142/19) and Parc de Salut Mar (2017-7221 -I) and was developed in line with the ethical and legal regulations on the protection of personal data and studies with humans, complying with the Declaration of Helsinki guidelines (World Medical Association General Assembly, 2013).

Assessment instruments

An ad-hoc questionnaire (sociodemographic and clinical variables) and the Spanish version of the HDRS scale (Hamilton, 1960; validation in Spanish by Bobes et al., 2003) were used for the purposes of assessing the sample. Finally, the California Verbal Learning Test (CVLT) (Delis, Kramer, Kaplan & Ober, 1987) was used to measure different indices of verbal memory such as encoding, free and cued recall, and recognition presented orally. For this purpose, the examiner reads a list of 16 nouns aloud (List A), at one second intervals, in fixed order, during five learning trials, with the sum of the correct answers forming the CVLT Total Attempts score. Next, a list of interferences is presented (List B) and subjects are asked if they remember List A (CVLT Immediate Free Recall). After 20 minutes, subjects were asked to remember as many words as possible (CVLT Delayed Recall), after which the examiner gave semantic signals or clues (CVLT Cued Recall). Finally, a recognition test was presented in which the participants had to discriminate the List A words from the distractors (CVLT Recognition).

Data analysis

Data were analyzed using the SPSS 24.0 statistical package (SPSS, Armonk, NY: IBM Corp.). Data are presented using means (M) and standard deviations (SD) for numerical variables and frequencies and percentages for categorical variables.

The chi-square test (χ^2) was used for categorical variables, with Fisher's exact test used to establish statistically different groups, provided that the degrees of freedom (df) were greater than 1, and the analysis of variance was carried

out with a one-factor ANOVA with post hoc Bonferroni correction to make the comparison of numerical variables across the 3 groups. Subsequently, two bidirectional analyses of covariance (ANCOVA) were carried out. Fixed factors in the first of the ANCOVAs were sample group membership and gender, and covariates were those variables shown in the literature as influencing the results of the different CVLT indices, age and completed years of education. In the second ANCOVA, depression severity according to the HDRS was added as another covariate. The level of statistical significance established in all cases was $\alpha = 0.05$ (2 tails).

Results

The total sample was made up of 289 individuals, 111 of whom had an AUD diagnosis [mean age (SD)= 49.07 (8.41); males: $n = 87$ (78.4%)], 78 with MDD [mean age (SD) = 52.28 (10.63); males: $n = 32$ (41.0%)] and 100 healthy controls [mean age (SD) = 48.66 (9.57); males: $n = 74$ (74.0%)]. The main sociodemographic characteristics of the sample are summarized in Table 1. Key results in the group of patients with AUD were 15.45 (9.92) mean years (SD) of dependence and consumption of 9.61 (6.43) SDUs/day in the previous month. Meanwhile, in patients with MDD, mean severity (SD) of depression measured with the HDRS was 21.03 (4.09), in line with the clinical picture of major depression according to the Bech (1996) criteria. The corresponding analysis based independently on sex in each of the groups studied, found no statistically significant differences between men and women in the different sociodemographic and clinical variables included in the study.

To compare the results obtained in the different CVLT indices across the three study groups, an exploratory ANOVA was first carried out. This revealed that the scores obtained by AUD and MDD groups were similar to each other and statistically lower than those of the group of healthy controls ($p < 0.001$) with the exception of the scores obtained in the CVLT Cued index, in which all groups were different from each other and the patients with MDD were those who obtained the lowest scores ($p < 0.001$) (see table 2). Two consecutive ANCOVAs were subsequently performed, with the first considering sample group membership and sex as fixed factors, and age and completed years of education as covariates, and the second adding severity of depression according to HDRS as a new covariate (Table 2). After the first ANCOVA, it can be observed that the differences in the scores obtained between the AUD and MDD groups persisted as compared to the control group ($p \leq 0.003$) in all indices except for CVLT Immediate Free and CVLT Cued, in which there were also differences between the scores obtained by patients with AUD and MDD ($p = 0.022$ and $p = 0.035$, respectively)

Table 1
Sociodemographic and clinical variables of the study groups

	Alcohol ¹ (n = 111)	Depression ² (n = 78)	Controls ³ (n = 100)	X ² (df) / F (df)	p
Sex [n (%)]					
Male	87 (78.4%)	32 (41.0%)	74 (74.0%)	32.403 (2)*	< 0.001 (1 y 3 ≠ 2)***
Age [M (SD)]	49.07 (8.41)	52.28 (10.63)	48.66 (9.57)	3.749 (288)**	0.035 (2 ≠ 3)****
Marital status [n (%)]					< 0.001
Single	28 (25.2%)	2 (2.6%)	27 (27.0%)	28.960 (6)*	< 0.001 (1 y 3 ≠ 2)***
Married / partner	46 (41.4%)	52 (66.7%)	56 (56.0%)		≤ 0.039 (1 ≠ 2 y 3)***
Separated / divorced	33 (29.7%)	19 (24.4%)	15 (15.0%)		0.032 (1 ≠ 3)***
Widowed	4 (3.6%)	5 (6.4%)	2 (2.0%)		NS
Completed years of study [M (SD)]	13.30 (2.88)	13.32 (4.76)	12.76 (2.42)	0.865 (288)**	0.422
HDRS [M (SD)]	1.97 (2.02)	21.03 (4.09)	1.22 (1.76)	1505.96 (288)**	< 0.001 (1 y 3 ≠ 2)****
Age of dependence onset [M (SD)]	33.62 (9.15)	–	–	–	–
Years of dependence [M (SD)]	15.45 (9.92)	–	–	–	–
SDUs/day(previous month) [M (SD)]	9.61 (6.43)	–	–	–	–

Note. *Chi-squared; **Analysis of variance; ***Statistically different groups after Fisher exact test; ****Statistically significant groups after post-hoc Bonferroni correction; df = degrees of freedom; M = mean; SD = standard deviation; HDRS = Hamilton Depression Rating Scale; SDU = standard drink unit; NS = not significant.

Table 2
Means, adjusted means, standard deviations and standard errors for the different indices of the California Verbal Learning Test in the different groups

	Alcohol ¹ (n = 111)	Depression ² (n = 78)	Controls ³ (n = 100)	F (df)	p (****)
CVLT Total Attempts [M (SD)]	45.76 (11.61)	45.56 (12.16)	53.20 (9.80)	14.826 (2. 286)***	< 0.001 (1 y 2 ≠ 3)
CVLT Total Attempts [Madjusted (SE)]*	47.84 (1.19)	45.62 (1.21)	54.42 (1.19)	14.599 (2. 281)****	< 0.001 (1 y 2 ≠ 3)
CVLT Total Attempts [Madjusted (SE)]**	46.16 (1.64)	50.56 (3.52)	52.44 (1.78)	7.149 (2. 280)****	0.001 (1 ≠ 3)
CVLT Immediate Free [M (SD)]	9.77 (3.32)	9.08 (3.41)	12.31 (2.82)	26.838 (2. 286)***	< 0.001 (1 y 2 ≠ 3)
CVLT Immediate Free [Madjusted (SE)]*	10.40 (0.34)	9.09 (0.34)	12.70 (0.34)	28.451 (2.281)****	< 0.001 (1 y 2 ≠ 3) 0.022 (1 ≠ 2)
CVLT Immediate Free [Madjusted (SE)]**	10.19 (0.47)	9.70 (1.01)	12.45 (0.51)	11.155 (2. 280)****	< 0.001 (1 ≠ 3)
CVLT Delayed Free [M (SD)]	10.32 (3.35)	9.56 (3.37)	12.98 (2.90)	29.394 (2. 286)***	< 0.001 (1 y 2 ≠ 3)
CVLT Delayed Free [Madjusted (SE)]*	10.79 (0.35)	9.67 (0.36)	13.25 (0.35)	26.575 (2. 281)****	< 0.001 (1 y 2 ≠ 3)
CVLT Delayed Free [Madjusted (SE)]**	10.39 (0.49)	10.87 (1.05)	12.78 (0.53)	11.341 (2. 280)****	< 0.001 (1 ≠ 3)
CVLT Cued [M (SD)]	11.42 (2.83)	10.56 (2.99)	13.64 (2.70)	29.171 (2. 286)***	< 0.001 (1 ≠ 2 ≠ 3)
CVLT Cued [M (SE)]*	11.75 (0.32)	10.64 (0.32)	13.87 (0.32)	26.911 (2. 281)****	< 0.001 (1 y 2 ≠ 3) 0.035 (1 ≠ 2)
CVLT Cued [M (SE)]**	11.62 (0.44)	10.99 (0.94)	13.71 (0.47)	11.088 (2. 280)****	< 0.001 (1 ≠ 3)
CVLT Recognition [M (SD)]	14.20 (2.12)	13.94 (2.37)	15.34 (1.08)	14.502 (2. 286)***	< 0.001 (1 y 2 ≠ 3)
CVLT Recognition [M (SE)]*	14.37 (0.22)	13.89 (0.22)	15.40 (0.22)	12.351 (2. 281)****	0.003 (1 ≠ 3) < 0.001 (2 ≠ 3)
CVLT Recognition [M (SE)]**	13.94 (0.30)	15.16 (0.64)	14.89 (0.32)	5.495 (2. 280)****	0.007 (1 ≠ 3)

Note. *Covariates: age and completed years of education; **Covariates: age, completed years of education and score on Hamilton Depression Rating Scale (HDRS); ***Analysis of variance; ****Analysis of covariance; *****Statistically significant groups after post-hoc Bonferroni correction; CVLT = California Verbal Learning Test; M = mean; SD = standard deviation; df = degrees of freedom; SE = standard error.

(Table 2). It should be noted that women obtained statistically higher scores than men in all indices and in all groups ($p \leq 0.017$) (Table 3). A statistically significant interaction between sex and group was not observed in any of the indices after controlling for age and completed years of education [CVLT Total Attempts: $F(2, 281) = 0.569$, $p = 0.567$, partial $\eta^2 = 0.004$; CVLT Immediate Free: $F(2,$

281) = 0.252, $p = 0.777$, partial $\eta^2 = 0.002$; CVLT Delayed Free: $F(2, 281) = 0.617$, $p = 0.540$, partial $\eta^2 = 0.004$; CVLT Cued: $F(2, 281) = 0.224$, $p = 0.800$, partial $\eta^2 = 0.002$; CVLT Recognition: $F(2, 281) = 0.467$, $p = 0.628$, partial $\eta^2 = 0.003$] (Table 3).

As mentioned above, the second of the ANCOVAs carried out also included the total score on the HDRS scale

Table 3

Means, adjusted means, standard deviations and standard errors for the different indices of the California Verbal Learning Test in the different groups by sex

	Men			Women			Effect (p)	
	Alcohol ¹ (n = 87)	Depression ² (n = 32)	Controls ³ (n = 74)	Alcohol ¹ (n = 24)	Depression ² (n = 46)	Controls ³ (n = 26)	Sex	Grupo*sexo Interaction
CVLT Total Attempts [M (SD)]	43.99 (10.95)	41.41 (8.41)	51.96 (9.94)	52.17 (11.90)	48.46 (13.55)	56.73 (8.54)	-	-
CVLT Total Attempts [Madjusted (SE)]*	43.66 (1.11)	43.07 (1.86)	51.71 (1.21)	52.03 (2.12)	48.18 (1.53)	57.12 (2.04)	< 0.001	0.567
CVLT Total Attempts [Madjusted (SE)]**	41.96 (1.59)	48.23 (3.92)	49.80 (1.76)	50.36 (2.39)	52.89 (3.51)	55.09 (2.45)	< 0.001	0.497
CVLT Immediate Free [M (SD)]	9.24 (3.25)	7.72 (3.29)	11.85 (2.93)	11.71 (2.85)	10.02 (3.21)	13.62 (2.02)	-	-
CVLT Immediate Free [Madjusted (SE)]*	9.18 (0.32)	8.17 (0.53)	11.76 (0.34)	11.63 (0.60)	10.02 (0.44)	13.63 (0.58)	< 0.001	0.777
CVLT Immediate Free [Madjusted (SE)]**	8.97 (0.45)	8.81 (1.12)	11.52 (0.50)	11.42 (0.68)	10.60 (1.00)	13.38 (0.70)	< 0.001	0.751
CVLT Delayed Free [M (SD)]	9.90 (3.27)	8.84 (3.23)	12.64 (2.98)	11.83 (3.25)	10.07 (3.40)	13.96 (2.44)	-	-
CVLT Delayed Free [Madjusted (SE)]*	9.84 (0.33)	9.27 (0.55)	12.54 (0.36)	11.75 (0.63)	10.07 (0.46)	13.97 (0.60)	0.001	0.540
CVLT Delayed Free [Madjusted (SE)]**	9.43 (0.47)	10.52 (1.17)	12.08 (0.52)	11.35 (0.71)	11.21 (1.04)	13.47 (0.73)	0.001	0.474
CVLT Cued [M (SD)]	11.14 (2.83)	9.94 (2.85)	13.39 (2.83)	12.46 (2.62)	11.00 (3.03)	14.35 (2.15)	-	-
CVLT Cued [M (SE)]*	11.09 (0.30)	10.24 (0.50)	13.34 (0.32)	12.42 (0.56)	10.97 (0.41)	14.39 (0.54)	0.005	0.800
CVLT Cued [M (SE)]**	10.95 (0.42)	10.64 (1.05)	13.19 (0.47)	12.29 (0.64)	11.33 (0.94)	14.23 (0.65)	0.006	0.780
CVLT Recognition [M (SD)]	14.06 (2.16)	13.38 (2.87)	15.27 (1.16)	14.71 (1.92)	14.33 (1.87)	15.54 (0.76)	-	-
CVLT Recognition [M (SE)]*	14.05 (0.20)	13.45 (0.34)	15.25 (0.22)	14.69 (0.39)	14.33 (0.28)	15.54 (0.37)	0.017	0.628
CVLT Recognition [M (SE)]**	13.61 (0.29)	14.78 (0.72)	14.76 (0.32)	14.27 (0.44)	15.54 (0.64)	15.02 (0.45)	0.027	0.682

Note. *Covariates: age and completed years of education; **Covariates: age, completed years of education and score on Hamilton Depression Rating Scale (HDRS); CVLT = California Verbal Learning Test; M = mean; SD = standard deviation; SE = standard error.

as a covariate. Figure 1 shows that for all indices, women obtained significantly higher scores than men, regardless of the group to which they belong (CVLT Total Attempts: $p < 0.001$; CVLT Immediate Free: $p < 0.001$; CVLT Delayed Free: $p = 0.001$; CVLT Cued: $p = 0.006$; CVLT Recognition: $p = 0.027$) (Table 3). Table 2 shows how after controlling for the depression severity, statistically significant differences were only detected between the group of patients with AUD and healthy controls ($p \leq 0.007$). Finally, it should be noted that there was no statistically significant interaction between sex and group for any of the indices after the corresponding controls for age, completed years of education and HDRS score [CVLT Total Attempts: $F(2, 280) = 0.702$, $p = 0.497$, partial $\eta^2 = 0.005$; CVLT Immediate Free: $F(2, 280) = 0.286$, $p = 0.751$, partial $\eta^2 = 0.002$; CVLT Delayed Free: $F(2, 280) = 0.748$, $p = 0.474$, partial $\eta^2 = 0.005$; CVLT Cued: $F(2, 280) = 0.249$, $p = 0.780$, partial $\eta^2 = 0.002$; CVLT Recognition: $F(2, 280) = 0.384$, $p = 0.682$, partial $\eta^2 = 0.003$] (Table 3).

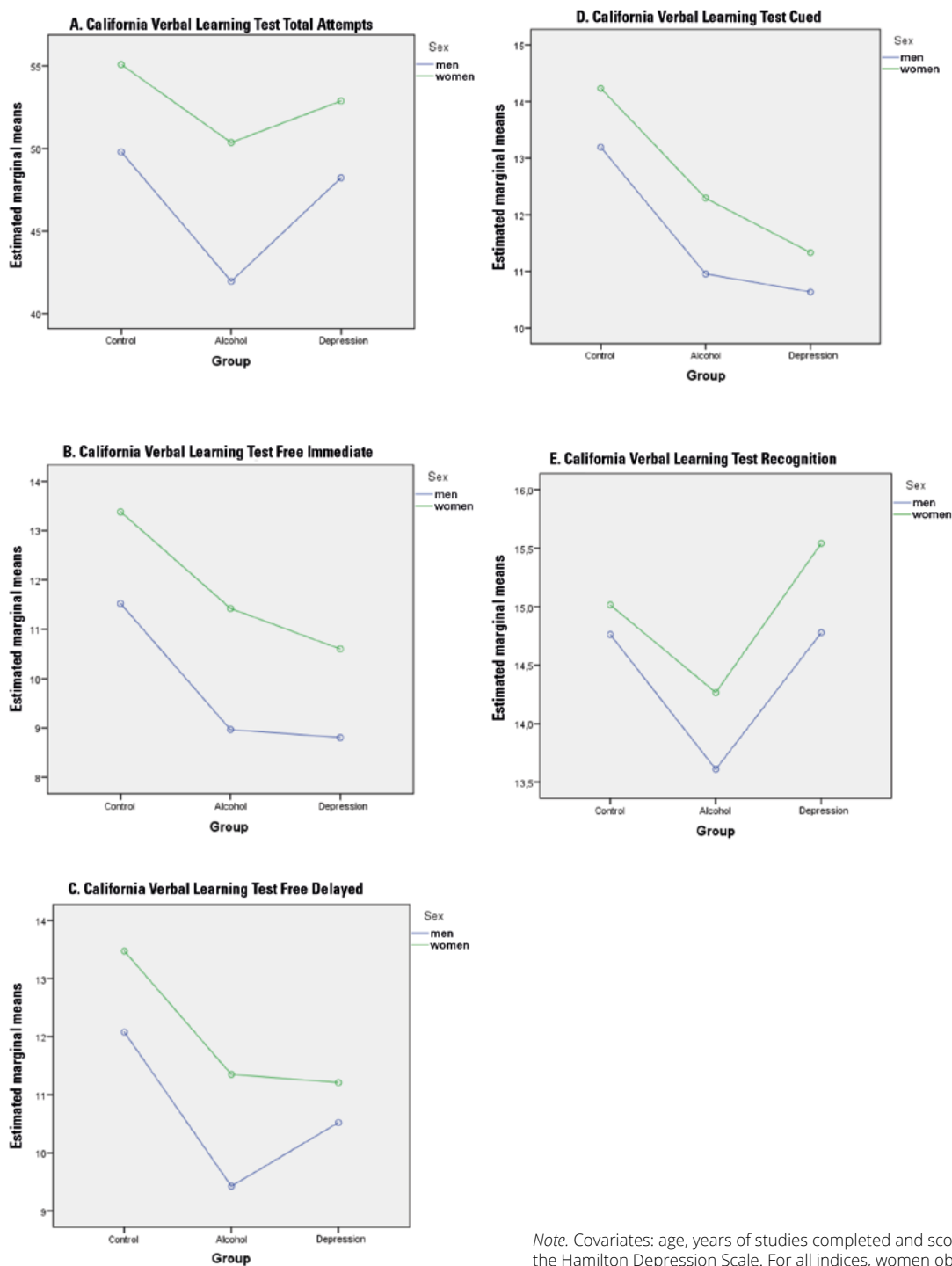
Discussion

The main objective of this study was to compare the verbal memory performance of patients with AUD and MDD and healthy controls using the CVLT. As might be expected, patients with AUD or MDD performed worse than healthy controls in all indices assessed in this test.

Initial exploratory analysis shows that the impairment in learning, immediate recall and delayed recall was similar in patients with AUD and MDD, with significantly lower scores in both cases than those detected in healthy people. These data coincide with those reported in previous studies comparing patients with AUD versus healthy controls (Ros-Cucurull et al., 2018; Stavro et al., 2013; Van Geldorp et al., 2012; Villa et al., 2021; Villa et al., 2022; Wester et al., 2014) and MDD patients versus healthy controls (Lee, Hermens, Porter & Redoblado-Hodge, 2012; Marazziti et al., 2010; Mesholam-Gately et al., 2012; Roca et al., 2015). Furthermore, patients with MDD obtained worse scores in the cued free recall index, that is, in the index in which categorical clues are provided to facilitate recall. Various authors argue that the results obtained in the CVLT may be mediated by executive functioning (Mesholam-Gately et al., 2012; Moreira, Santos, Sousa & Costa, 2015). It could be hypothesized that recall guided by categorical clues would require frontal intervention for the semantic association that favours recall and this could be behind the poorer performance in MDD patients, since notable impairment of executive function has been described in depression (Nuño, Gómez-Benito, Carmona & Pino, 2021; Rock et al., 2014). However, it should be noted that other authors have not found significant differences in delayed cued recall between patients with MDD and healthy controls (Fossatti, Deweer, Raoux & Allilaire, 1995).

Figure 1

Adjusted means for the different indices of the California Verbal Learning Test by sex and group membership



Note. Covariates: age, years of studies completed and score on the Hamilton Depression Scale. For all indices, women obtained significantly higher scores ($p \leq 0.027$), regardless of group membership.

After controlling for confounding factors in the subsequent ANCOVA analysis, it can be observed that the performances in recent memory and recognition continue to be similar and significantly lower in patients with AUD and MDD compared to healthy controls, with the exception

of worse performance in immediate free recall and in cued recall in patients with MDD (versus AUD and controls). Previous data have shown that depressed patients have difficulties with immediate free verbal memory tasks (Fossatti et al., 1995), and there is broad agreement that they may

be secondary to other dysfunctions, such as attention deficit, cognitive interference from pessimistic ruminative thoughts, the lack of motivation, as well as the difficulty of maintaining sustained effort (Marazziti et al., 2010; Millan et al., 2012).

This first analysis shows that MDD patients had persistently greater difficulty in cued recall, with the implication that recall facilitated by clues is not influenced by the confounding factors taken into account (age, sex and/or educational level).

Furthermore, it is interesting to note that, in all groups (AUD, MDD and healthy controls) and in all test indices, women performed better than men. A statistically significant interaction between sex and group was not observed in any of the indices after the corresponding control for age and completed years of education. Previous studies have highlighted that women outperform men in learning and verbal recall in all age ranges using the CVLT, which is consistent with the hypothesis linking oestrogen level and verbal memory performance (Kramer et al., 2019; Lundervold, Wollschläger & Wehling, 2014).

After controlling for the severity of depression, statistically significant differences were only detected between the group of AUD patients and healthy controls. In our sample, therefore, depression severity stands out as a determining factor in the impairment of verbal memory in patients with MDD. Our data confirm earlier findings that the severity of depression is associated with a deficit in verbal learning and memory in depressed patients (Lee et al., 2015; Marazziti et al., 2010; McDermott & Ebmeier, 2009). Moreover, the initial working hypothesis was confirmed since AUD patients presented a greater degree of deterioration in all CVLT test indices when compared to MDD patients and healthy controls. Previous studies have shown that AUD patients seeking treatment present clear cognitive impairment which includes executive dysfunction and memory deficits (Oscar-Berman et al., 2014; Stavro et al., 2013; Sullivan, Rosenbloom, Lim & Pfefferbaum, 2000). Alcohol abuse damages brain tissue causing a marked generalized brain atrophy, as well as specific damage in the areas responsible for learning and memory (Ridley et al., 2013; Stavro et al., 2013; Zahr & Pfefferbaum, 2017). In patients with AUD there are deficits in the coding and verbal retrieval processes (Bernardin, Maheut-Bosser & Paille, 2014; Noël et al., 2001; Pitel et al., 2007) and the learning of verbal and non-verbal information may be affected (Kopera et al., 2012). Our results confirm what has been previously described regarding the impairment of verbal memory in AUD (Ros-Cucurull et al., 2018; Van Geldorp et al., 2012; Villa et al., 2021; Villa et al., 2022; Wester et al., 2014). However, it should be noted that the studies carried out to date compare AUD with healthy controls, without including another group of patients classically associated with significant impairment in cognition, such as patients with MDD. Our results are therefore more relevant both

at clinical and therapeutic levels. Memory and executive functioning are cognitive domains closely linked to treatment outcomes and maintenance of abstinence (Bates, Buckman & Nguyen, 2013). Dysfunction in learning and memory could interfere with the adequate assimilation of psychotherapeutic interventions, potentially reducing their effectiveness, and making it difficult to achieve the goal of quitting alcohol (Bates et al., 2013; Florez et al., 2019; Sachdeva et al., 2016). It should be noted that, although some studies have reported data that could be promising in the improvement of such cognitive dysfunction, using both psychopharmacological approaches (Bell, Pittman, Petrakis & Yoon, 2021; Sachdeva et al., 2016) as well as psychotherapeutics (Frias-Torres et al., 2018; Hayes et al., 2016; Rupp, Kemmler, Kurz, Hinterhuber & Fleischhacker, 2012; Sachdeva et al., 2016; Svanberg et al., 2013), the results of these studies are not conclusive at present.

The main limitation of this study is its cross-sectional design, which does not allow the prognosis of memory dysfunction to be assessed in the medium/long term. Another limitation associated with the cross-sectional design is the difficulty of retrospectively measuring alcohol use with a greater degree of accuracy. Moreover, it should be noted that a premorbid IQ measurement was not made, which may in turn have an influence on test performance. Finally, it should be noted that the interference in cognition of the pharmacological treatments used was not analyzed. However, the various strengths of the study can also be highlighted. Chief among them is that this is the first study of its kind to assess verbal learning and memory in a sample of AUD patients compared to MDD patients and healthy controls. Similarly, the selection of the sample was very strict, excluding patients with other psychiatric comorbidities, in order to allow the specific factors associated with verbal memory in patients with AUD and MDD to be established.

Finally, it should be pointed out that AUD patients in our sample presented significant impairment in verbal learning and memory when compared with patients with MDD and with healthy individuals. These results raise the need for future studies to analyze the extent to which this verbal mnemonic disorder can negatively influence the results of an alcoholic cessation program. Thus, it may be relevant to adapt the therapeutic interventions to the cognitive level of each patient to favour their effectiveness.

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Conflict of interests

The authors declare no conflicts of interest in relation to the study, its authorship, and/or the publication of this manuscript.

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ORIGINAL

Co-occurrence of substance use disorders and other mental disorders in people undergoing specific treatment for any of them in Spain

Concurrencia de trastorno por consumo de sustancias y de otro trastorno mental en personas en tratamiento por alguno de ellos en España

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Abstract

The co-occurrence of substance use disorders (SUD) and other mental disorders (OMD) is assumed to be high but is, in fact, unknown in Spain; and it is approached from different healthcare networks. The objective of the present study was to know the prevalence of this co-occurrence, both in specific addiction treatment networks and in mental health networks, in Spain. An observational, multicenter cross study, with a randomized sample, of patients under treatment for SUD or OMD in different Autonomous Communities of Spain was carried out (N=1,783). A specific *ad hoc* online questionnaire collecting sociodemographic variables, substance use and diagnoses of SUD and OMD was completed. The data obtained in the survey show a significant concurrence of SUD and OMD diagnoses (in more than 60% of the patients). A high prevalence of OMD was found in those patients receiving treatment for their SUD (71%), and also of diagnoses of any SUD (68.9%) and active substance use (50%, except tobacco) in people receiving treatment for diagnoses of OMD. Also were found significant relationships between addiction to certain substances and specific mental disorders: personality disorders with all SUDs; psychotic disorders with cannabis use disorder, but not cocaine use disorder; affective disorders with cocaine use disorder; and anxiety disorders with cannabis use disorder. This study provides preliminary information about the high coexistence in routine clinical practice of addictive disorders and other mental disorders in different treatment settings in Spain.

Keywords: prevalence, comorbidity, substance use disorder, mental disorder, substance use

Resumen

La concurrencia de trastornos por consumo de sustancias (TUS) y de otros trastornos mentales (OTM) es desconocida en su conjunto en España, y su abordaje se hace desde diferentes redes asistenciales. El objetivo del presente estudio era conocer la prevalencia de esta comorbilidad tanto en las redes de tratamiento de las adicciones como en las de salud mental. Se diseñó un estudio observacional, transversal, multicéntrico, con una muestra aleatorizada de pacientes en tratamiento por TUS u OTM en diferentes Comunidades Autónomas (N=1.783). Se completó un cuestionario *ad hoc on-line* recogiendo variables sociodemográficas, sobre uso de sustancias, y de diagnósticos de TUS y de OTM. Los datos obtenidos en la encuesta arrojan una importante concurrencia de diagnósticos TUS y OTM. Se encontró una elevada prevalencia de OTM en aquellos en tratamiento en redes de adicciones por su TUS (71%) y también tanto de diagnósticos de T.U. de cualquier sustancia (68,9%) como de consumo activo de sustancias (50%, exceptuando tabaco) en las personas en tratamiento por diagnósticos de OTM en redes de salud mental. Y, además, relaciones significativas entre la adicción a determinadas sustancias y trastornos mentales concretos: trastorno de personalidad con todos los TUS; trastornos psicóticos con trastorno por uso de cannabis, pero no de cocaína; trastornos afectivos con trastornos por consumo de cocaína, y trastorno de ansiedad con trastorno por uso de cannabis. Este estudio aporta información preliminar sobre la elevada coexistencia en la práctica clínica habitual de trastornos adictivos y otros trastornos mentales en España, tanto en redes asistenciales de salud mental como específicas de adicciones.

Palabras clave: prevalencia, comorbilidad, trastorno por consumo de sustancias, trastorno mental, consumo de sustancias

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Although the high prevalence of psychiatric comorbidity between substance use disorder (SUD) and other mental disorders (OMD) is well known, the precise extent of this co-occurrence is not. Studies provide differing figures, depending on the diagnostic method or whether they involve the general population or those in treatment (Hasin & Grant, 2015; Kessler & Merikangas, 2004; Regier et al., 1990). The importance of this comorbidity lies not only in its high prevalence but also in its clinical and social severity, and the difficulty of managing it (Pascual-Pastor, Fernández-Miranda, Díaz-Fernández & Sala-Añó, 2017; Torrens, Mestre-Pintó & Domingo-Salvany, 2015).

Indeed, it is assumed that the co-occurrence of SUD and OMD in Spain is high, but it is not generally known, and there are no records that could help define how many people might have this dual diagnosis. In addition, as different healthcare networks (specifically focused on addictions and mental health) are involved in treating it, there is a large degree of variability. Although it is important to coordinate strategies for the detection and correct treatment of patients with these comorbid disorders, an important first challenge for the National Health System is to know as precisely as possible what it is actually dealing with in this regard.

In Spain, although studies on the occurrence of SUD and OMD have been published since the late 1990s, these have generally been carried out on populations undergoing treatment, with very specific diagnoses in almost all of them, and in specific autonomous communities, with different models of care (Arias, Ochoa & López-Ibor, 1996; Arias et al., 2013a; Fernández-Miranda, García-Portilla González, Sáiz Martínez, Gutiérrez-Cienfuegos & Bobes García, 2001; Lana, Fernández San Martín, Sánchez Gil & Bonet, 2008; Martínez-Gras et al., 2016; Pedrero-Pérez, 2018; Pereiro, Pino, Flórez, Arrojo & Becoña, 2013; Rodríguez-Llera et al., 2006; Roncero et al., 2011; Sánchez-Peña, Alvarez-Cotoli & Rodríguez-Solano, 2012), the exception perhaps being the study by Gual (2007). In other words, there has been no study to date on the global prevalence of this comorbidity, with clear characteristics, at the national level and in both treatment networks.

In order to reach an understanding of the co-occurrence prevalence of SUD with other mental disorders in Spain at the healthcare level, a study was designed focussing on people undergoing treatment in mental health or addiction networks in the different autonomous communities and in each of the networks within the various treatment resources for SUDs or other MDs. The objectives of the study were to discover the use of substances among patients treated both in specific addiction and mental health networks, the diagnoses of OMD in addition to SUD and the diagnoses of SUD concomitant with OMD (comorbidity between disorders), as well as the relationships existing between the

diagnoses of use disorders (UD) of different substances and the specific OMDs.

Method

This was an observational, cross-sectional, multicentre study, with a randomized sample of patients undergoing treatment for addictive disorders or other mental disorders throughout Spain (N = 1,783). A group of health professionals completed an online questionnaire, specifically designed by the study authors, on substance use and their patients' diagnoses in specific addiction and mental health treatment networks (detoxification units, outpatient programs, hospitals/day centres, acute psychiatric units, therapeutic communities, medium-stay and rehabilitation units, mental health units/centres, prisons). The Socidrogalcohol website hosted the ad hoc survey where professionals could enter each patient's data (see Table 1 for variables collected), always guaranteeing highest levels of confidentiality and anonymity. The patients were anonymized from the start.

The study population was people receiving treatment in mental health or addiction care networks in Spain who were aged over 18 years and had a diagnosis of substance use or other mental disorder at the time of the survey. Non-probabilistic, convenience, and consecutive sampling was used. Randomization was carried out by conducting the survey on the same day each week for four consecutive weeks on all patients attending the professional's office that day.

The variables studied were: Sociodemographic (age, sex, employment status, coexistence), related to somatic pathologies (HBV, HCV, HIV), substance use, and diagnoses of both substance use disorder and other mental disorders made by the professionals who carried out the survey (Table 1). Data collection was carried out between May 2019 and May 2020 in fifteen autonomous communities.

Descriptive and inferential statistics were performed. Pearson's chi-square (bilateral asymptotic significance) was used for the latter, with Fisher's exact test (bilateral exact significance) for qualitative and dichotomized quantitative variables. The confidence interval was set at 95%. The SPSS program (version v. 23) was used for data processing.

The study was carried out in accordance with the ethical principles of the Declaration of Helsinki.

Results

A total of 1,783 correctly completed surveys were obtained, out of 2,000 planned, carried out by 61 professionals in all autonomous communities except Cantabria and Navarra. Of these, 322 came from mental health network resources (13 professionals) and the rest from addictive disorders care resources (48 professionals) (Table 2).

Table 1
Variables studied

Treatment resource: Addictions network: Specific centre for attention to addictions/ Association of affected persons/ Prisons. Mental health network: <i>Outpatient Mental Health Unit/ Hospital Unit / Association of affected persons.</i>
Sociodemographic: Sex, age, marital status, coexistence, employment situation. Other somatic pathologies: <i>Hepatitis C-Hepatitis B. HIV. Neurological diseases.</i>
Substances used in the last month/ Substances used, but not in the last month: Tobacco/Alcohol/Cannabis/Cocaine/Stimulants/Heroin/ Opioid prescription/Others.
Mental disorders due to substance use - last twelve months/ more than 12 months ago: F10. Alcohol use disorder F11. Opioid use disorder F12. Cannabinoid use disorder F13. Sedative or Hypnotic use disorder F14. Cocaine use disorder F15. Other Stimulant use disorder F16. Hallucinogen use disorder F17. Tobacco use disorder F18. Volatile solvent use disorder F19. Multi-drug or other psychotropic substance use disorder
Other mental disorders (grouped): F00-09 (Organic disorders) F20-29 (Psychotic disorders) F30-39 (Affective disorders) F40-49 (Anxiety disorders) F50-59 (Eating and sleeping disorders) F60-69 (Personality disorders) F70-99 (Other disorders)

The addiction network had more men and more young people. Patients undergoing treatment in the addiction network also more frequently had jobs and previous treatments, and were more frequently diagnosed with infectious diseases (HIV, HCV). Alcohol use was linked to HBV and the presence of neurological disease; opioids and cannabis to hepatitis C, B and HIV; tobacco to hepatitis C and neurological diseases; cocaine to HCV; and the use of anxiolytics with HCV and HIV.

Table 2
Number of surveys by Autonomous Community [Total (mental health)]

Autonomous community	Number (mental health)	Percentage
Galicia	281 (44)	15.8
C. Valenciana	265 (20)	14.9
Baleares	242 (11)	13.6
Asturias	191 (91)	10.7
Madrid	185 (95)	10.4
Castilla y León	165 (26)	9.3
Andalucía	110 (8)	6.2
Cataluña	99 (19)	5.6
Aragón	92	5.2
Canarias	89	5.0
Castilla-La Mancha	34 (6)	1.9
País Vasco	11 (2)	.6
Extremadura	7	.4
Murcia	7	.4
Rioja	5	.3
TOTAL	1,783	100.0

The most commonly used substances were, in this order: Alcohol, tobacco, cannabis, cocaine and opioids. There was a higher percentage of active and past (abstinent) users in the addiction network, and a high percentage of patients with substance use in the mental health network. All substances were more commonly used in the addiction network except for alcohol, which was the same in both networks. Although not reflected in Table 4, polydrug use was found in many cases, the most common being tobacco and alcohol (19.3% of subjects) and tobacco and cannabis (6.8%).

In the mental health network, 68.9% of patients had a current diagnosis of SUD, lower than in the addictions network. The use disorders (UD) of alcohol, tobacco, cocaine and cannabis stand out in the total. In the addiction network, alcohol, tobacco and cocaine UD were the most common, while in the mental health network these were tobacco, alcohol and cannabis UD. Furthermore, and not specified in Table 5, there was a significant co-occurrence of several current diagnoses for substance use, the most frequent being those tobacco and alcohol UD (10.6%) and cocaine and alcohol UD (5.3%).

There was a very high prevalence of comorbid diagnoses in the addiction network, especially involving affective and personality disorders; in the mental health network, psychotic and affective disorders were the most commonly diagnosed. A significant difference in diagnosis between both networks was found in regard to psychotic disorders.

The relationships found between the UD of specific substances and the different most relevant specific mental

Table 3
Sociodemographic and clinical (somatic) characteristics of the sample

	TOTAL N= 1783	MENTAL H. N=322	ADDICTIONS N=1461	Values of F; χ^2; p
Sex (male)	1310 (73.6%)	216 (67.3%)	1094 (75%)	7.67; 0.005
Age*	47.54 $\pm$ 1.38	48.30 $\pm$ 12.17	43.11 $\pm$ 11.21	1.79; 0.04
Living arrangements (own family+alone)	1049 (33+25.9 %)	34.5+27.3 %	25.5+32.6 %	1.08; 0.75
Work situation (active+OD)	591 (29.3%)	89 (20.8%)	462 (31.2%)	5.38; <.0001
Marital status (single)	908 (50.9%)	168 (52.2%)	740 (50.7%)	1.51; 0.624
HVC	292 (16.4%)	27 (8.4%)	265 (18.1%)	4.97; <.0001
HVB	65 (3.6%)	7 (2.2%)	58 (4%)	1.05; 0.120
HIV	89 (5%)	5 (1.6%)	84 (5.7%)	8.12; 0.002
Neurological disease	71 (4%)	15 (4.7%)	56 (3.8%)	0.07; 0.493

Note*: Mean, standard deviation. OD: Occupational disability.

Table 4
Prevalence of substances used (total, mental health network and addiction network [N (%)]

	TOTAL N= 1783	MENTAL H. N=322	ADDICTIONS N=1461	Values of χ^2; p
Any previously	1287 (72.2%)	251 (78%)	1036 (70.9%) *	3.85; 0.011
Any previously except tobacco	1258 (70.6%)	237 (73.6%)	1021 (69.9%)	1.06; 0.185
Any current	1482 (83.1%)	250 (77.6%)	1232 (84.3%)	7.67; 0.004
Any current except tobacco	1044 (58.6%)	161 (50%)	883 (60.4%)	9.03; 0.001
Substances consumed last month				
Tobacco	1195 (89.1%)	215 (80.2%)	980 (91.3%)	10.03; <.0001
Alcohol	693 (50.3%)	129 (48.7%)	564 (50.6%)	0.08; 0.568
Cannabis	413 (45.3%)	49 (31.6%)	364 (48.1%)	16.78; <.0001
Cocaine	331 (33.6%)	27 (20%)	304 (35.8%)	12.11; <.0001
Stimulants (amphetamines)	31 (1.7%)	12 (3.7%)	19 (1.3%)	7.97; 0.003
Heroin	117 (8.5%)	4 (1.5%)	113 (10.1%)	25.64; <.0001
Prescription opioids	191 (9.3%)	5 (1.4%)	186 (18.3%)	10.06; 0.002
Substances consumed, but not in the last month (quit)				
Tobacco	146 (10.9%)	53 (19.8%)	9 (8.7%)	11.93; <.0001
Alcohol	686 (49.7%)	136 (51.3%)	550 (49.4%)	1.16; 0.158
Cannabis	498 (54.7%)	106 (68.4%)	392 (51.9%)	13.76; <.0001
Cocaine	654 (66.4%)	108 (80%)	546 (64.2%)	9.89; <.0001
Stimulants (amphetamines)	260 (14.6%)	73 (22.7%)	187 (12.8%)	19.31; <.0001
Heroin	253 (18.3%)	24 (9.1%)	229 (20.6%)	20.08; <.0001
Prescription opioids	44 (18.7%)	6 (54.5%)	38 (17%)	22.13; <.0001

Note *: Rest not specified or not answered.

disorders are the following: Alcohol UD with affective disorder; opioid UD with personality disorder; cannabinoid UD with psychotic disorder, TP and anxiety disorder; UD sedatives with personality disorder, anxiety disorder and sleep disorder; cocaine UD with affective disorder and personality disorder, not related to psychotic disorders; stimulant UD (amphetamines) with psychotic disorder and personality disorder; and tobacco UD with psychotic disorder and personality disorder.

With regard to non-SUD mental disorders, the most significant relationships are: Psychotic disorders with cannabis, other stimulants and tobacco UD, and to a lesser extent with alcohol UD; affective disorder especially with cocaine UD and less with alcohol UD; anxiety disorder with cannabis UD and less significantly with sedative UD. Personality disorders are related to all UD, but especially opioid UD, cannabis UD, sedative UD, cocaine UD and tobacco UD.

Table 5*Diagnosis of substance use disorder (total, mental health network and addiction network [N (%)]*

	TOTAL N= 1783	MENTAL H. N=322	ADDICTIONS N=1461	Values χ^2; p
Any previously	1431 (80.3%)	215 (66.8%)	1216 (83.2%) *	16.07; < .0001
Any current	1036 (58.1%)	222 (68.9%)	814 (55.7%)	14.21; < .0001
Any previously (except tobacco UD)	875 (49.1%)	190 (59%)	685 (46.9%)	11.96; < .0001
Any current (except tobacco UD)	643 (36.1%)	142 (44.1%)	501 (34.3%)	8.68; 0 .002
<i>Substance use disorder in the past 12 months</i>				
Alcohol	744 (41.7%)	80 (24.8%)	664 (45.4%)	18.32; <.0001
Opioids	370 (20.8%)	12 (3.7%)	358 (24.5%)	28.93; <.0001
Cannabinoids	416 (23.3%)	41 (12.7%)	375 (25.7%)	13.11; <.0001
Sedatives/ Hypnotics	116 (6.5%)	10 (3.1%)	106 (7.3%)	15.07; <.0001
Cocaine	521 (29.2%)	33 (10.2%)	488 (33.4%)	18.81; <.0001
Stimulants (amph.)	45 (2.5%)	12 (3.7%)	33 (2.3%)	1.02; 0.128
Hallucinogens	5 (0.3%)	0	5 (0.3%)	0.96; 0.293
Tobacco	643 (36.1%)	142 (44.1%)	501 (34.3%)	8.98; 0.001
Multiple drugs	36 (2%)	6 (1.9%)	30 (2.1%)	1.91; 0.826
<i>Substance use disorder prior to last 12 months (currently abstinent)</i>				
Alcohol	498 (27.9%)	93 (28.9%)	405 (27.7%)	1.52; 0.674
Opioids	305 (17.1%)	22 (6.8%)	283 (19.4%)	18.75; <.0001
Cannabinoids	355 (19.9%)	71 (22%)	284 (19.4%)	0.66; 0.288
Sedatives/ Hypnotics	109 (6.1%)	6 (1.9%)	103 (7%)	22.91; <.0001
Cocaine	505 (28.3%)	66 (20.5%)	439 (30%)	6.99; 0.001
Stimulants (Amp.)	81 (4.5%)	26 (8.1%)	55 (3.8%)	10.87; 0.001
Hallucinogens	23 (1.3%)	1 (0.3%)	22 (1.5%)	3.48; 0.085
Tobacco	347 (19.5%)	98 (30.4%)	249 (17%)	10.16; <.0001
Multiple drugs	45 (2.5%)	16 (5%)	29 (2%)	8.49; 0.002

Note *: Rest not specified or not answered.

Table 6*Diagnosis of other mental disorders (not F 10-19) (total, mental health network and addiction network [N (%)]*

	TOTAL N= 1783	MENTAL H. N=322	ADDICTIONS N=1461	Values of χ^2; p
ANY	1334 (74.8%)	297 (92.2%) *	1037 (71.0%)	10.06; <.0001
PSYCHOTICS (F 20-29)	315 (17.7%)	113 (35.1%)	202 (13.8%)	14.02; <.0001
AFFECTIVE (F 30-39)	580 (32.5%)	108 (33.5%)	472 (32.3%)	0.06; 0.669
ANXIETY (F 40-49)	296 (16.6%)	43 (13.4%)	253 (17.3%)	1.21; 0.084
EAT and SLEEP (F 50-59)	70 (3.9%)	10 (3.1%)	60 (4.1%)	0.09; 0.402
PERSONALITY (F60-69)	459 (25.7%)	71 (22%)	388 (26.6%)	1.16; 0.094
OTHERS (F 00-09, 70-99)	75 (4.2%)	7 (2.1%)	68 (4.7%)	3.08; 0.042

Note *: Rest not specified or not answered.

The results are summarized in Tables 3 to 7 (P values < .05 in bold). The sociodemographic and somatic clinical characteristics are summarized in Table 3, while Table 4 shows the substances used both by patients in the mental health network and the addiction network, with SUDs in Table 5. The diagnoses of mental disorders not due

to substance use are summarized in Table 6. Finally, the relationships found between disorders due to the use of different substances and other mental disorder diagnoses, grouped by major syndromes, are shown in Table 7 (these are not shown in function of the healthcare network as no significant differences were found).

Table 7
Substance use disorder and other mental disorder (p-values)

<i>N=1783</i>	F-10 ALCOHOL	F-11 OPIOIDS	F-12 CANNABIS	F-13 SEDATIVES	F-14 COCAINE	F-15 OTH ESTIM.	F-16,18,19 OTH DRGS.	F17 TOBACCO
F0-9. ORGANIC Ds	0.468	0.716	0.435	0.803	0.090	0.020	0.821	0.216
F20-29. PSYCHOTIC Ds	0.012	0.188	0.000	0.594	0.739	0.000	0.866	0.000
F30-39. AFFECTIVE Ds	0.001	0.112	0.276	0.079	0.000	0.079	0.562	0.161
F 40-49. ANXIETY Ds	0.633	0.093	0.006	0.013	0.693	0.736	0.880	0.424
F 50-59. EAT & SLEEP Ds	0.638	0.609	0.170	0.541	0.046	0.164	0.100	0.044
F 60-69. PERSONALITY Ds	0.033	0.000	0.000	0.000	0.000	0.031	0.757	0.000
F 70-99. OTHER MDs	0.597	0.079	0.036	0.690	0.019	0.129	0.831	0.009

Note. (G.L.=1; values of χ^2 Pearson between 0.03 and 20.66).

Discussion

Knowledge of the problem in Spain

It is estimated that more than a third of people diagnosed with a mental disorder abuse or are dependent on psychoactive substances, especially alcohol, and among substance-dependent patients at least a similar percentage have other mental disorders (Conway, Compton, Stinson & Grant, 2006; Grant et al., 2004; Hasin & Grant, 2015; Hunt, Large, Cleary, Lai & Saunders, 2018; Kessler & Merikangas, 2004; Lev-Ran, Imtiaz, Rehm & Le Foll, 2013; Regier et al., 1990). The prevalence of comorbidity is different in the general population compared to people in treatment, being higher in the latter (Pascual-Pastor et al., 2017; Torrens et al., 2015). Numerous studies point to high rates of dual diagnosis in patients undergoing treatment in mental health and addiction networks (Compton, Thomas, Stinson & Grant, 2007; Hunt et al., 2018; Lev-Ran et al., 2013; Pascual-Pastor et al., 2017).

In Spain, Arias et al. (1996) studied personality disorders (PD) in opioid dependents under treatment with naltrexone; Fernández-Miranda et al. (2001) explored the influence of psychiatric disorders on the effectiveness of a methadone maintenance program; Haro, Bolinches & De Vicente (2001) studied the influence of PD on the evolution of addictive behaviour and associated psychopathology, as did Fernández-Miranda & Gutiérrez-Cienfuegos (2005). Rodríguez-Llera et al. (2006) revealed the prevalence of co-occurring mental disorders in heroin users. Other research has focused on specific mental disorders, especially personality disorders and their concomitance with addictive disorders (Fernández-Miranda, 2002; Lana et al., 2008; Pedrero-Pérez, 2018). Herrero, Domingo-Salvany, Torrens & Brugal (2008) determined psychiatric comorbidity in cocaine users, as did Martínez-Gras et al. (2016). Roncero et al. (2011) studied psychiatric comorbidities in patients receiving methadone treatment in various Autonomous

Communities. In the study by Gual (2007) involving 2,361 patients with SUD being treated in addiction networks in various autonomous communities, 33.8% had a dual diagnosis. Depression was the most prevalent disorder (21.6%), followed by anxiety disorders (11.7%). Alcohol dependents who also abused other drugs presented the highest level of comorbidity (48.5%) and those addicted to opioids the lowest (27.4%).

In the study by Arias et al. (2013a), 61.8% of the patients had a current diagnosis of a mental disorder other than SUD. In that of Pereiro et al. (2013), it was found that 56.3% of SUD patients also had a diagnosis of another mental disorder. Specifically, Cuenca-Royo et al. (2013) and Comín et al. (2016) studied psychiatric comorbidity in cannabis users and cocaine dependents, while Araos et al. (2017) did the same with cocaine use disorder patients. All found important prevalences.

On the other hand, in a study in a hospital unit of (acute) psychiatry (Rodríguez-Jiménez et al., 2008), 24.9% of the admitted patients presented a co-occurring SUD (excluding nicotine dependence). In a sample of patients from mental health centres, more than 50% of those attending also had an addictive disorder (Sánchez-Peña et al., 2012).

These studies provide data on the situation of co-occurring partial SUD and OMD, but also point to some findings of our research not confirmed by others:

Sociodemographic and clinical profile and substance use

In terms of the profile of people treated in the addiction network, the sociodemographic characteristics of our sample did not differ greatly from those already known (Arias et al., 2013a; Gual, 2007; Pascual-Pastor et al., 2017; Torrens et al., 2015), thus supporting the representativeness of the sample in this regard. As for the somatic clinical situation, it is logical that a higher prevalence of HCV and

HIV infections were found in the addiction network, and that previous treatments for SUD were more frequent in addiction treatment centres. Hepatitis B and C, and HIV, were more common in men than in women, and may reflect riskier behaviours on the part of men. In the case of hepatitis C and HIV, there was a relationship with heroin, as with prescription opioids and also with cannabis and anxiolytics. This could be explained by polydrug use (Arias et al., 2013a; Fernández-Miranda et al., 2001).

The most commonly used substances in both networks were, in order, alcohol, tobacco, cocaine, cannabis and opioids, which largely corresponds to what is known about populations in treatment. It is not surprising that there was a higher percentage of both active and abstinent users in the addiction network, but there was a high percentage of substance use in the mental health network (almost half, if tobacco is excluded). It also highlights that, while there was obviously greater consumption of all substances in the addiction network, the exception is alcohol, which was the same in both networks. However, this could reflect distortions in the attention paid to alcohol problems compared to other substances of abuse in the addiction network (Arias et al., 2013b; Flórez-Menéndez, Balcells-Oliveró & Uzal-Fernández, 2018; Smith & Randall, 2012).

Except for alcohol, there were more patients who stopped substance use in the mental health network than in the addiction network, which could be a consequence of lower severity of use, or of improvement in their OMD (“self-medication”) (Arias et al., 2013a; Torrens et al., 2015).

SUD and OMD diagnoses. Comorbidity

In our study, it is striking that 66.9% of patients in the mental health network had a current diagnosis of SUD (44.1% if tobacco is excluded), a percentage that is lower in the addiction network (possibly explained by the specific treatments for quitting). The most prevalent disorders were tobacco UD (89.1%), alcohol UD (24.8%), cannabis UD (12.7%) and cocaine UD (10.2%), which does not differ much from other research (Arias et al., 2016; Fernández-Miranda et al., 2001; Ochoa-Mangado, Molins-Pascual & Seijo-Ceballos, 2018; Welsh et al., 2017). There were more diagnoses related to tobacco UD in patients treated in the mental health network than in the addiction network (44.1% vs. 34.3%), although this may not accurately reflect reality and be conditioned by a greater concern for smoking in the mental health network than in the addiction network (Becoña et al., 2006).

With regard to diagnoses for other mental disorders, the fundamental finding is that 71% of patients in the addiction network were diagnosed with a mental disorder other than addiction. This may also show how sensitive the professionals are regarding the problem of the co-occurrence of diagnoses and its widespread detection. The

frequent co-occurrence of affective (32.3%), personality (26.6%), anxiety (17.3%) and psychotic disorders (13.8%) is consistent with what is generally shown by some previous studies (Arias et al., 2013a; Farren, Hill & Weiss, 2012; Fernández-Miranda et al., 2001; Grant et al., 2004; Lev-Ran et al., 2013; Nocon, Bergé, Astals, Martín-Santos & Torrens, 2007). It should be noted that, except for psychotic disorders, which were somewhat less frequent, the percentages of the different mental disorders treated were similar to those of the mental health network, thereby strengthening the perception of the addiction network’s ability to detect other mental disorders (Arias et al., 2013a; Ochoa-Mangado et al., 2018; Pereiro et al., 2013).

Regarding the relationships found between specific SUDs and specific OMDs, it can be highlighted that psychotic disorders were related to cannabis UD, but not to cocaine UD, although they were related to other stimulants, which is not in line with the usual findings (Arias et al., 2013c; Herrero et al., 2008; Hunt et al., 2018; Martínez-Gras et al., 2016). The relationship with tobacco UD in first place is more common, and to a lesser extent with alcohol (Arias et al., 2013b; Flórez-Menéndez et al., 2018; Pascual-Pastor et al., 2017). Affective disorders were especially related to cocaine UD, which is common especially in bipolar disorders (Araos et al., 2017; Arias et al., 2016; Herrero et al., 2008), although it is less common that there is a weaker link to alcohol UD (Araos et al., 2017; Arias et al., 2013b; Flórez-Menéndez et al., 2018). Regarding anxiety disorders, their relationship with cannabis UD is less clearly explained (Conway et al., 2006; Fatséas, Denis, Lavie & Auriacombe, 2010; Grant et al., 2004; Sáiz Martínez et al., 2014; Smith & Randall, 2012). It is also striking that the relationship was less significant with sedative UD, even though this disorder is conditioned by and overlaps with the prescription of these drugs itself, and it is not possible to clarify the extent to which there was abuse or dependence on them (Fernández-Miranda, Orengo-Caus & Díaz-Fernández, 2019; Guardia-Serecigni & Flórez-Menéndez, 2018; Pereiro et al., 2013; Sáiz Martínez et al., 2014).

It is very clarifying to see how personality disorders were significantly related to all SUDs, especially to opioid UD (Fernández-Miranda & Gutiérrez-Cienfuegos, 2005; Fernández-Miranda et al., 2019), cannabis UD, sedative UD, cocaine UD (Haro et al., 2001; Pedrero-Pérez, 2018) and tobacco UD (Becoña et al., 2006), and to a lesser extent with alcohol UD and other stimulant UD (Arias et al., 2013b; 2013c). The relationship between having a PD and problematic drug use is clearly confirmed in our study. Additionally, this use involved very different substances, although it was not possible to clearly link particular one to this disorder (Arias et al., 2013a; Fernández-Miranda, 2002; Pedrero-Pérez, 2018).

Strengths and limitations of the study

This research is the first to be carried out in our country with an objective clearly national in scope, involving almost all the autonomous communities and also reflecting the diversity of healthcare networks. The sample is of significant size and was also subjected to randomization. A descriptive approach and an inclusive definition of comorbidity were used. Given the above, it can be considered representative to a large extent of people with diagnoses of SUD and other concurrent MDs, in routine treatment throughout Spain. In short, the main strengths of this study are the size of the sample, the national scope and the variety of treatment settings to avoid biases as far as possible, thereby ensuring an acceptable level of representativeness.

A possible limitation of this study is that the inclusion of cases was not carried out in a uniform manner and could have resulted in bias in sample collection, especially given the fact that patients treated in the mental health network are less represented than those with addictions. A bias may also result from the heterogeneity of the care structures themselves in the different autonomous communities. Nevertheless, it reflects the reality of care for SUDs (and in part also for mental disorders) in Spain. Another possible limitation could also be the randomization method, details of which have already been mentioned, which was chosen for its ease of application. Additionally, instead of validated questionnaires, the one used was constructed ad hoc, easy to fill out and collected the most relevant variables for the objective of the study.

Finally, it should be noted that comparability with other studies is limited, since, as mentioned, there are hardly any studies of such a general nature in our setting.

Conclusions

Given the characteristics of its design, which tried to avoid various biases, and despite its limitations, this research can provide indicative and valuable preliminary information on the prevalence of co-occurrence of SUD and OMD diagnoses both in the mental health and especially in the addiction networks throughout the country. However, it must be remembered that there was a lower response to the surveys in the mental health network, possibly reflecting a lower awareness of the problem in this network, which historically and until recent times has been characterized by a low exploration of the addiction disorders that patients treated for another mental disorder in those services may have.

In general, the data obtained show a significant co-occurrence of diagnoses (in more than 60% of the patients). They show the existence of a high prevalence of other mental disorders in those patients undergoing treatment for their addictive disorder and, perhaps more surprisingly, a very high prevalence of both SUD diagnoses

and active substance use in people undergoing treatment for diagnoses of other mental disorders in mental health resources. It also reflects how drug dependencies are clearly related to specific mental disorders, which is relevant for the diagnostic exploration and the design of adequate and personalized treatment.

In conclusion, the study provides updated information on the actual coexistence of addictive disorders and other mental disorders in the Spanish health system, reflecting this comorbidity in routine clinical practice conditions. However, it is a first approximation to the epidemiological-healthcare situation of the problem, and it is clear that more research is needed to deepen our knowledge and thus enable healthcare responses to better adapt to reality, and with greater efficiency.

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Conflict of interests

This study and its authors have no connection whatsoever with the tobacco, alcohol or pharmaceutical industry and therefore no conflict of interests.

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ORIGINAL

Bidirectional association between tobacco use and depression risk in the SUN cohort study

Asociación bidireccional entre uso de tabaco y riesgo de depresión en el estudio de cohorte SUN

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Abstract

We assessed the association of tobacco use or smoking cessation with depression risk and determined if the presence of a depressive disorder was associated with smoking onset. We conducted a prospective cohort study (SUN Project) based on 16,519 Spanish university graduates without depression at baseline. Tobacco use was determined at baseline and after four years of follow-up. Incident cases of depression were ascertained according to a previously validated report of a clinical diagnosis of depression during follow-up. Multivariable Cox regression models were used to estimate hazard ratios (HR) of depression according to previous smoking status. We used logistic regression models as a secondary analysis to estimate Odds Ratios (OR) of smoking onset during the first four years of follow-up according to lifetime depression prevalence at baseline. The multivariable HR (95% CI) for current smokers was 1.24 (1.05-1.46) as compared to participants who had never smoked. Participants with the highest exposure to tobacco (≥ 20 packs-years) had a significant 38% relative increment in depression risk. Smoking cessation during the first four years of follow-up was inversely associated with depression (HR = 0.63; 95% CI = 0.40-0.99). Finally, a significant increment in the risk of smoking onset for participants with lifetime depression prevalence was observed (multivariable OR = 1.44; 95% CI = 1.13-1.83). A bidirectional association between tobacco use and depression in the SUN cohort was found. Therefore, tobacco control and health promotion campaigns for smoking cessation could be considered as effective strategies of public health for the prevention and management of depressive disorders.

Keywords: smoking, packs-year, cohort, depression risk, smoking cessation, smoking onset

Resumen

Evaluamos la asociación del consumo de tabaco o su abandono con el riesgo de depresión y determinamos si presentar depresión se asoció al inicio de fumar. Diseño: estudio de cohortes prospectivo de 16.519 graduados universitarios españoles sin depresión al inicio del estudio. El consumo de tabaco se determinó al inicio y tras cuatro años de seguimiento. Los casos incidentes de depresión fueron autoinformados en los cuestionarios de seguimiento. Usamos modelos de regresión de Cox para estimar los Hazard Ratios (HR) de depresión según el nivel de tabaquismo inicial y sus cambios. Se estimaron los Odds Ratios (OR) para la asociación entre prevalencia de tabaquismo a lo largo de la vida y comienzo del hábito con modelos de regresión logística. Se observó un HR (IC 95%) para fumadores de 1,24 (1,05-1,46) en comparación con los que nunca habían fumado. Los participantes con la exposición más alta al tabaco (≥ 20 paquetes-año) tuvieron un incremento relativo del riesgo de depresión de 38%. Dejar de fumar durante los primeros cuatro años de seguimiento se asoció inversamente con la depresión (HR = 0,63; IC 95% = 0,40-0,99). Observamos un incremento significativo del riesgo de aparición de tabaquismo en los participantes con prevalencia de depresión a lo largo de la vida (OR multivariable = 1,44; IC 95% = 1,13-1,83). Encontramos una asociación bidireccional entre el consumo de tabaco y la depresión en la cohorte SUN. El control del tabaco y las campañas sanitarias de abstinencia deberían considerarse estrategias efectivas de salud pública para prevenir y manejar los trastornos depresivos.

Palabras clave: fumar, paquetes-año, cohorte, riesgo de depresión, dejar de fumar, comienzo de fumar

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Unipolar depression is considered an important global cause of disability-adjusted life years (DALYs) (Kyu et al., 2018) and this disease was the third cause of years lost due to disability (YLDs) in 2017 (James et al., 2018). In this context, preventing depression is an important aim from a public health perspective. Depression is a multifactorial disease. Several lifestyle factors have been analyzed as potentially modifiable determinants of depression development. Diet (Lassale et al., 2019; Opie et al., 2017), physical activity (Fernández-Montero et al., 2020), and toxic habits (Kedzior & Laeber, 2014) are clinically relevant modifiable determinants of depression risk; toxic habits refer to smoking, alcohol intake and use of illegal drugs. Regarding tobacco, a systematic review has suggested a bidirectional association between smoking and mental health measured as depression and anxiety, with smoking increasing the risk of mental diseases and mental diseases increasing the risk of smoking onset (Fluharty, Taylor, Grabski & Munafò, 2017). Moreover, another meta-analysis yielded significant reductions in depressive symptomatology after smoking cessation (Taylor et al., 2014). Some authors have also observed a tendency towards a linear association between the number of cigarettes/day consumed and severity of depression according to the Hamilton Depression Scale (HDRS), suggesting a relationship between severity of consumption and severity of depressive symptoms (Jiménez-Treviño et al., 2019). Finally, several studies have reported that individuals with mental illness tend to be more likely to adopt smoking habits and to smoke more heavily than the general population (Fluharty et al., 2017; Fluharty, Sallis & Munafò, 2018). In this context, there is a scarcity of longitudinal epidemiological studies that have analyzed all these aspects simultaneously. We consider that our study provides clarification in determining the association between smoking habit, including use, dose, smoking duration and smoking cessation, and the risk of developing depression, as well as analyzing whether having a depressive disorder represents a risk factor for smoking onset/relapse using a prospective epidemiological design. The use of this type of design allowed us to efficiently assess both the role of depression in smoking onset or relapse and the role of smoking use and duration on the risk of developing depression after several years of follow-up.

Thus, the aims of this study were to (1) assess the association between tobacco (use, and dose and smoking duration measured through pack-years of cigarette smoking) and depression risk; (2) assess the role of smoking cessation in depression risk; (3) and finally to ascertain if the presence of a depressive disorder was associated with smoking onset in the SUN cohort study.

Method

Study population

The SUN Project is a prospective, dynamic cohort study, initiated in December 1999 in Spain. The sample is composed of Spanish university graduates who agree to participate. Its methods have been previously described (Carlos et al., 2018; Martínez-González, Sánchez-Villegas, De Irala, Marti & Martínez, 2002). Briefly, information about sociodemographic and lifestyle characteristics, anthropometric variables, and medical history or use of medication is gathered biennially by mail or by Web-based questionnaires sent to participants every two years. The overall retention in the cohort approaches 90%.

Up to July 2018, 22,791 participants had completed the baseline questionnaire of the SUN Project. Participants who were lost to follow-up, who had not completed at least one follow-up questionnaire, or who were outside of predefined limits for baseline total energy intake were excluded from the analyses. For analyses considering the incidence of depression as the outcome, we also excluded those participants who were users of antidepressant medication or had reported a present or previous history of clinical diagnosis of depression (lifetime depression) at baseline. Finally, 16,519 participants were included in the prospective analyses for the incidence of new-onset depression (Figure 1). In an ancillary analysis, we selected 11,246 participants of the cohort with at least four years of follow-up and being nonsmokers or former smokers at baseline to assess the role of lifetime-prevalence of depression in the relapse. (Figure 2).

The study was approved by the Institutional Review Board of the University of Navarra and registered at clinicaltrials.gov (NCT02669602). Written informed consent was not requested from the participants. Voluntary completion of the first questionnaire was considered to imply informed consent.

Exposure assessment

Tobacco use was ascertained at baseline and after four years of follow-up. A participant was considered as a current or former smoker if he/she responded positively to the question: “Have you smoked 100 or more cigarettes in your life?” in the baseline questionnaire (Q₀). Those participants who answered positively were additionally asked about the mean number of cigarettes consumed per day at some specific periods of their life. If a participant referred to be a former smoker he/she was inquired about how long ago he/she gave up smoking. Former smokers were then classified into two groups, former smokers who quit ten or more years ago and former smokers who quit less than 10 years ago. We chose this cut-off point because we consider that ten years is a relevant period to ascertain the overcoming of smoking habit and ensures that the state of the participant is really that of the former smoker.

The number of pack-years consumed by current and former smokers was also estimated. We used the pack-years definition according to the National Cancer Institute Dictionary of Cancer Terms; pack-years were calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person had smoked. For example, 1 pack-year is equal to smoking 1 pack per day for 1 year, or 2 packs per day for half a year, and so on (National Cancer Institute, 2019).

Participants updated their smoking status after four years of follow-up. Thus, the number of quitters and starters in smoking habit were ascertained.

Outcome assessment

Incident cases of depression were defined as participants who positively responded to the following question ‘Have you ever been diagnosed with depression by a medical doctor?’ in any of the biennial follow-up questionnaires from the second year of follow-up (Q_2–Q_16). A self-

reported physician-provided diagnosis of depression has demonstrated acceptable validity in a subsample of our cohort using the Structured Clinical Interview for DSM-IV as ‘gold standard’ applied by experienced psychiatrists blinded to the answers of the questionnaires (Sánchez-Villegas et al., 2008a). The percentage of confirmed depression was 74.2% [95% Confidence Interval (CI) = 63.3-85.1]. The percentage of confirmed non-depression was 81.1% (95% CI = 69.1-92.9).

Other variables assessment

Information about socio-demographic (e.g., sex, age, marital status and employment status) and lifestyle-related variables (e.g., physical activity, dietary habits) were obtained from Q_0. Physical activity was assessed using a validated physical activity questionnaire with data about seventeen activities used in Spanish-speaking populations and previously adapted from US (Nurses’ Health Study and Health Professionals’ Follow-up Study) (Martínez-González,

Figure 1
Flow chart for the selection of participants

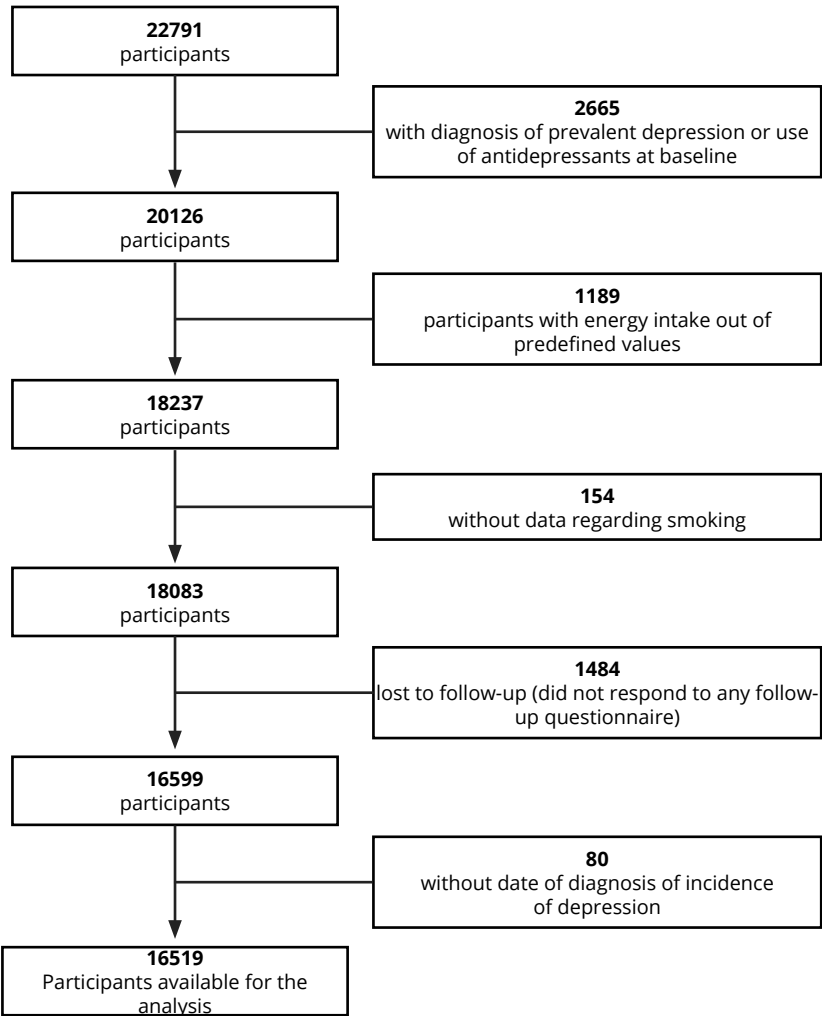
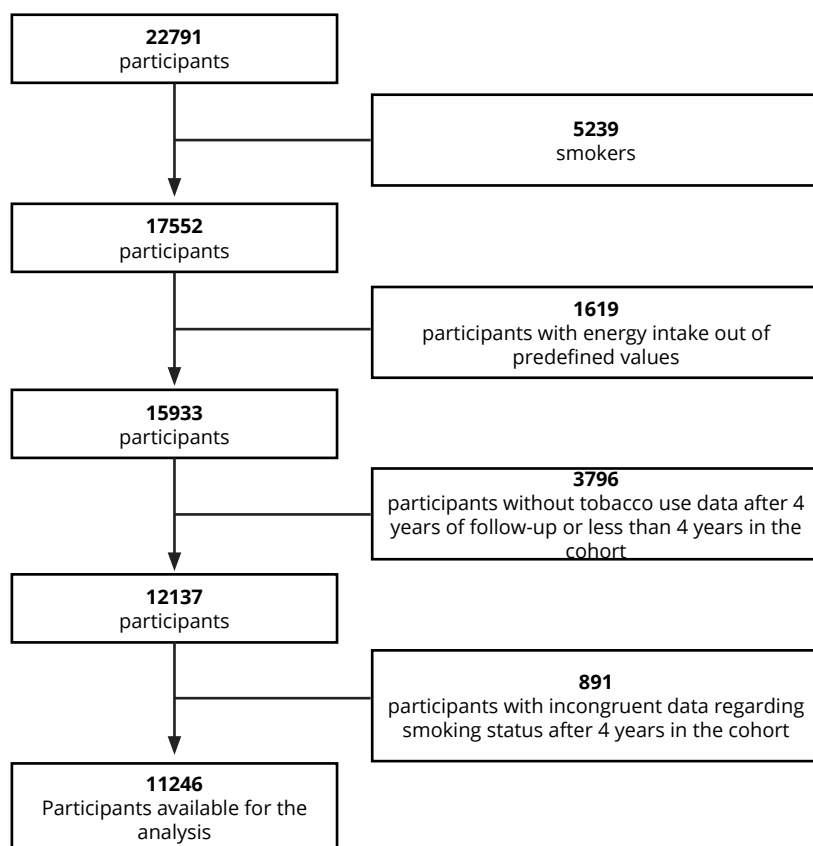


Figure 2
Flow chart for the selection of participants (secondary analysis)



López-Fontana, Varo, Sánchez-Villegas & Martínez, 2005). The validation study consisted in calculating the non-parametric correlation coefficients between the level of physical activity and sedentary lifestyle collected by the self-administered questionnaire and the triaxial accelerometer measurements. Percentage of misclassification and kappa coefficients were also calculated. The study population consisted of a sample of 40 obese women who were participants of the SUN project. Physical activity during leisure time (estimated as MET-h week) derived from the self-administered questionnaire moderately correlated with kcal/day assessed through the accelerometer (Spearman's $r = 0.507$, 95% confidence interval (CI) 0.232-0.707). The Spearman correlation between the ratio of sedentary lifestyle to physical activity obtained through the questionnaire and the direct estimation (RT3) was -0.578 (95% CI -0.754 , -0.325). The kappa index was 0.25 ($P = .002$) when assessing the cross-classification into quintiles and 0.41 for the dichotomous estimation of a sedentary lifestyle. Only 2.5% of participants were misclassified by the questionnaire more than two quintiles apart from the estimates of the RT3.

Dietary intake was assessed at baseline with a 136-item, validated, semi-quantitative food frequency questionnaire (FFQ) (De La Fuente-Arrillaga, Vázquez-Ruiz, Bes-Rastrollo, Sampson & Martínez-González, 2010; Fernández-Ballart et al., 2010). Nutrient and energy intakes were calculated as frequency multiplied by the nutrient composition of specified portion size for each food item using an ad hoc computer program specifically developed for this aim. A trained dietician updated the nutrient database using the latest available information included in food composition tables for Spain (Mataix, 2003; Moreiras, Carbajal, Cabrera & Cuadrado, 2005). Adherence to the Mediterranean Diet was evaluated using the information included in the FFQ and calculating the MEDAS score (Schröder et al., 2011).

Information regarding personality traits (self-perceived level of competitiveness, psychological tension, and dependency) was also obtained with Q₀ using Likert scales. Participants were categorized into three different groups according to the declared answers in the Q₀: low level (1-4), moderate level (5-6), and high level (7-10).

Body mass index (BMI) was calculated as weight (kg) divided by the square of height (m²) using data collected in Q₀. Validity of auto-referred weight and height has been assessed in the cohort (Bes-Rastrollo, Pérez-Valdivieso, Sánchez-Villegas, Alonso & Martínez-González, 2005).

The prevalence and history of cancer, cardiovascular disease, hypertension, and type 2 diabetes mellitus were determined at baseline. Cardiovascular disease included myocardial infarction, stroke, atrial fibrillation, paroxysmal tachycardia, coronary artery bypass grafting or other revascularization procedures, heart failure, aortic aneurism, pulmonary embolism, or peripheral venous thrombosis. All the diagnoses were based on participants' self-reports. The validity of self-reported hypertension diagnosis has been assessed in a subsample of the cohort (Alonso, Beunza, Delgado-Rodríguez & Martínez-González, 2005).

Statistical methods

Baseline characteristics of participants adjusted for age and sex, using inverse probability weighting, were described according to their smoking habits using relative frequencies, means, and standard deviations.

For each participant, we computed person-years of follow-up from the date of returning the Q₀ to the date of depression diagnosis or the date of returning the last follow-up questionnaire, whichever came first.

Cox proportional-hazards regression models were fitted to assess the relationship between tobacco use and the incidence of depression during the follow-up. Hazard ratios (HR) and their 95 % CI were calculated considering nonsmokers as the reference category. To control for potential confounding factors, we conducted a multivariable-adjusted model adjusting for sex, age, BMI (kg/m², continuous), physical activity during leisure time (METs/h-w, continuous), total energy intake (kcal/d, continuous), adherence to the Mediterranean Diet (1-14, continuous), alcohol intake (abstainers; 0.1-9.9 g/d; 10-25 g/d; >25 g/d), living alone (yes, no, unknown), unemployment (yes/no), years of education (continuous) and personality traits (competitiveness, psychological tension, and dependence, three categories). Other confounding factors such as the presence of several diseases (cancer, cardiovascular disease, hypertension, and diabetes), or marital status were also explored but not included in the final models because their inclusion in the regression models did not substantially change the reported associations.

The role of tobacco cessation (during the first four years of follow-up) in depression risk was also evaluated through multivariable Cox proportional-hazards regression models considering no cessation in tobacco use as the reference value. We represented adjusted cumulative incidence of depression according to the smoking habit, using inverse probability weighting. We then estimated the number needed to treat (NNT) as the inverse of the risk difference,

which was estimated using a pooled logistic model. The 95% CI was the 2.5th and 97.5th percentiles of the distribution obtained from a nonparametric bootstrap with 1000 samples.

Subgroup analyses were performed by sex, age, adherence to the Mediterranean diet, physical activity level, and personality traits as stratification variables. To assess possible interactions product terms were introduced in the different multivariable models. *P* values for the interaction were calculated using the likelihood ratio test.

In addition, several sensitivity analyses were conducted after (1) considering a maximum time of follow-up of 6 years (participants with a longer period of follow-up were censored to 6 years and depression cases occurred after the sixth year were considered non-depressed); (2) considering only depression cases diagnosed after 2 years of follow-up; (3) considering only depression cases diagnosed after 4 years of follow-up and (4) excluding participants with cancer, cardiovascular disease or type two diabetes at baseline.

Among former smokers, we also calculated the possible non-linear association between the number of years since tobacco cessation and depression risk with the same method. Tests for nonlinearity used the likelihood ratio test, comparing the model with only the linear term to the model with the cubic spline terms. The results were adjusted for the same potential confounding factors as the main Cox regression analysis.

Finally, to assess a possible bidirectional association tobacco-depression we analyzed the role of depression in tobacco initiation. In an ancillary analysis based on 11,246 participants of the cohort (with at least four years of follow-up and being nonsmokers or former smokers at baseline), we analyzed the association between lifetime prevalence of depression at baseline and the likelihood of tobacco onset/relapse after four years of follow-up in the cohort, by using multivariable-adjusted logistic regression models with smoking onset during the first 4 years of follow-up as the outcome. Analyses were repeated after separating never and former smokers in two different groups and analyzing the role of depression in smoking onset and smoking relapse individually.

All *p* values were two-tailed, and *p* < .05 was considered significant. Statistical analysis was performed using STATA version 12.0 (StataCorp).

Results

Table 1 shows the baseline characteristics of participants according to categories of smoking status. Current smokers were younger than former smokers, more likely to be single, and tended to have a lower physical activity level, higher alcohol intake, and lower adherence to the Mediterranean Diet. However, the prevalence of major chronic disease at

baseline (including cancer, cardiovascular disease, diabetes or hypertension) was lower among these participants.

As this is a dynamic cohort, the time of follow-up is not equal for all the participants included in the analysis. The maximum time of follow-up was 13.5 years approximately, however, the median follow-up in this analysis was 11.1 years.

For the main analysis, during a total of 174,754 person-years of follow-up, we found 889 incident cases of depression. The association between tobacco use and depression is shown in table 2. The results indicate a direct and significant association between smoking and depression risk. The multivariable HR (95% CI) for depression in current smokers was 1.24 (1.05-1.46) as compared to never smokers. We did not find any significant association for former smokers regardless of the years since they quit compared with never smokers. However, compared to current smokers, being a former smoker was associated with a lower incidence of depression: 0.85 (0.70-1.02). This association was especially relevant for smokers who quit more than 10 years before baseline: 0.74 (0.57-0.97).

When the analysis was repeated separating never and former smokers, the association between the presence of depression at baseline and the risk of smoking onset or relapse was no longer significant. The multivariable OR for the association between lifetime depression prevalence and smoking onset among never smokers was 1.13 (0.71-1.82); whereas OR for smoking relapse among former smokers was 1.26 (0.89-1.78).

Tobacco dose and smoking duration were also directly associated with depression risk. Participants with higher

exposure to tobacco products or prolonged smoking duration (20 or more packs-years) had a 38% significant increment in the relative risk of developing depression during follow-up (95% CI = 1.07-1.79). On the other hand, smoking cessation during the first four years of follow-up was inversely associated with depression risk (HR = 0.63; 95% CI = 0.40-0.99) compared to current smokers. As shown in figure 3, the risk of participants who quit smoking reaches the rates of never smokers after around 8-10 years. These results seem consistent with the results found for baseline exposure. For every 47 participants who quit smoking, 1 incident case could be avoided during the following 10 years: NNT (95% CI): 47 (22-276). (Figure 3).

We did not find any significant interaction between tobacco use and several baseline characteristics of participants (sex, age, physical activity, adherence to the Mediterranean Diet, or personality traits) (Table 3). Nevertheless, the results suggested that smoking could be especially detrimental among younger participants with poorer dietary habits and those with several personality characteristics (less competitive and more relaxed persons).

The main results did not change after carrying out several sensitivity analyses (Table 4).

Finally, to assess the role of depression in smoke initiation, never and former smokers were evaluated after 4 years of follow-up with the presence of depression at baseline. Among 11,246 participants with four years of follow-up and who were never or former smokers at baseline, we observed a significant increment in the risk of smoking

Table 1

Baseline characteristics of the participants of the SUN Cohort study according to tobacco use adjusted for age and sex with the inverse probability weighting

	Never smoker (n = 8022)	Former smoker >10y* (n = 1854)	Former smoker <10y* (n = 2674)	Current smoker (n = 3510)
Body Mass Index (kg/m ²)	23.5 (3.6)	24.5 (3.6)	23.9 (3.6)	23.5 (3.5)
Physical activity (MET-h/w)	24.2 (23.1)	23.9 (23.7)	22.3 (21.4)	20.3 (19.6)
Energy intake (kcal/day)	2345 (625)	2308 (617)	2320 (611)	2347 (629)
Mediterranean Diet (1-14)	6.0 (2.0)	6.3 (1.9)	5.9 (1.9)	5.7 (1.8)
Alcohol intake (g/day)	4.9 (7.5)	8.7 (12.2)	8.2 (11.6)	8.9 (12.2)
Competitiveness level (0-10)	7.0 (1.7)	6.9 (1.8)	6.9 (1.7)	6.9 (1.8)
Psychological tension (0-10)	5.8 (2.3)	6.0 (2.1)	6.0 (2.2)	5.8 (2.3)
Dependence level (0-10)	3.5 (2.8)	3.5 (3.0)	3.7 (2.9)	3.6 (2.9)
Years of university education	5.1 (1.6)	5.3 (1.6)	5.0 (1.4)	5.0 (1.4)
Living alone (%)	7.0	4.1	7.5	6.9
Unemployment (%)	3.9	2.4	3.5	4.5
Married (%)	48.8	77.4	57.0	48.2
Prevalence of diseases (%)				
Cancer	3.5	5.1	3.3	3.0
Cardiovascular disease	1.7	1.9	2.2	1.1
Diabetes	2.2	2.3	2.1	1.5
Hypertension	21.8	26.7	18.8	18.4

Note. Data represent means and standard deviations or percentages.

*Date of tobacco cessation was not available in 134 participants.

Table 2
Association (HR and 95% CI) between tobacco use and risk of depression in the SUN Cohort study

	Cases	Person-years	Model 1	Model 2
Never smoker	407	85610	1 (ref.)	1 (ref.)
Former smoker	252	50757	1.08 (0.92-1.27)	1.05 (0.89-1.25)
Current smoker	230	38386	1.27 (1.08-1.49)	1.24 (1.05-1.46)
Never smoker	407	85610	1 (ref.)	1 (ref.)
Former smoker > 10y*	86	20317	0.93 (0.72-1.19)	0.92 (0.71-1.19)
Former smoker < 10y*	161	29150	1.17 (0.97-1.41)	1.14 (0.94-1.37)
Current smoker	230	38386	1.27 (1.08-1.49)	1.24 (1.05-1.47)
Number of packs-year**				
0	407	85610	1 (ref.)	1 (ref.)
<10	215	40741	1.07 (0.91-1.27)	1.08 (0.91-1.28)
10 -< 20	95	18453	1.15 (0.91-1.44)	1.11 (0.88-1.40)
20 +	90	15056	1.50 (1.16-1.93)	1.38 (1.07-1.79)
For +10 packs-year			1.11 (1.03-1.19)	1.08 (1.01-1.06)
Quitting smoking (0 to 4-y)***				
No	64	17018	1 (ref.)	1 (ref.)
Yes	27	10653	0.65 (0.41-1.02)	0.63 (0.40-0.99)

Note. *Date of tobacco cessation was not available in 134 participants.

** Data regarding packs-years was not available in 1423 participants.

***Including only baseline smokers with 4-y follow-up data and without incident depression in the 4 first years of follow-up (n = 2193).

HR: Hazard Ratio; CI: Confidence Interval.

Model 1: HR and 95% CI adjusted for age and sex.

Model 2: Model 1 additionally adjusted for years of education (y, continuous), living alone (yes, no, unknown), unemployment (yes/no), body mass index (Kg/m², continuous), physical activity (METs-h/w, continuous), total energy intake (kcal/d, continuous), alcohol consumption (four categories), adherence to the Mediterranean diet (MEDAS questionnaire unit, continuous) and personality traits (competitiveness, psychological tension and dependency: low, medium, high, unknown).

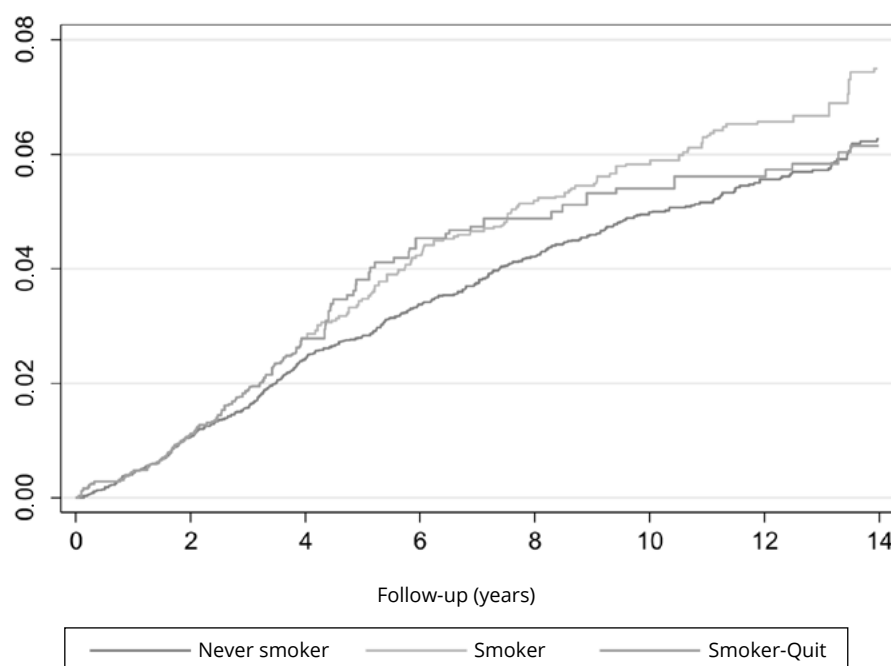
Figure 3
Cumulative incidence of depression according to tobacco use: The SUN Cohort study 1999-2018


Table 3

Association (HR and 95% CI) between tobacco use and risk of depression in the SUN Cohort study according to several characteristics of the participants

	n	Cases	Never smoker	Former smoker >10y*	Former smoker <10y*	Current smoker	p interaction
Sex							0,319
Men	6723	260	1 (ref.)	1.09 (0.72-1.64)	0.97 (0.67-1.41)	1.35 (0.98-1.84)	
Woman	9662	624	1 (ref.)	0.79 (0.56-1.11)	1.22 (0.98-1.52)	1.21 (0.99-1.47)	
Age							0.717
< 50 y	13477	749	1 (ref.)	1.03 (0.76-1.41)	1.19 (0.97-1.45)	1.27 (1.07-1.52)	
≥50 y	2908	135	1 (ref.)	0.80 (0.52-1.24)	0.96 (0.56-1.64)	1.01 (0.61-1.68)	
Mediterranean diet							0.745
Low (< 6 puntos)	7135	444	1 (ref.)	1.05 (0.71-1.55)	1.09 (0.83-1.43)	1.29 (1.03-1.63)	
High (≥ 6 puntos)	9250	440	1 (ref.)	0.83 (0.59-1.16)	1.18 (0.91-1.52)	1.19 (0.93-1.52)	
Physical activity							0.636
Low (< P50)	8185	484	1 (ref.)	0.97 (0.67-1.40)	1.26 (0.98-1.62)	1.24 (0.99-1.54)	
High (≥P50)	8200	400	1 (ref.)	0.86 (0.61-1.23)	1.00 (0.75-1.33)	1.23 (0.95-1.59)	
Competitiveness**							0.510
Low (< P50)	9245	490	1 (ref.)	0.94 (0.66-1.34)	1.13 (0.88-1.46)	1.39 (1.12-1.73)	
High (≥ P50)	7283	399	1 (ref.)	0.90 (0.62-1.29)	1.14 (0.87-1.50)	1.06 (0.82-1.38)	
Tension**							0.272
Low (< P50)	9133	383	1 (ref.)	0.91 (0.60-1.39)	1.41 (1.06-1.87)	1.42 (1.11-1.81)	
High (≥P50)	7403	509	1 (ref.)	0.89 (0.65-1.23)	0.97 (0.76-1.24)	1.13 (0.90-1.41)	
Dependency**							0.408
Low (< P50)	10147	503	1 (ref.)	0.96 (0.69-1.34)	1.29 (1.01-1.65)	1.24 (0.99-1.55)	
High (≥P50)	6469	391	1 (ref.)	0.84 (0.56-1.26)	0.95 (0.71-1.26)	1.22 (0.95-1.56)	

Note. *Date of tobacco cessation was not available in 134 participants.

**Several missing values for competitiveness, tension and dependency.

HR: Hazard Ratio; CI: Confidence Interval; P50: Percentile 50.

Table 4

Association (HR and 95% CI) between tobacco use and risk of depression in the SUN Cohort study. Sensitivity analysis

	cases/N	Former smoker >10y*	Former smoker <10y*	Current smoker
Overall sample	884/16385	0.92 (0.71-1.19)	1.14 (0.94-1.37)	1.24 (1.05-1.47)
Analysis from baseline to the first 6 years of follow-up	545/16385	0.78 (0.56-1.09)	1.09 (0.86-1.39)	1.30 (1.05-1.60)
Considering only cases diagnosed after the first 2 years of follow-up	716/16138	1.01 (0.76-1.34)	1.18 (0.96-1.45)	1.27 (1.05-1.53)
Considering only cases diagnosed after the first 4 years of follow-up	488/14900	1.03(0.73-1.46)	1.15 (0.89-1.48)	1.29 (1.04-1.62)
Excluding participants with cardiovascular disease, diabetes or cancer at baseline	827/15423	1.02 (0.78-1.32)	1.11 (0.92-1.35)	1.25 (1.05-1.49)

Note. *Date of tobacco cessation was not available in 134 participants.

Adjusted for sex, age, years of education (y, continuous), living alone (yes, no, unknown), unemployment (yes/no), body mass index (Kg/m2, continuous), physical activity (METs-h/w, continuous), total energy intake (kcal/d, continuous), alcohol consumption (four categories), adherence to the Mediterranean diet (MEDAS questionnaire unit, continuous) and personality traits (competitiveness, psychological tension and dependence: low, medium, high, unknown).

HR: Hazard Ratio; CI: Confidence Interval; Q_2: questionnaire 2; 2-y of follow-up; Q_4: questionnaire 4; 4-y of follow-up.

onset associated with the presence of depression at baseline (multivariable OR = 1.44; 95% CI = 1.13-1.83). When the analysis was repeated separating never and former smokers, the association between the presence of depression at baseline and the risk of smoking onset or relapse was no longer significant. Multivariable OR for smoking onset among never smokers: 1.13 (0.71-1.82), OR for smoking relapse among former smokers: 1.26 (0.89-1.78).

Discussion

In these analyses conducted within the framework of the SUN cohort, we found that current smoking was prospectively associated with a higher risk of depression. Additionally, participants with elevated tobacco dose and smoking duration (measured as at least 20 pack-years of cigarette smoking) had a significant increment in the risk of developing depression during follow-up. Moreover,

smoking cessation was inversely associated with depression incidence.

These results confirm the results obtained in our cohort more than 10 years ago with less time of follow-up and a smaller sample size. In that analysis, being a smoker was associated with a 39% relative increment in the risk of depression. Moreover, smoking duration and the number of cigarettes smoked per day were also associated with the depression risk (Sánchez-Villegas, Serrano-Martínez, Alonso, Tortosa & Martínez-González, 2008b).

The presence of depression at baseline doesn't seem to be associated with smoking onset in our cohort. However, although the association was not statistically significant for smoking relapse among former smokers, the magnitude of the association could be considered moderate, with an increment in the risk of smoking relapse of 26%. Probably the small number of participants in this analysis did not allow us to detect statistically significant associations.

A detrimental role of smoking in depression have been reported by some longitudinal studies (Clyde, Smith, Gariépy & Schmitz, 2015; Flensburg-Madsen et al., 2011; Raffetti, Donato, Forsell & Galanti, 2019; Zhang, Woud, Becker & Margraf, 2018) although the results are not fully consistent (Bruin, Comijs, Kok, Van der Mast & Van den Berg, 2018; Furihata et al., 2018).

Several mechanisms could explain the deleterious role of tobacco in depression. Exposure to nicotine and other additives of tobacco cigarettes could predispose to depression through several physiological mechanisms related to central nervous system function. For example, smokers show an important reduction in monoamine oxidase B levels (Fowler et al., 1996). This enzyme is involved in brain and peripheral oxidative catabolism of neurotransmitters including dopamine. Dopamine system dysregulation has been recently associated with several core symptoms in depression such as the presence of anhedonia (Belujon & Grace, 2017). Moreover, animal models and human studies have suggested that long-term exposure to nicotine might act as a stressor leading to a dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis (Furihata et al., 2018) with cortisol, adrenocorticotrophic hormone, and corticotropin-releasing hormone simultaneously elevated. This dysregulation would be implicated in a reduced volume of the hippocampus, reduced rates of neurogenesis, and increased levels of pro-inflammatory cytokines and oxidative stress markers. Both low-grade systemic inflammation and oxidative stress are implicated in several pathophysiologic mechanisms related to depression.

The role of smoking in depression risk could be mediated through the incidence of several diseases consequence of tobacco use such as cardiovascular disease that has been associated with depression in our cohort (Molero et al., 2017).

Another possible explanation of the association between tobacco use and depression is the presence of several

confounding factors associated independently with both variables such as lifestyle or personality characteristics. However, this explanation is unlikely since we have adjusted the models for several lifestyle variables (e.g., physical activity, alcohol intake, or dietary habits) and personality traits such as tension, competitiveness, or dependence level. Finally, participants with subclinical depression but without a depression diagnosis at baseline could have initiated the smoking habit to alleviate their initial symptoms of an undiagnosed depression at baseline and the obtained results could have been a consequence of a reverse causation bias. These undiagnosed cases potentially responsible for a reverse causation bias are more likely to be reported after the first 2-4 years of follow-up. However, when we repeated the analyses after excluding early cases (in the first 2 o 4 years of follow-up) the results did not change.

The presence of depression at baseline was also prospectively associated with a higher likelihood of smoking onset in our cohort suggesting a bidirectional association between tobacco use and depression. Some other studies have reported results in the same line of thought. A representative sample of 44,921 adolescents found that among non-smoker, the lifetime prevalence of depression was approximately 50% lower than among smokers (Cohn, 2018). Other studies have found that among smokers with mental diseases smoking cessation rates remain consistently lower than for smokers without depressive symptoms (Huffman, Bromberg & Augustson, 2018; Secades-Villa, Weidberg, González-Roz, Reed & Fernández-Hermida, 2018). One of the most accepted explanations is that based on the self-medication hypothesis (as it has already been mentioned) that postulates that individuals turn to smoke to alleviate their symptoms but worsening them over time (Fluharty et al., 2017). Another possible explanation of this bidirectional association is shared vulnerability for both smoking addiction and depression occurrence, though that would not support a reduction of risk of depression associated with smoking cessation in this and other studies (Khaled et al., 2012; Zarghami, Taghizadeh, Sharifpour & Alipour, 2018).

Strengths of this study deserve to be mentioned and include its prospective longitudinal design, the use of previously validated methods, the large sample size, and the extensive control for confounding, including dietary factors. Participants were highly educated, which increases the quality of self-reported information and reduces the potential for misclassification bias. In addition, the restriction to a fairly homogenous subgroup of participants concerning educational level minimizes the potential for residual confounding and is an excellent technique to improve the internal validity of our results.

However, some possible limitations have to be also addressed. A limitation of this study is that the diagnosis of depression was self-reported, although the validity

of the approach adopted to adjudicate incident cases of depression during follow-up was validated in a sub-sample of this cohort (Sánchez-Villegas et al., 2008a). In addition to a cohort, design mitigates this to some extent. We restricted our cohort to highly educated participants to obtain a better quality of self-reported information. In this context, misclassification is more likely to be non-differential and therefore would bias the results towards the null.

Although all results were adjusted for a variety of major potential confounders, we cannot exclude the possibility of some unknown or unmeasured factors that could partly explain the reported results. This possibility will fit well in the hypothesis of shared vulnerability and we admit that this limitation is inherent to the observational design of our study. However, it would be unlikely that such an unknown factor leading to “shared vulnerability” might not be correlated with the many potential confounders controlled for in our study. Finally, our sample was not representative of the general population. However, lack of representativeness does not prevent establishing associations that can be generalized to other groups, as long as no biological mechanism suggests that the association no longer holds for other populations. The selection of study groups that maintain homogeneity concerning important confounders such as educational level, has been recommended to maximize the cohort validity, rather than aiming for a “representative sample” of a natural population (Rothman, Greenland & Lash, 2008), especially in the study of highly complex behaviors such as the ones that mediate depressive disorder and tobacco use.

In conclusion, a bidirectional association between tobacco use and depression was found in the SUN cohort study, reinforcing the conclusions of previous studies. The novelty brought by our study lays in the use of a design that is prospective longitudinal and the simultaneous analysis of the use, dose, and smoking duration. Moreover, we also assessed the role of smoking cessation in depression risk and we found that smoking cessation was inversely associated with depression incidence. On the other hand, the presence of a depressive disorder was prospectively associated with smoking onset, suggesting a bidirectional association between tobacco use and depression. Therefore, tobacco control and health promotion campaigns for smoking cessation could be considered as effective strategies of public health for the prevention and management of depressive disorders.

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Conflict of interests

Without relevance to this work, PM reports being supported by Clínica Universidad de Navarra and having received research grants from the Ministry of Education (Spain), the Government of Navarra (Spain), the Spanish Foundation of Psychiatry and Mental Health and AstraZeneca; he is a clinical consultant for MedAvanteProPhase and has received lecture honoraria from or has been a consultant for AB-Biotics, Janssen, Novumed, Roland Berger, and Scien-ta. The other authors declare no conflict of interests.

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ORIGINAL

A preliminary exploration on psychological variables related to online social network addiction

Exploración preliminar sobre las variables psicológicas implicadas en la adicción a redes sociales on-line

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Abstract

This study examined the roles of anxiety, experiential avoidance and meaning in life in the abusive use of social networks. Participants in the study (N = 235: 172 women, 62 men, 1 non-binary) volunteered to complete a brief online survey measuring experiential avoidance, anxiety and meaning in life. Correlational and linear regression analyses were performed controlling for age in both the total sample and the subsamples of men and women. The partial correlation analyses showed that, once age was controlled for experiential avoidance, anxiety and meaning in life were related to the abusive use of social networks in women, while for men, only anxiety was significant. For women the linear regression equation which best predicted abusive use of social networks included little meaning in life and high experiential avoidance. For men, only anxiety was a possible predictive factor of abusive use of social networks. These results are discussed with regard to existing research on abusive use of social networks, noting the possible protective effect of meaning in life and calling greater attention to gender differences in behaviors related to online social networks.

Keywords: anxiety, experiential avoidance, meaning in life, internet, addictive behavior

Resumen

El presente estudio examinó el papel de la ansiedad, la evitación experiencial y el sentido vital en el uso abusivo de redes sociales. Los participantes (N = 235: 172 mujeres, 62 hombres, 1 no-binario) completaron una breve encuesta dirigida a medir la evitación experiencial, la ansiedad y el sentido vital. Se llevaron a cabo análisis de regresión lineal y correlaciones controlando la influencia de la edad tanto para hombres como para mujeres. Los análisis de correlación parcial mostraron que, una vez controlada la edad de los participantes, tanto la evitación experiencial como la ansiedad y el sentido vital estuvieron relacionados con el uso abusivo de redes sociales en mujeres; sin embargo, para los varones, sólo la ansiedad se relacionó con un mayor uso de redes sociales. Para las mujeres la ecuación de regresión lineal que mejor predijo el uso abusivo de redes sociales incluyó un bajo sentido vital y una elevada evitación experiencial, mientras que para los varones sólo la ansiedad predijo el mayor uso de redes sociales. Los resultados obtenidos se discuten en relación con la investigación existente sobre el uso de las redes sociales, destacando el sentido vital como un posible factor protector y la importancia de una perspectiva de género para estudiar las redes sociales en línea.

Palabras clave: ansiedad, evitación experiencial, sentido vital, internet, conducta adictiva

According to Wasserman & Faust (1994), a social network is a social structure containing a set of actors and a set of dyadic ties identifying social relationships existing between these actors in the social context considered. Online social networks are widespread throughout society. Facebook is now, by a very wide margin, the biggest social network worldwide. As of the third quarter of 2021, Facebook had over 2.9 billion global monthly active users (Statista Research Department, 2021a). As of January 2021, the average time spent by day by American users on Facebook was 33 minutes, and that was the platform with the largest amount of time spent daily, followed by TikTok and Twitter (Statista Research Department, 2021b). In Spain, in 2020, there were 22 million Facebook profiles (the most popular social network), 4.1 million Twitter profiles, 20 million Instagram profiles, and 14 millions of LinkedIn profiles (The Social Media Family, 2021). It is therefore not surprising that “social network addiction” and even “Facebook addiction” may be spoken of (Karaïskos, Tzavellas, Balta & Paparrigopoulos, 2010; Lozano Blasco, Latorre Cosculluela & Quílez Robres, 2020; Ryan, Chester, Reece & Xenos, 2014).

In fact, it has been questioned whether it is possible to talk about an addiction to online social networks and what the criteria would be for differentiating “normal” from “pathological” use. Social network addiction can be defined as excessive participation or attachment in Social Network Sites (SNS) activities causing difficulties in everyday social functioning (Alzougool, 2018). In this direction, a comprehensive review carried out by Andreassen showed that the idea that some people show compulsive and uncontrollable behavior related to the social networks has empirical support and that the best way to understand such behavior is through the classic concept of addiction (Andreassen, 2015). Following this view, AlBarashdi (2020) found that 78% of the studies reviewed showed some negative consequences of social network addiction in young university students, especially, the impact on their academic performance. Furthermore, 18.4% of studies reviewed found that social network addiction is significantly positively related to depression and neuroticism.

The subject is not even close to being closed, and Koç & Akbiyik (2019) concluded that, although excessive use of social networks cannot be accepted as a behavioral addiction, some individuals with certain characteristics (timidity, loneliness, etc.) are more prone to develop addictive behavior to the social networks in everyday use.

Some demographic variables have also been shown to be relevant in regard to compulsive use of social networks. Thus, De Cock et al. (2014) found in a sample of 1,000 Belgian participants over 18 years of age, that gender and age explained 5% of use of social networks. Previously, Acar (2008) had already found that gender was one of the strongest and most ample predictors of time spent

on online social networks. Furthermore, it seems that the use made by men and women is different. Thus, for example, Tifferet (2018) performed a meta-analysis of privacy-seeking tendencies on social networks by men and women, and found that there were important differences, in that women were more worried about their privacy. Mazman & Usluel (2011) also found significant differences between women and men, with regard to four categories in which the most common uses of social networks were grouped (maintaining existing relationships, making new relationships, use for academic purposes and following specific agenda). In this sense, women use social networks more than men to keep up already existing relationships, while men use them more for making new relationships. That is, in addition to the quantitative differences concerning the use of social networks by men and women, there are also other qualitative differences.

Among the psychological factors which have been studied the most with regard to developing addiction to social networks loneliness is the most widely studied (Savolainen, Oksanen, Kaakinen, Sirola & Paek, 2020). Indeed, Savolainen et al. (2020) concluded that loneliness is consistently linked to compulsive internet use across countries. This important role of loneliness in developing problematic behaviors related to social networks has also been confirmed in Spain in a sample of male and female university students (Aparicio-Martínez et al., 2020). On the contrary, a systematic review concluded that, in general, “social aspects, including feelings of social support, social connectedness, and positive interaction quality, emerged as protective factors for SNS users” (Seabrook, Kern & Rickard, 2016, p. 9-10). Other factors concerning problematic use of social networks are relief from suffering and search for social relationships. Thus, Stockdale & Coyne (2020), in a three year follow-up longitudinal study found that the starting levels of use of social networks to relieve boredom were associated over time not only with greater problems in regard to the networks, but also to greater financial stress and higher levels of anxiety. In general, it has been proposed that the transition from normal to problematic use of the social networks takes place when the person uses them as a predominant means (sometimes the only one) of relieving stress, anxiety, loneliness or depression (Cheikh-Ammar, 2020; Griffiths, 2013; Xu & Tan, 2012). This use of social networks as an escape from unpleasant emotional states could be considered a case of what in recent years has been called “Experiential Avoidance” (EA).

The concept of EA is proposed by contextualism as a functional diagnostic dimension explaining the appearance and worsening of several psychological disorders (Hayes, Wilson, Gifford, Follette & Strosahl, 1996), among them addictions (Shameli & Sadeghzadeh, 2019). EA involves the unwillingness to remain in contact with private experiences, such as painful thoughts and emotions (Chawla & Ostafin,

2007). With regard to technology, García-Oliva & Piqueras (2016) found that EA largely explained addictive use of the internet, mobile phones and video games. In a similar direction, Lee (2017) found that the relationship between stress and internet and mobile phone addiction were mediated by certain EA factors. Recently, Faghani, Akbari, Hasani & Marino (2020) studied the relationship between several emotional and cognitive factors in predicting problematic internet use in a sole model. Results revealed full mediation of experiential avoidance and wishful thinking in the relationship between difficulties in emotion regulation and problematic internet use.

Although EA may be a basic psychological factor contributing to abuse of social networks, the predominant emotion or feeling it is desired to escape from through abuse of the networks would still have to be determined. As mentioned above, it has been proposed that people who abuse social networks could be escaping from loneliness (Morahan-Martin & Schumacher, 2003), stress (Brailovskaia, Rohmann, Bierhoff, Schillack & Margraf, 2019; Cheikh-Ammar, 2020), social anxiety (Lee & Stapinski, 2012), low self-esteem (Tazghini & Siedlecki, 2013), or general emotion regulation problems (Faghani et al., 2020), or a combination of these (e.g., Caplan, 2007). One factor studied little has to do with meaning in life. Zika and Chamberlain (1992) already highlighted the importance of vital meaning for psychology in the 1990s, although they also highlighted that such a construct has been the subject of few studies. Meaning in life may be defined as, "...the cognizance of order, coherence and purpose in one's existence, the pursuit and attainment of worthwhile goals, and an accompanying sense of fulfillment" (Reker & Wong, 1988, p. 221). Several studies have recognized the relationship between a low meaning in life and drug abuse (e.g., Nicholson et al., 1994). With specific reference to addictions to technology, Ghaderi Rammazi, Askarizadeh, Ahmadi & Divsalar (2018) found a lower meaning in life was related to stronger addiction to the Internet in an Iranian population.

The objective of this study was to find out any possible relationship existing between addiction to social networks on one hand, and on the other, certain factors that could account for its problematic use, such as experiential avoidance, anxiety, and meaning in life.

In the light of the literature reviewed, we started out from the hypothesis that the three variables considered in this study would be related to addiction to social networks. Both anxiety and experiential avoidance would do so directly, while meaning in life would show a negative relationship with addiction to social networks. Regarding the sociodemographic variables, it is postulated that gender and age would be relevant to explain the variability in addiction to social networks.

Method

Participants

This study was performed with a sample of 235 participants from a Spanish population aged 18 to 62 ($M = 30.35$; $SD = 10.54$). Of these, 172 were women (73.2%), 62 were men (26.4%) and one participant identified as non-binary (0.4%). Of the total participants, 117 received or had received psychological and/or psychiatric care (49.8%), and the remaining 118 participants had never received psychological and/or psychiatric care (50.2%).

Twenty participants were currently taking psychotropic medication (8.5%) and 215 were not (91.5%). Finally, concerning use of medication, under some of the above conditions, 67 participants had previously taken psychotropic medication (28.5%), and 168 participants had not (71.5%).

Instruments

Acceptance and Action Questionnaire II (AAQ-II; Bond et al., 2011). This questionnaire assesses the construct referred to variously as acceptance, experiential avoidance, and psychological inflexibility. It contains seven items which are answered on a seven-point Likert scale. The items reflect an unwillingness to experience unwanted emotions and thoughts (e.g., "I worry about not being able to control my worries and feelings") and the inability to be in the present moment and behave towards value-directed actions when experiencing psychological events that could undermine them (e.g., "My painful memories prevent me from having a fulfilling life"). Results with 2,816 participants across six samples indicated the satisfactory structure, reliability and validity of this measure. This study used the Spanish version by Ruiz, Langer Herrera, Luciano, Cangas & Beltrán (2013). The psychometric data for this Spanish version were similar to those for the original version of the AAQ-II. The internal consistency across the different samples was good (between $\alpha = .75$ and $\alpha = .93$). The AAQ-II scores were significantly related to general psychopathology and quality of life measures. The internal consistency of the AAQ-II in the work presented here was measured by Cronbach's alpha ($\alpha = .90$).

Beck Anxiety Inventory (BAI; Beck & Steer, 1993). This instrument is made up of 21 items which are answered on a Likert-type scale from 1 (*not at all*) to 4 (*severely*). All the answers make statements about symptoms referring to anxiety, such as "feeling hot", "wobbliness in legs", etc. This study used the Spanish version by Sanz & Navarro (2003). The psychometric properties of this questionnaire in the general population were studied in depth by Magán, Sanz & García-Vera (2008). Factor analyses suggested that the BAI taps a general anxiety dimension. The estimated internal consistency for the BAI was high ($\alpha = .93$). The BAI correlated .63 with the BDI-II and .32 with the Trait-Anger scale of the STAXI 2 (Magán et al., 2008). The

internal consistency of the BAI in our study was measured by Cronbach's alpha ($\alpha = .91$).

Purpose-In-Life Test (PIL, Crumbaugh & Maholick, 1969). This is the most widely used instrument for studying meaning in life based on the assumptions of Logotherapy by Victor Frankl (García-Alandete, Martínez & Sellés Nohales, 2012). It consists of 20 items answered on a seven-point Likert scale between two extremes (e.g., "Life seems: completely routine/always exciting"; "My life is: out of my hands and controlled by external factors/in my hands and under my control"). This study used the Spanish version by García-Alandete et al. (2012). A coefficient of $\alpha = .862$ for the scale indicates high internal consistency, similar to previous studies. The internal consistency of the PIL was measured in our investigation by Cronbach's alpha ($\alpha = .93$).

Test de Adicción a Redes Sociales [Social Network Addiction Test] (TARS; Basteiro Monje, Robles-Fernández, Juarros-Basterretxea & Pedrosa, 2013). This instrument has 36 items with two answer choices (true/false) evaluating abuse of social networks. Examples of some of the items are: "The use of social networks helps me be a more complete person", or "I am not as shy when I relate on the social networks". The questionnaire enjoys a unifactorial structure, with adequate fit indices ($\chi^2/df = 2.74$; Goodness-of-Fit Index [GFI] = .94). Its reliability is $\alpha = .90$. Although the authors found no statistically significant differences by sex, education or geographic area of the participants, the addiction decreased with age. The internal consistency of the TARS in our work was measured by Cronbach's alpha ($\alpha = .86$).

Procedure

This research was developed during the second semester of 2020 and received the approval of the Bioethics Committee of the University of Almería a few months before (UALBIO2020/007). The questionnaire was implemented on the Google Forms virtual platform so they could be administered without participants having to attend in person. Sampling was incidental and snowball, since participants were sought precisely through the social networks. On the first page of the questionnaire, after an explanation of the purposes of the study (informed consent) and participants' rights to data provided, demographic data were collected: nickname (optional), age, gender, education, residence in Spain or other territory, whether they had sought psychological and/or psychiatric attention previously, whether they were currently taking psychotropic medication and whether they had previously taken psychotropic medication. The second page of the questionnaire contained the AAQ-II and the BAI. The PIL was on the third page, and the TARS was on the last page. At the end a message appeared thanking them for their participation in the study and an

email address they could contact for any questions about the study or use of their data.

Data were analyzed using IBM SPSS Statistics software for Windows (Version 26).

Results

Descriptive data

Table 1 presents the means and standard deviations for participant age and their scores on the AAQ, BAI, PIL, for the total sample and for men and women separately. The person who was identified as non-binary gender was excluded from the analyses because there was only a single case.

Table 1

Means, standard deviations and comparison of means on AAQ-II, BAI, PIL and TARS in the subsamples of men and women

	Total	Women	Men	Student's t-test	p
Age	30.35 (10.54)	30.88 (10.69)	29.02 (10.20)	1.19	.23
AAQ-II	20.05 (8.42)	20.67 (8.46)	18.45 (8.15)	1.78	.07
BAI	11.83 (9.72)	12.97 (10.47)	8.55 (6.303)	3.91	.00
PIL	101.24 (19.63)	102.34 (20.20)	98.47 (17.85)	1.33	.18
TARS	8.85 (6.00)	9.05 (6.08)	8.32 (5.84)	1.41	.41

Note: AAQ-II: Acceptance and Action Questionnaire; BAI: Beck Anxiety Inventory; PIL: Purpose-in-Life Test; TARS: Addiction to Social Network Test.

The Student's *t*-test was calculated to check whether there were any statistically significant differences between men and women for the variables in the table above. The only variable in which men and women differentiated was on the BAI score ($t = 3.91$; $p < .01$), which was higher for women than for men.

Correlations between variables by gender

Table 2 shows the correlations between the variables studied, for the entire sample, controlling for the age of participants.

Due to the influence that participant gender could have, the same analyses were repeated for participants who identified themselves as women and for those who identified themselves as men. The data found are shown in Tables 3 and 4, respectively.

Variables predicting abusive use of social networks by gender

To determine which variables could predict addiction to social networks, three linear regression analyses were done: One for the general sample, another for participants who identified themselves as women and a third for those who identified as men. In the three linear regression analyses,

Table 2
Partial correlation for the total sample (controlling the age)

	AAQ-II	BAI	PIL	TARS
AAQ-II		.557**	-.626**	.383**
BAI			-.456**	.357**
PIL				-.402**

** $p < .01$.

Note: AAQ-II: Acceptance and Action Questionnaire; BAI: Beck Anxiety Inventory; PIL: Purpose-in-Life Test; TARS: Addiction to Social Network Test.

Table 3
Partial correlation for women (controlling the age)

	AAQ-II	BAI	PIL	TARS
AAQ-II		.588**	-.645**	.446**
BAI			-.483**	.368**
PIL				-.478**

** $p < .01$.

Note: AAQ-II: Acceptance and Action Questionnaire; BAI: Beck Anxiety Inventory; PIL: Purpose-in-Life Test; TARS: Addiction to Social Network Test.

Table 4
Partial correlation for men (controlling the age)

	AAQ-II	BAI	PIL	TARS
AAQ-II		.427**	-.702**	.168
BAI			-.526**	.303*
PIL				-.206

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

Note: AAQ-II: Acceptance and Action Questionnaire; BAI: Beck Anxiety Inventory; PIL: Purpose-in-Life Test; TARS: Addiction to Social Network Test.

Table 5
Multiple regression analysis for the total sample controlling the age of participants

Step	Variables entered	Adjusted R ²	Std. error of the estimates	β	t	p	Collinearity statistics	
							Tolerance	VIF
Step 1	Age	.025	5.926	-.170	-2.637	.009	1.000	1.000
Step 2	Age	.179	5.439	-.143	-2.412	.017	.995	1.005
	PIL			-.397	-6.678	.000	.995	1.005
Step 3	Age	.212	5.326	-.130	-2.234	.026	.991	1.009
	PIL			-.298	-4.560	.000	.789	1.268
	BAI			.217	3.317	.001	.786	1.272

Note: PIL: Purpose-in-Life Test; BAI: Beck Anxiety Inventory.

the dependent variable was participant score on the social network addiction test. To control for the effect of age, in the first step of these analyses, the age variable was entered using the “enter” method. In the next step, participant scores on the AAQ-II, on the Beck Anxiety Scale and on the PIL were entered as predictor variables. In this second step, stepwise regression analysis was used with a probability of F for inclusion of $<.05$ and of $F > .100$ for exclusion.

The equation resulting for the total sample was significant ($F(3, 234) = 22.04$; $p < .01$), explaining over 20% of the variance (adjusted $R^2 = .212$). Table 5 shows the results of the linear regression analysis for the total sample.

It may be observed that age was a variable that did in fact determine addiction to social networks. Once this variable was controlled for, the variables included in the equation were participant scores on the PIL and the BAI, leaving experiential avoidance out. It should be mentioned that the PIL was entered in the equation with a negative β weight, while the BAI had a positive β weight. Validity of the model was confirmed by checking independence of errors with the Durbin-Watson test, which found a result of 1.89, located between the critical values of 1.5 and 2.5.

When the analyses were repeated for the subsample of women, the resulting regression equation was equally significant ($F(3, 168) = 23.42$, $p < .01$). This equation explained over 28% of the variance in the scores of the participants on the Social Network Addiction Scale (adjusted $R^2 = .282$). Table 6 shows the results of the linear regression analysis for women:

It may be seen that age is again significant in predicting addiction to social networks in the subsample of women. And, again, the relationship is negative, that is, the older, the less addiction there is to the social networks. Once age was

Table 6
Multiple regression analysis for the sample of women controlling the age

Step	Variables entered	Adjusted R ²	Std. error of the estimates	β	<i>t</i>	<i>p</i>	Collinearity statistics	
							Tolerance	VIF
Step 1	Age	.041	5.953	-.216	-2.879	.004	1.000	1.000
Step 2	Age	.255	5.245	-.197	-2.289	.004	.997	1.003
	PIL			-.467	-7.066	.000	.997	1.003
Step 3	Age	.282	5.149	-.131	-1.917	.057	.894	1.118
	PIL			-.318	-3.750	.000	.583	1.716
	AAQ-II			.240	2.717	.007	.583	1.859

Note: PIL: Purpose-in-Life Test; AAQ-II: Acceptance and Action Questionnaire II.

Tabla 7
Multiple regression analysis for the sample of men controlling the age

Step	Variables entered	Adjusted R ²	Std. error of the estimates	β	<i>t</i>	<i>p</i>	Collinearity statistics	
							Tolerance	VIF
Step 1	Age	-.14	5.887	-.054	-.423	.674	1.000	1.000
Step 2	Age	.064	5.658	-.042	-.340	.735	.998	1.002
	BAI			-.303	2.440	.018	.998	1.002

Note: BAI: Beck Anxiety Inventory.

controlled for, the score of the participants in the Purpose-in-Life Test, with a negative β weight, took first place in the regression equation. In second place, participants score on the AAQ-II with a positive β weight, indicating a direct relationship between experiential avoidance and addiction to social networks. Again, the independence of errors was checked by the Durbin-Watson test, which found a score of 1.85, between the critical points of 1.5 and 2.5.

Finally, a third linear regression analysis was carried out for the subsample of men. The model just brushed statistical significance, but did not reach it ($F(2, 59) = 3.073$, $p = .54$). This regression equation explained a little over 6% of the total variation recorded in addiction to social networks among men (R^2 adjusted = .064). Table 7 summarizes the main results of the regression analysis for the subsample of men.

It may be observed in this subsample of men that age was not statistically significant in predicting the score on the scale of addiction to social networks. The score of the participants on the BAI is statistically significant. The Durbin-Watson test result was 2.25, below the critical point of 2.5.

Discussion

This study was based on the hypothesis that abusive use of social networks is related to high experiential avoidance, high anxiety and low meaning in life. This starting

hypothesis was partially confirmed. The correlations found between the variables confirmed these relationships, for both the total sample and for the subsample of women. However, in the subsample of men, only anxiety had a statistically significant relationship with social network addiction. It should be emphasized that when the linear regression analyses were done controlling for participant age in the sample of women, both meaning in life and experiential avoidance were included in the regression equation. Although due to the study design, causal relationships cannot be established between the variables, the data suggest the possibility that, at least to some extent, the use of social networks by the female population may be seen as an avoidance of some type of emotion, thoughts or other private events related to the loss of meaning in life. In any case, the combination of high experiential avoidance and low meaning in life seems to especially favor anxiety (Kelso, Kashdan, Imamoğlu & Ashraf, 2020). The results of this study suggest that this combination also has harmful effects insofar as abusive use of the social networks.

As mentioned above, a good part of psychological research on social networks has focused on loneliness as a major variable for explaining its abusive use (e.g., Savolainen et al., 2020). With regard to the results found in the regression analyses, it may be important to mention that previous studies have confirmed that social exclusion reduces the global perception of life as meaningful (Stillman et al., 2009). In this regard, meaning in life reduces the

negative impact of loneliness (Cole et al., 2015). The study by Cole et al. (2015) is consistent with the possibility that psychological resilience factors, like meaning in life, can outweigh the effects of a well-established psychological risk factor, such as social isolation. Thus, more attention to meaning in life as a protective psychological variable could be beneficial in understanding abusive use of social networks.

Concerning the regression analysis of the subsample of men, it should be underlined that anxiety has some relationship, although of little magnitude, with the abusive use of social networks. In the first place, it would have to be emphasized that among the participants in this study, the level of anxiety of men was significantly lower than in women. These results are contrary to those found by Azher et al. (2014) in a sample of Pakistani university students who habitually used the internet. In the second place, it would have to be considered that anxiety is precisely one of the psychological disorders which has been the most studied with regard to the consequences of problematic social networking site use (Hussain & Griffiths, 2018). Thus, it has been hypothesized that social media sites may become a source of stress contributing to elevated anxiety symptoms and related impairment (Vannucci, Flannery & Ohannessian, 2017), suggesting factors as diverse as communication overload (Chen & Lee, 2013), social comparison promoted by the networks (Chou & Edge, 2012) or the possibility of experiencing some type of cyber-victimization (Rose & Tynes, 2015).

In any case, the results of this study seem to indicate the need to consider differential abusive use of the social networks by men and women. In previous studies, done from a gender perspective, it has been emphasized that women and men are motivated to continue using social networking sites for different reasons. It seems that women are motivated by the ability to maintain close ties and gain social information, while men are by the ability to gain general information (Krasnova, Vilitri, Eling & Buxmann, 2017). Similarly, it has been observed that women usually use social networks to maintain relationships, while men use them to create new relations (Muscanell & Guadagno, 2012). This study shows that the loss of meaning in life and experiential avoidance could be key factors in explaining abusive use of the social networks by women, while anxiety would be a more important factor in explaining it in men.

When interpreting the results, it should be kept in mind that considerably fewer men participated in this study than women. It would be advisable to raise the number of male participants in future studies in order to be able to establish more robust comparisons between genders. Similarly, the nature of the design, which was correlational, impedes establishing causal relationships between the variables studied. Although it has been proposed that women may make abusive use of the network as a response to scant

meaning in life, it could well be the opposite relationship. That is, that based on abusive use of social networks a loss of meaning in life is generated. Likewise, both variables could depend on a third which was not considered in this study. To overcome this limitation, longitudinal studies should be undertaken to establish the direction of the relationship found between the variables. Nor can it be ignored that the population that participated in this study was in large part recruited from the very social networks for which we were studying abusive use. Therefore, it would not be surprising that the participants were not representative of the general population, and in some way, individuals with a higher probability of making heavy use of the social networks were already self-selected. In this sense, the generalizations that could be made to the general population might not be entirely right.

Future lines of work could concentrate on the role of meaning in life as a protective variable against adverse situations, such as loneliness or isolation, especially for women. It would be expectable that people with a higher meaning in life, in spite of going through difficult social situations, could have response options other than abusive use of the social networks. A line of intervention consistent with working indirectly on abusive use of social networks could be opened, by highlighting the subjects which are important to a person's life without needing to focus necessarily on abusive behavior involving social networks.

The results enable us to open a line of research and of novel intervention in regard to abusive use of social networks, emphasizing the psychological role, and especially meaning in life as a protective factor. The importance of considering abuse of social networks, and behavioral addictions in general, from a differential gender perspective should also be mentioned.

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Conflict of interests

The authors declare no conflicts of interest.

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ORIGINAL

How does smoking tobacco affect choosing a stable partner?

¿Cómo afecta el consumo de tabaco en la elección de pareja estable?

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Abstract

This study aimed to analyze the rejection towards smokers when considering a stable relationship. The sample included 445 participants who were recruited using the snowball method. A questionnaire created ad hoc was answered online by each participant. The effect of tobacco use was evaluated in choosing a stable partner, a stable partner to live with, and a stable partner to live with and have children. The results showed a significant rejection towards smokers for the different types of relationships. Statistically significant differences were found depending on the participants' educational background and tobacco use, and their partner's tobacco use. A higher level of rejection towards smokers was found in participants with university studies, in non-smokers, and those with a non-smoker partner. The main reasons for rejection were related to hygiene, health, and household economy. In conclusion, tobacco use can interfere with the establishment of a stable relationship. This argument could be added to the list of drawbacks associated with tobacco use for prevention and treatment.

Keywords: smoking, tobacco use, partner choice, prevention

Resumen

El objetivo de este estudio fue analizar el rechazo hacia los fumadores de cara al establecimiento de una relación de pareja estable. La muestra constó de 445 participantes que fueron reclutados mediante el método de bola de nieve. Se utilizó un cuestionario elaborado *ad hoc* que fue aplicado en línea de forma individual. Se evaluó la influencia del tabaquismo en la elección de pareja estable, estable con convivencia en el mismo hogar y estable con convivencia en el hogar e hijos en común. Los resultados mostraron un importante rechazo hacia personas fumadoras para los distintos tipos de relación. Se hallaron diferencias estadísticamente significativas en función del nivel de estudios, el tabaquismo de los participantes y el tabaquismo de sus parejas. Se encontró mayor nivel de rechazo hacia personas fumadoras en los participantes con estudios universitarios, en los no fumadores y en aquellos con pareja no fumadora. Los principales motivos de rechazo hicieron referencia a higiene, salud y gasto económico. En conclusión, el tabaquismo puede obstaculizar el establecimiento de una relación de pareja estable. Este argumento podría ser incorporado al listado de inconvenientes asociados al tabaquismo de cara a la prevención y el tratamiento.

Palabras clave: fumar, tabaquismo, elección de pareja, prevención

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Tobacco use is one of the major public health problems and is an important risk factor for the development of several health problems. It is related to approximately 8.7 million deaths per year, and the number is expected to increase (Global Burden of Disease 2019 Risk Factor Collaborators, 2020). In Spain, the daily prevalence of tobacco use is around 23% in men and 16% in women for the population older than 15 years old according to the European Health Survey (Instituto Nacional de Estadística, 2020a).

Contrary to the effects on health, the influence of tobacco use on social relationships and particularly on the choice of a partner has not been deeply studied. The results extracted from these studies could improve preventive and therapeutic interventions, as they provide knowledge that helps reduce social acceptance and sensitize society, thus generating a culture of tobacco rejection (Amigo, Álvarez & Secades-Villa, 2018; González-Roz, Secades-Villa, Martínez-Loredo & Fernández-Hermida, 2020; Vincke, 2016). In this context, the benefits of being in a relationship for health should be highlighted (for a review, see Berli, Schwaninger & Scholz, 2021; Perelli-Harris et al., 2018; Umberson & Montez, 2010).

Several studies have pointed to the role of tobacco use as a barrier to establishing a stable relationship in smokers. In this sense, a higher preference for non-smokers has been reported (Goldstein, 1991), a lower willingness from non-smokers to marry smokers (Dillard, Magnan, Köblitz & McCaul, 2013), and a lower attractiveness of smokers as a possible long-term partner (Vincke, 2016). Within other contexts with a culture of tobacco use rejection, such as in the United Arab Emirates or India, health-related reasons aside, there is a majority refusal to marry smokers (Bello et al., 2012; Sreedharan, Muttappallymyalil & Divakaran, 2010).

The focus has been placed on sporadic relationships as well. Thus, a lower willingness from non-smokers to date smokers has been reported (Dillard et al., 2013), a lower willingness to go out with smokers (Peretti-Watel, Legleye, Guignard & Beck, 2014), and less attractiveness of smokers as a possible short-term partner (Vincke, 2016). A recent report shows that even if the relationship is casual and intimate, the use of tobacco has a negative influence; pointing to bad breath, smell, or tobacco smoke as the main reasons (Amigo et al., 2018).

The previous literature is scarce and there are questions that need further investigation. Previous studies have not adequately answered the question of what effect tobacco use can have on choosing a stable partner. They have not focused on the different factors where tobacco use can condition a relationship, such as living in the same home or having children together. Furthermore, the reasons for the possible rejection towards smokers have not been explored. Finally, it should be noted that some of the studies carried out refer to specific cultural contexts in which the results

may not be generalizable to other populations, in which the culture regarding tobacco use is different.

The main objective of this study was to analyze the influence of tobacco use on the choice of a stable partner. The specific aims were: (1) analyze rejection for each type of partner relationship: a stable partner, a stable partner to live with, and a stable partner to live with and have children; (2) analyze the relation between the rejection and different sociodemographic variables (age, gender, educational level, tobacco use of the participant and tobacco consumption of their partner); and (3) explore the reasons related to the rejection towards smokers. Our main hypothesis is that tobacco use affects the probability of being rejected when people choose a stable partner. Moreover, the reasons of rejection toward smokers will differ if considering other elements involved in the relation, such as cohabitation or having children in common.

Method

Participants

The sample included 445 participants ($M = 25.41$ years; range = 18-69 years) recruited through the snowball method. The country of residence was Spain for the 97.75% of the participants, followed by United Kingdom and Mexico with 0.45% each one, by last France, Germany, Poland, Ireland, Italy and Venezuela with 0.22% each one. The sample was divided into two age groups, under and over 30 years of age, considering that from the age of 30 the establishment of a stable relationship is more relevant.

Table 1
Descriptive statistics of the sample

Variable	<i>n</i>	Percentage
Gender		
Women	278	62.5%
Men	167	37.5%
Age		
Under 30 years	389	87.4%
Over 30 years	56	12.6%
Educational level		
University studies	360	80.9%
High school studies	64	14.4%
Middle school studies	20	4.5%
Primary school studies	1	0.2%
Tobacco use		
Non-smokers	297	66.7%
Ex-smokers	52	11.7%
Smokers	96	21.6%
Relationship status		
With couple	276	62.0%
Singles	169	38.0%
Partner's tobacco use		
Non-smoker	207	75.0%
Smoker	69	25.0%

In Spain, country of residence of the vast majority of the sample, according to 2020 data from the National Institute of Statistics, the average marriage age is 38.83 years old, and that of the first child is 31.22 years old (Instituto Nacional de Estadística, 2020b; Instituto Nacional de Estadística, 2020c). The descriptive data of the sample are collected in Table 1.

Instruments and procedure

An ad hoc questionnaire was created. It collected the following data: age, gender, country of residence, educational level, participant's tobacco use, partner's tobacco use, and rejection to the establishment of the different types of couple relationship, together with the reasons for this rejection. This objective categorization of relationship components avoided more complex cultural referents or legal terms, such as marriage. The items referring to the reasons for rejection were of non-mandatory answer.

Items related to rejection appeared first. There were statements such as “If a person smoked it would negatively affect me, to the point of rejecting the beginning of a stable relationship with them.” The answer modality was using a five-point Likert-type scale that reflects the degree of agreement, from 1 (“Strongly disagree”) to 5 (“Strongly agree”). Next, a multiple-choice question about the reasons for rejection was posed.

The questionnaire was applied online individually, using *Google Forms*, and spread through social networks under the name of “Survey on tobacco use”. Participation was voluntary and unpaid. The participants were informed about the anonymity, confidentiality, and subsequent use of the data. Before collecting the answers, the research was approved by the Research Ethics Committee of the Principality of Asturias (reference assigned: TFG/26/18).

Data analysis

The rejection differences considering the different variables measured by the Likert scale were analyzed using ANOVA. Corrections of the DMS and Games-Howell type for multiple post hoc comparisons were used, according to the compliance of the principle of homoscedasticity. Rejection and related reasons were analyzed using frequency analysis. The researchers dichotomized the Likert rejection variables scale. The purpose of the transformation was to improve the interpretation of the results by presenting global percentages of rejection and provided reasons of those participants who rejected smokers. For this, responses greater than 3 on the Likert scale, those that reflected agreement with the statement, were considered as rejection. This type of transformation procedure was supported by previous literature (Jeong & Lee, 2016). The statistical package used was SPSS Version 27 (IBM Corp., Armonk, NY, 2020).

Table 2
Rejecting level toward smokers according the types of relationships

Variable	Stable partner		Stable partner to live with		Stable partner to live with and have children	
	<i>M (SD)</i>	test stat. (<i>p</i>) effect size stat.	<i>M (SD)</i>	test stat. (<i>p</i>) effect size stat.	<i>M (SD)</i>	test stat. (<i>p</i>) effect size stat.
Gender						
Men	3.0 (1.3)	1.879 ^a (0.061)	3.0 (1.4)	0.647 ^a (0.518)	2.9 (1.5)	0.451 ^a (0.652)
Women	2.7 (1.4)	1.369	2.9 (1.4)	1.419	2.8 (1.5)	1.470
Age						
Under 30 years	2.9 (1.4)	0.436 ^a (0.730)	3.0 (1.4)	0.187 ^a (0.819)	2.9 (1.5)	0.943 ^a (0.681)
Over 30 years	2.8 (1.5)	1.374	2.9 (1.5)	1.419	2.7 (1.5)	1.469
Educational level						
University studies	3.0 (1.3)	8.233 ^b (<0.001) ^{d, e}	3.1 (1.4)	7.734 ^b (<0.001) ^{d, e}	3.0 (1.5)	6.189 ^b (0.002) ^{d, e}
High school studies	2.3 (1.4)	0.040	2.5 (1.4)	0.038	2.4 (1.5)	0.031
Middle school studies	2.3 (1.3)		2.4 (1.3)		2.3 (1.2)	
Tobacco use						
Non-smoker	3.3 (1.2)	77.036 ^c (<0.001) ^{f, g, h}	3.4 (1.3)	79.753 ^c (<0.001) ^{f, g, h}	3.2 (1.4)	33.787 ^c (<0.001) ^{f, g, h}
Ex-smoker	2.6 (1.3)	0.268	2.8 (1.3)	0.265	2.6 (1.3)	0.133
Smoker	1.6 (0.9)		1.6 (1.0)		1.9 (1.2)	
Partner's tobacco use						
Non-smoker	3.2 (1.4)	5.857 ^a (<0.001) ⁱ	3.3 (1.4)	5.614 ^a (<0.001) ⁱ	3.1 (1.5)	3.802 ^a (<0.001) ⁱ
Smoker	2.2 (1.2)	1.350	2.2 (1.2)	1.380	2.4 (1.3)	1.426

Note. ^at-test. ^b Analysis of variance (ANOVA) following post-hoc test corrected by DMS. ^c Analysis of variance (ANOVA) following post-hoc test corrected by Games-Howell. ^d University studies > High school studies ($p < 0.05$). ^e University studies > Middle school studies ($p < 0.05$). ^f Non-smoker > Ex-smoker ($p < 0.05$). ^g Non-smoker > Smoker ($p < 0.05$). ^h Ex-smoker > Smoker ($p < 0.05$). ⁱ With non-smoker partner > With smoker partner ($p < 0.05$). Effects sizes correspond to Cohen's *d* for t-test analyses and partial eta-squared (η^2) for ANOVA analyses.

Results

Out of the total number of participants, 40.04% would reject a smoker for a stable relationship, 42.90% would reject them if it included living together, and 38.90% if it implies having children as well.

Statistically significant differences were found in the level of rejection according to the different variables (Table 2). No differences were found in gender or age. Regarding educational level, a significantly higher rejection was found in participants with university studies than with high school studies and with secondary studies. Concerning tobacco use, non-smokers presented a significantly higher rejection than ex-smokers and smokers; ex-smokers also presented a greater rejection than smokers. Lastly, the participants with a non-smoking partner showed a significantly higher rejection than those with a smoking partner.

The main reasons for rejection towards smokers for the different types of couple relationships refer mainly to health, hygiene, and household economy (Table 3). The percentages correspond to subjects that showed rejection

toward smokers in each different type of relation, with a report criterion of more than 20% of the received responses.

Discussion

The main aim of this study was to analyze the influence of tobacco use on the choice of a stable partner. Following our main aims, the results showed that: (1) there is a rejection towards smokers as stable partners, especially if considering living with and having children in common; (2) the highest rates of rejection towards smokers are among participants with university studies, non-smokers, and those with a non-smoking partner; and (3) the main reasons for rejection are health, hygienic and household economy.

The findings showed how around 40% of participants would reject having a stable relationship with a smoker. Specifically, 40.04% of participants would reject them for a stable relationship, 42.90% if it includes living together and, 38.90% if it also implies having children together. This follows the direction of previous studies, in which participants overwhelmingly preferred non-smokers as a stable partner (Goldstein, 1991). In addition, the percentage of rejection towards non-smokers increases from a stable relationship to a relationship that includes living in the same home. That is, when there is a factor that implies a higher level of involvement in the relationship, the rejection towards smokers increased. This increase was not reflected when, in addition to coexistence, the relationship implies having children. Despite this, the rejection percentages show continuity for the different types of relationships.

Previously, in regards to a casual and intimate relationship, it was found that for around 3.5% of smokers, 27% of ex-smokers, and 42% of non-smokers, the fact that a person smokes would have a negative effect (Amigo et al., 2018). This result contrasts with those obtained, which places the rejection percentage for the entire sample at around 40% for the different types of stable relationships. Thus, the rejection of smokers in the general population was located in these types of relationships, which imply long-term commitment and other associated elements, in values similar to those found only in the non-smokers group in the case of occasional relationships. In addition, these percentages in rejection contrast with the preference towards smokers of around 11% for a casual and intimate relationship found in the previous study, a figure that despite being low could be reflecting that there is a certain attraction towards people smokers. Thus, although it is possible that tobacco is a short-term pairing strategy in some cases (Vincke, 2016), this seems to be ruled out when it comes to establishing a long-term relationship.

On the other hand, the fact that a person smokes or not seems to have an important influence on their preferences when choosing a partner. The results showed a greater rejection

Table 3
Main reasons for rejecting smokers

Reasons	Response percentage
Stable partner responses, <i>N</i> = 178	
Tobacco smell	83.71%
Tobacco breath	78.65%
Partner's health	72.47%
Tobacco smoke	71.35%
Own health	69.66%
Household economy	26.40%
Leaving leisure facilities to smoke	26.40%
Stable partner to live with responses, <i>N</i> = 185	
Tobacco smell	85.95%
Tobacco smoke	81.08%
Own health	78.92%
Partner's health	75.14%
Tobacco breath	71.35%
Household economy	44.32%
Leaving leisure facilities to smoke	24.32%
Stable partner to live with and have children responses, <i>N</i> = 169	
Children's health	95.27%
Learning of smoking behavior	75.74%
Partner's health	64.50%
Tobacco smell	66.27%
Own health	62.72%
Tobacco smoke	62.72%
Tobacco breath	54.44%
Household economy	38.46%
Leaving leisure facilities to smoke	21.89%

towards smokers by non-smokers, which was reduced in ex-smokers and even more in smokers. These results are similar to those previously found, where non-smokers mostly preferred a non-smoker while smokers were indifferent to tobacco use (Goldstein, 1991). Likewise, participants with a non-smoking partner showed a higher level of rejection towards smokers than those with a smoking partner. Some nonsmokers may have a lower prior tolerance towards tobacco use, or the attitude towards tobacco may become more tolerant as the relationship with a smoker develops.

Regarding the differences depending on the educational level, there is a greater rejection from the participants with university studies, followed by those with high school and middle school studies. It is possible that tolerance to tobacco is directly related to the level of education, as occurs with the use itself, which according to statistics is more prevalent in people with a secondary education level (Instituto Nacional de Estadística, 2020a).

The most frequent reasons for rejection towards smokers were those related to health (own, partner's, or children's), hygienic reasons (smell, smoke, and breath), and household economy. Economic spending becomes more important to a greater number of aspects involved in the relationship if it includes living together in the same home and even more so if it involves having children in common. The learning of smoking behavior by children affects in an important way when it comes to a relationship that involves having children together. The other aspects present greater stability among the different types of relationships. These results contrast with those found for a casual and intimate partner relationship, where the reasons for negative influence referred to hygiene, and those related to health were left in the background (Amigo et al., 2018).

From a gender perspective, it is worth highlighting the absence of differences in the variables studied. In any case, future analyzes should delve into the qualitative aspects in which there could be remarkable gender aspects, such as the influence of the partner's tobacco use during pregnancy (Míguez & Pereira, 2020). On the other hand, no transgender or gender non-binary people responded to the questionnaire. Future studies should take this aspect into account in their sampling strategy. Another aspect non-addressed in this work is whether there is an implication of sexual orientation in the influence of smoking on the choice of partner.

The main limitation of this study is that snowball sampling does not always guarantee the representativeness of the sample. This method poses problems of sample diversity (for a review, see Kirchherr & Charles, 2018). Remarkably, the analyzed sample has a higher percentage of women than men. Moreover, has more people with university studies than without them. These facts compromise the generalizability of the obtained results. Secondly, the employed questionnaire is not validated. Furthermore, there

are limitations due to the use of questionnaires in the health research that should be considered, particularly when online surveys are used (for a review, see Andrade, 2020). Another aspect to consider is that the age classification in analyses is established considering sociodemographic statistics of the main population studied. Future research should ask the participants if being in a relationship is truly important for them at the time of evaluation, as a control variable, and for classification proposes. Lastly, the level of tobacco use of the participants has not been taken into account, which could report differences between the smoking participants. Finally, there may have been an underestimation regarding the establishment of a stable relationship with children in common, the wording of the item may have led to the understanding that the question referred to having children in a stable relationship in which previously there was a coexistence.

It is also important to note the contrast of the findings with respect to other cultural contexts in which there is a large majority rejection towards smokers when establishing a relationship (Bello et al., 2012; Sreedharan et al., 2010). These cultures of rejection, which do not necessarily respond to health criteria, contrast with the culture of a higher tobacco use acceptance that exists among the Western society, specifically in Spain. This culture needs a change aimed at reducing this social acceptance and raise awareness about the health problems that tobacco use generates (Amigo et al., 2018; González-Roz et al., 2020; Vincke 2016). In the case of the current study, the differences between countries or regions of residence were not possible. For future research, international sampling and between regions analyses could be addressed.

In terms of generalizability, the interpretation of the findings must be cautious. The sample is mainly of women and persons with universities studies. In this sense, also to prevent inadequate interpretations, effect sizes have been included in the reported results.

In conclusion, the results of the study indicate that tobacco use can challenge a stable relationship. Thus, the relevance of the research comes from the possible direct implications of the results as arguments for prevention and treatment. This type of social argument has extensive implications due to the link between health and having a partner (for a review, see Berli et al., 2021; Perelli-Harris et al., 2018; Umberson & Montez, 2010). This argument could be added to the list of inconveniences associated with tobacco use. This kind of strategy centered in the social relations could be put into practice and compared with the current more centered on the effects of tobacco use on physical and mental health. It should be considered especially between the ages that represent the critical stage in the consolidation of tobacco addiction, between 13 and 20 years old (Amigo, 2020); and in older people, when aspects of coexistence and children in common are included.

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Conflict of interests

The authors declare no competing interests.

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ORIGINAL

Spanish validation of the Gamblers' Belief Questionnaire (GBQ)

Validación española de la escala "Gamblers Belief Questionnaire (GBQ)"

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Abstract

The objective of this study is to validate The Gambler's Beliefs Questionnaire, a measure of gamblers' cognitive distortions. The psychometric properties of the scale were analyzed with a Spanish sample of 515 participants aged from 16 and 24 years. Three scales related to pathological gambling (SOGS-RA and MAGS) and to social desirability were administered. A cross-sectional validation was performed, obtaining a scale with 21 items distributed in two independent factors (Luck/perseverance and Illusion of control). The internal consistency ($\alpha = .93$) and test-retest reliability ($r = .69$) are adequate. GBQ scale scores correlate significantly with other measures of pathological gambling (SOGS: $r = .35$; MAGS: $r = .40$, both $p \leq .001$). Higher levels of cognitive distortions are associated with a higher likelihood of being classified as a problem or at-risk gambler. GBQ scores are influenced by social desirability, although the effect sizes are small (r below .20). The GBQ is a useful instrument in the diagnosis and evaluation of the treatment of Spanish youths and adolescents with gambling problems.

Keywords: gambling, questionnaire validation, Gamblers' Beliefs Questionnaire, cognitive distortions, teenagers, youth

Resumen

El objetivo de este estudio es la validación española del "Gamblers Belief Questionnaire (GBQ)" que mide distorsiones cognitivas relacionadas con los problemas de juego. Se analizan las propiedades psicométricas de la escala en 515 jóvenes españoles, de 16 a 24 años. Se administraron tres escalas sobre juego patológico (GBQ, SOGS-RA y MAGS) y deseabilidad social. Se realizó una validación cruzada, obteniéndose una escala de 21 ítems con una estructura bifactorial (Suerte/Perseverancia e Ilusión de Control). La consistencia interna ($\alpha = .93$) y estabilidad temporal ($r = .69$) de la escala son adecuadas. Las puntuaciones de la escala GBQ correlacionan de forma significativa con otras medidas de juego patológico (SOGS: $r = .35$; MAGS: $r = .40$, ambas $p \leq .001$). Un mayor nivel de distorsiones cognitivas se asocia a mayor probabilidad de ser clasificado como jugador con problemas o de riesgo. Las puntuaciones del GBQ están influenciadas por la deseabilidad social, aunque los tamaños del efecto son pequeños (r menores a .20). El GBQ es un instrumento útil en el diagnóstico y evaluación de tratamientos de jóvenes y adolescentes españoles con problemas de juego.

Palabras clave: juego, validación de cuestionario, Gamblers Belief Questionnaire, distorsiones cognitivas, adolescentes, jóvenes

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Gambling addiction or gambling disorder is a non-substance psychological addiction involving loss of control and dependence on gambling (American Psychiatric Association, APA, 2013). It has negative outcomes on the finances, social relationships and health of those affected (World Health Organization, 2017). Gambling disorder has been linked to substance abuse, depression, anxiety, and emotional regulation difficulties (Jauregui, Estévez & Urbiola, 2016). Among the factors contributing to the incidence and maintenance of the disorder are cognitive distortions related to gambling (Chan, Ruiz-Pérez, Morales-Quintero & Echeburúa, 2019; Buen & Flack, 2021), such as the illusion of control, luck, superstitions, predictions and self-

correcting chance (Cosenza & Nigro, 2015). A lower level of cognitive bias is associated with a better understanding of chance, the impossibility of predicting results and a higher rate of quitting gambling (Labrador, Mañoso & Alba, 2008; Labrador, Labrador, Crespo, Echeburúa & Becoña, 2020). Indeed, one approach to clinically treating this disorder and problem gambling is to correct the distortions related to gambling (Gooding & Tarrier, 2009).

In young Europeans, pathological gambling rates range from 0.2% to 12.3% (Calado, Alexandre & Griffiths, 2017) and in Spain from 0.72% to 5.6% (Becoña, Míguez & Vázquez, 2001; Chóliz, Marcos & Lázaro-Mateo, 2019). In general, the age of onset is decreasing (13 or 14 years), although there are not many studies on problem gambling

Table 1
Validation and psychometric properties of the GBQ scale in different countries

Country	Author and year	N	Sample	Reverse translation	Nº items	EF	Reliability	Validity
USA	Steenbergh et al., 2002	403	Community and university	Original versions	21	EFA: 2 factors	$\alpha = .92$ F1 $\alpha = .90$ F2 $\alpha = .84$ $r = .77$	GBQ with duration of gambling sessions: $r = .43$, $p = .001$ Problematic scores higher than non-problematic GBQ with social desirability: $r = -.03$, $p > .050$
Hispanic USA	Winfree, Meyers & Whelan, 2013	219	Community	Yes	20	EFA: 2 factors	$\alpha = .95$ F1 $\alpha = .96$ F2 $\alpha = .86$	GBQ-S with SOGS: $r = .33$, $p < .001$ GBQ-S with DSM-IV: $r = .35$, $p < .001$ Differences in GBQ-S between non-gamblers and non-pathological gamblers and problem gamblers classified by SOGS and DSM-IV
China	Wong & Tsang, 2012	258	Youth services centres	Yes	14	EFA: 2 factors	$\alpha = .91$ F1 $\alpha = .87$ F2 $\alpha = .82$	GBQ-C with GUS-C: $r = .52$, $p < .01$ GBQ-C with GRCS-C dimensions: r entre .48 y .75, $p < .01$ GBQ-C accounted for 22% of SOGS-RA variance controlling for sex and age
Italy	Marchetti et al., 2016	749	Community	Yes	21	EFA: unidimensional	$\alpha = .93$ $r = .83$	GBQ-I with SOGS: $r = .42$; with GABS: $r = .63$; with gambling frequency: $r = .26$; with BDI-II: $r = .19$, $p < .01$; with STAI-Y state and trait: $r = .18$, $p < .01$ and $r = .16$, $p < .01$ Differences in GBQ-I means between non-gamblers, social gamblers and problem gamblers GBQ-I accounted for 22.1% of SOGS variance controlling for sex and age
Argentina	Pilatti, Cupani, Tuzinkievich, Winfree, 2016	508		Winfree et al., 2013	20	EFA: 2 factors	F1: $p = 0.94$ F2: $p = 0.85$	Illusion of control ($r = 0.40$, $p \leq 0.001$) and Luck/Perseverance ($r = 0.45$, $p \leq 0.001$) with gambling severity (S-PGSI) Factors F1 and F2 increased the variance explained by gambling severity by 12% (men) and 31% (women)

Note. GBQ: Gamblers' Beliefs Questionnaire; F1: Luck/Perseverance and F2: Illusion of control; GBQ-S: Spanish version Gamblers' Beliefs Questionnaire; SOGS: South Oaks Gambling Screen; DSM-IV: Diagnostic Criteria; GBQ-C: Chinese version Gamblers' Beliefs Questionnaire; GUS-C: Gambling Urge Scale-Chinese; GRCS-C: Gambling Related Cognition Scale-Chinese; SOGS-RA: South Oaks Gambling Screen revised for adolescents; GBQ-I: Italian version Gamblers' Beliefs Questionnaire; GABS: Gambling Attitudes and Beliefs Survey; BDI-II: Beck Depression Inventory II; STAI-Y: State-Trait Anxiety Inventory Y; S-PGSI: Spanish-Problem Gambling Severity Index.

and gambling disorders at these ages (Ciccarelli, Nigro, D'Olimpio, Griffiths & Cosenza, 2021; Estévez, Herrero & Sarabia, 2014; Labrador et al., 2021; Muñoz-Molina, 2008).

The measurement of factors associated with gambling disorder, such as cognitive distortion, can contribute to understanding this type of addiction. Cognitive biases are created by reducing large amounts of available information to facilitate cognitive processing tasks, which can lead to drawing distorted conclusions from reality. In gambling, cognitive biases (for example, the illusion of control, evaluation biases about outcomes, or the gambler's fallacy) can lead to irrational conclusions about the probability of predicting or controlling the outcomes of an event occurring by chance, that is, one that is unpredictable and uncontrollable (Labrador et al., 2021). Several studies have shown that, while cognitive distortions are found in non-gamblers, such biases grow as the participation in gambling and its problems increase (Goodie & Fortune 2013; Labrador et al., 2021). Moreover, cognitive distortions in students have been shown to be an important risk factor for the development of gambling problems (MacKay & Hodgins, 2012).

Nevertheless, most research involving young people with gambling problems has been carried out in Anglo-Saxon countries and cannot be extrapolated to Spain. An initial review found five specific instruments in Spanish for young people. The SOGS-RA (Winters, Stinchfield, Fulkerson, 1993, translated by Secades & Villa, 1998), MAGS (Shaffer, LaBrie, Scanlan, & Cummings, 1994, translated by Secades & Villa, 1998), and DSM-IV-J (Fisher, 1993, translated by Becoña & Gestal, 1996), which are used to discriminate between gamblers with and without pathologies, have been validated in adolescents but not in the Spanish version. The Gambling Motives Questionnaire (GMQ; Stewart & Zack, 2008) has been validated in young Spanish people (Cerdà, Nebot, Campos & Quero, 2016), but does not measure cognitive distortions. Only the Inventory of Thoughts on Gambling (Echeburúa & Báez, 1994) evaluates cognitive distortions, focusing on users of slot machines. All the Anglo-Saxon instruments reviewed are also limited to classifying gamblers with or without problems; the only one to measure cognitive distortions about gambling is the Gamblers' Beliefs Questionnaire (GBQ) (Steenbergh, Meyers, May & Whelan, 2002).

The GBQ scale has been validated in different countries and languages (see Table 1), allowing for cross-cultural comparisons. It has high internal consistency and test-retest reliability, and high convergent validity with the SOGS and the DSM-IV. In addition, the GBQ scale is related to constructs associated with the development and maintenance of pathological gambling, and correlates with the Eysenck impulsivity questionnaire (Mackillop, Anderson, Castelda, Mattson & Donovan, 2006), the Canadian Problem Gambling Index (CPGI) (Ferris

& Wynne, 2001), and the Toronto Alexithymia and Motivation Scale (Mitrovic & Brown, 2009). Given the scarcity of instruments validated in Spanish and the fact that the scales do not include measurements of cognitive distortions, the objective of this study was to validate the "Gamblers' Beliefs Questionnaire" (Steenbergh et al., 2002) in Spanish adolescents and with young people.

Method

Sampling

The type of sampling applied was incidental. The sample was obtained in October and November 2020 and was composed of $N = 515$ Spanish students of secondary and university education in the city of Burgos. Women represented 53.2% ($n = 274$) of the sample and men 46.8% ($n = 241$). Ages ranged from 16 to 24 years ($M = 20.04$; $SD = 2.53$), with 38.8% ($n = 200$) aged between 16 and 18 years, 26.6% between 19 and 21 years ($n = 137$) and 34.6% ($n = 178$) between 22 and 24 years. High school students comprised 37.9% ($n = 195$), and 62.1% ($n = 320$) were at university.

Instruments

Gamblers' Beliefs Questionnaire (Steenbergh et al., 2002). This consists of 21 items with response scales from 1 = strongly agree to 7 = strongly disagree. Items were recoded so that higher scores indicate greater cognitive distortion. The total score range is 21 to 147. The internal consistency of the original version of the scale is .92 and test-retest reliability is .77. It has two related factors: Luck/Perseverance ($\alpha = .90$) and Illusion of control ($\alpha = .84$).

Massachusetts Gambling Screen (Shaffer et al., 1994, translated by Secades & Villa, 1998). This has 26 items and two subscales with yes/no answers. The first assesses the DSM-IV criteria, with a score greater than 5 on all 12 items indicating gambling problems. The second MAG subscale measures the participants' assessment of their gambling behaviour; a score of 2 or more points on its seven items represents gambling problems, 0 to < 2 points means in transition, and a negative score shows no gambling problems. The original scale has a Cronbach's alpha coefficient of .87, with .87 (DSM) and .83 (MAG) for the subscales. In our study, the internal consistencies were: $\alpha = .88$ (Total scale); $\alpha = .83$ (DSM) and $\alpha = .68$ (MAG).

South Oaks Gambling Screen Revised for Adolescents (SOGS-RA) (Winters et al., 1993, translated by Secades & Villa, 1998). This consists of 16 items, twelve of which are dichotomous (Yes/No). The positive answers are added: 0-1 = player without problems, 2-3 = player at risk and 4 or more = player with problems. This scale makes it possible to differentiate between game types: games of chance (heads or tails, bingo, dice, slot machines, scratch cards and lottery) and games of strategy (playing card games, betting

on games of skill, such as pool, golf or bowling, team sports, and horse racing). A Cronbach's alpha of .80 was obtained in the Anglo-Saxon and Spanish versions; in our study it was .88. The non-scored items provide information on the game type and amounts at stake, and the origin of the money. To measure severity, the study also analyzed the items referring to the frequency with which the subject has played ten different types of games during the last year (0 = never, 1 = less than once a month, 2 = monthly, 3 = weekly and 4 = daily). Cronbach's alpha for this subscale was .75.

Social Desirability Scale (Crowne & Marlowe, 1960, adapted by Ferrando & Chico, 2000). This comprises 33 dichotomous items (True/False), with higher scores indicating greater social desirability. The original version had a Cronbach's alpha of .73, with .78 for the Spanish version, while internal consistency in our study was .65.

Procedure

The reverse translation method was used (Hambleton & Patsula, 1999) in translating the GBQ scale (Steenbergh et al., 2002) into Spanish. Two researchers independently translated the original version into Spanish and agreed on the translations. The items were then translated into English by two other people, replicating the process. The resulting Spanish translation was reviewed by a bilingual expert psychologist who changed item 11 to improve clarity (Definitive item: *"Even when I may be losing with my strategy or playing technique, I must keep it because I know I will win again"*). Two researchers applied the scales in three secondary schools and at the University of Burgos during school hours (duration 15 minutes). Two weeks later, the GBQ scale was administered again to a subsample of adolescents and young people. The study complied with the Ethical Principles of the American Psychological Association for research (APA, 2017). Permissions were obtained from parents' associations and school directors, as was parental consent. All participants were informed in advance of the study and of their right to withdraw their participation at any time without consequences. Those who agreed to participate by signing an informed consent completed the anonymous questionnaires voluntarily and did not receive any compensation for taking part in the study.

Statistical and psychometric data analysis

Of the original $N = 528$ participants, 13 had more than 20% missing data and were eliminated (Downey & King, 1998). To obtain evidence of internal structure validity, cross-validation was applied by randomly dividing the sample into two. Exploratory factor analysis (EFA) was performed with the first half of the sample and confirmatory factor analysis (CFA) with the second, using a maximum likelihood estimation method for robust data with bootstrap (10,000) to analyze the correlation matrix. Various authors recommend this procedure as a

way of replicating the factorial model found in the EFA (Thompson, 2004). In the CFA, the fit indices and factorial weights were used to determine the model that best fit the data. The following indices were calculated: Chi square (χ^2), Akaike Information Criterion (AIC), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA). The lower the values of χ^2 , AIC, RMSEA ($< .08$), and the higher the CFI and TLI ($< .90$), the better the model. The goodness of fit of the theoretical models was measured using absolute and relative indices (Hu & Bentler, 1999).

Once the final model was obtained, in addition to Cronbach's alpha, reliability in the form of internal consistency was also measured with the Omega indices (ω) and the mean variance extracted (MVE). In the case of the ω index, values above .70 are considered adequate, and for MVE, values above .45 (Hayes & Coutts, 2020; Garson, 2016). The test-retest reliability of the scale was also calculated. Evidence of the validity of the relationship with external variables was obtained through Pearson correlations with the SOGS-RA and MAGS scales and with gambling frequency (severity) and three logistic regressions. The Odds Ratio (OR) or probability ratio for the values established by the DSM (binary logistic regression), SOGS-RA and MAGS (multinomial) were estimated on the basis of GBQ scores. It was thus verified whether the presence of cognitive distortions explained the classification in gambling problem categories as defined by the DSM, SOGS-RA and MAGS. To obtain evidence of discriminant validity, the SOGS-RA and MAGS classification was used to describe the differences in the mean GBQ scores and dimensions obtained by the classification of participant groups as people with or without gambling problems. Effect sizes were estimated using Cohen's d (low effect size: $d = 0.2$, medium: $d = 0.5$, high: $d = 0.8$) (Cohen, 2013). Finally, the influence of social desirability on the responses of the participants was examined using Pearson correlations. SPSS Windows 24 and M-Plus 8.5 were used, and a significance level of $\leq .05$.

Results

Prevalence of gamblers with problems and/or at risk/transition

The DSM screening test (MAGS subscale) detected $n = 33$ (6.4%) young people with gambling problems, with $n = 482$ (93.6%) not having gambling problems. The MAG (MAGS subscale) detected $n = 29$ (5.6%) youths with gambling problems, $n = 65$ (12.6%) in transition and $n = 421$ (81.7%) without gambling problems. The SOGS-RA test found $n = 42$ (8.2%) youths with gambling problems, $n = 56$ (10.9%) at risk, and $n = 417$ (81%) without gambling problems. Both games of chance and strategy were played by 75.8%

(DSM: $n = 25$), 69.1% (MAG: $n = 65$), and 75.5% (SOGS-RA: $n = 74$) of gamblers with gambling problems or at risk/in transition.

The percentage of men classified as pathological or at risk/in transition is greater than that of women (DSM: $\chi^2 = 20.506$, $p = .0001$; MAG: $\chi^2 = 39.017$, $p = .0001$; SOGS-RA: $\chi^2 = 30.490$, $p = .0001$). There are no differences by age in DSM ($t_{(513)} = -.901$, $p = .368$) or in MAG ($F_{(2,512)} = 1.313$, $p = .270$), but age differences were found in SOGS-RA ($F_{(2,512)} = 4.782$, $p = .009$). Pathological gamblers ($M = 20.81$; $SD = 2.14$) have a higher mean age than those at risk/in transition ($M = 19.25$; $SD = 2.59$).

Games of chance were reported by 6.1% (DSM: $n = 2$), 12.8% (MAG: $n = 12$) and 12.2% (SOGS-RA: $n = 12$), and games of strategy by 3% (DSM: $n = 1$), 8.5% (MAG: $n = 8$) and 7.1% (SOGS-RA: $n = 7$). Between 15.1% (DSM: $n = 5$) and 5.1% (SOGS-RA: $n = 5$) did not select any of the listed games.

Descriptive analysis of the scale items

The descriptive analysis of the GBQ scale (Steenbergh et al., 2002) showed that no item mean was above the theoretical scale mean (4) (see Table 2). The mean score for the entire sample of participants was 57.93 ($SD = 24.72$), with scores ranging from 21 to 138. The items with the highest scores were 5 and 7 of the “illusion of control” dimension, and the lowest scores were for items 10 and 15 of the “luck/perseverance” dimension. Skewness and kurtosis indices were calculated to examine the item distributions. Only the kurtosis coefficient of item 15 showed a value greater than ± 2.0 , considered unacceptable (George & Mallery, 2011).

Internal structure validity evidence

The sample was randomly divided into two halves. The EFA was performed with one half ($n = 258$) and the factorial structure was validated by CFA in the other ($n = 257$). The sample adequacy indices obtained (KMO = .94; Bartlett,

Table 2

Descriptive Analysis of the items in the Spanish version of the Gamblers' Beliefs Questionnaire

ITEMS	<i>M</i>	<i>SD</i>	<i>Skew</i>	<i>Kurtosis</i>
1.- I think of the game as a challenge.	3.34	1.80	.24	-.85
2.- My knowledge and skill in gambling contribute to the likelihood that I will make money.	3.36	1.95	.29	-1.05
3.- My choices or actions affect the game on which I am betting.	3.65	2.06	.10	-1.25
4.- If I am playing and losing, I should continue because I do not want to miss a win.	2.70	1.94	.87	-.43
5.- I should keep track of previous winning bets so that I can figure out how I should bet in the future.	3.77	2.02	.02	-1.19
6.- When I am gambling, “near misses” or times when I almost win remind me that if I keep playing, I will win.	2.93	1.82	.59	-.67
7.- Gambling is more than just luck.	3.76	2.08	.03	-1.31
8.- My gambling wins are evidence that I have skill and knowledge related to gambling.	2.99	1.84	.49	-.87
9.- I have a “lucky” technique that I use when I gamble.	2.49	1.76	.84	-.47
10.- In the long run, I will win more money than I will lose gambling.	2.09	1.66	1.52	1.45
11.- Even though I may be losing with my gambling strategy or plan, I must maintain that strategy or plan because I know it will eventually come through for me.	2.90	1.73	.56	-.57
12.- There are certain things I do when I am betting (for example, tapping a certain number of times, holding a lucky coin in my hand, crossing my fingers, etc.) which increase the chances that I will win.	2.46	1.91	1.07	-.10
13.- If I lose money gambling, I should try to win it back.	2.79	1.94	.76	-.61
14.- Those who don't gamble much don't understand that gambling success requires dedication and a willingness to invest some money.	2.78	1.84	.64	-.70
15.- Where I get money to gamble doesn't matter because I will win and pay it back.	1.87	1.59	1.97	3.03
16.- I am pretty accurate at predicting when a “win” will occur.	2.71	1.76	.75	-.41
17.- Gambling is the best way for me to experience excitement.	2.15	1.68	1.37	.84
18.- If I continue to gamble, it will eventually pay off and I will make money.	2.18	1.58	1.36	1.21
19.- I have more skills and knowledge related to gambling than most people who gamble.	2.22	1.69	1.27	.68
20.- When I lose at gambling, my losses are not as bad if I don't tell my loved ones.	2.19	1.73	1.41	1.01
21.- I should keep the same bet even when it hasn't come up lately because it is bound to win.	2.59	1.70	.80	-.25
Total scale	57.93	24.72	.73	.42

$\chi^2 = 2987.64$, $p \leq .001$) indicate that the application of the EFA was plausible and feasible. A factorial analysis of principal components with varimax rotation was performed. The factorial solution yielded three factors with 58.47% of the explained variance. Since it did not fit the original structure, a forced EFA was applied to two factors, which explained 53.55% of the variance. The first dimension explained 45.78%, with 14 items corresponding

to the “luck/perseverance” factor. The second dimension (7.77% of the variance) composed of seven items, corresponded to the “illusion of control” factor. Unlike the original version, in the EFA item 9 and 19 loaded on the first factor. In addition, items 6, 8, 11 and 14 carried a weight close to or greater than .40 in both factors. Items 6 and 8 had higher factorial weight in dimension 2 and items 11 and 14 in dimension 1 (see Table 3).

A CFA was carried out to confirm the two-dimensional model obtained in the forced EFA. Three models were proposed (see Table 4): original model 1, model 2 based on the EFA result, and model 3 showing the best fit with the data. Models 1 and 2 did not have acceptable fit indices. The CFA results for model 2 indicated that item 19 had more weight in the luck/perseverance factor 1 than in its original illusion of control dimension. The MIs of model 2 also suggested significant changes, with item 9 (MI: 16.81) (illusion of control Factor 2) and item 6 (MI: 16.82) (luck/perseverance factor 1) finally remaining in their original dimension. Although the EFA indicated that items 8, 11

Table 3
Exploratory Factor Analysis of the Gambler's Beliefs Questionnaire Scale: original model and Spanish version model

Items	Original version		Spanish version: forced EFA	
	I	II	I	II
1	.11	.56	.30	.65
2	.14	.61	.22	.71
3	-.03	.61	.07	.74
4	.48	.07	.58	.34
5	.15	.51	.14	.63
6	.52	.12	.46	.53
7	-.10	.57	.17	.49
8	.12	.67	.41	.58
9	.33	.40	.65	.30
10	.46	.21	.79	.25
11	.51	.31	.62	.42
12	.56	.11	.60	.33
13	.65	.13	.60	.38
14	.43	.19	.51	.49
15	.74	-.12	.81	.15
16	.43	.30	.68	.32
17	.61	-.02	.75	.20
18	.73	.05	.83	.28
19	.34	.41	.75	.20
20	.84	-.21	.79	.05
21	.70	.02	.57	.33

Figure 1
Confirmatory Factor Analysis of the Spanish version of the Gambler's Beliefs Questionnaire (GBQ-E): Model 3

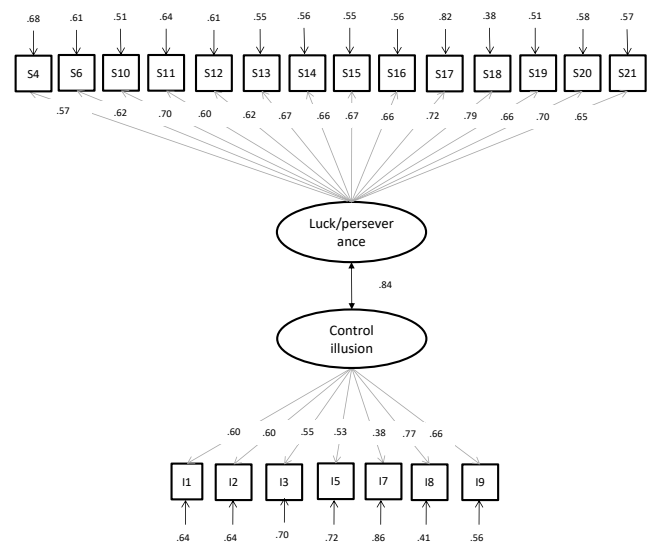


Table 4
Confirmatory Factor Analysis of the Gambler's Beliefs Questionnaire Scale

	N° of items	S-B χ^2	df	CFI	TLI	RMSA	90% CI of RMSA	AIC	$\Delta\chi^2$ (Δdf) ¹
Model 1	21	399.85	188	.88	.87	.066	.057; .075	19642.18	
Model 2	21	382.82	188	.89	.88	.063	.054; .073	19619.37	17.03. $p = .0001$
Model 3	21	342.73	188	.91	.90	.057	.048; .067	19571.12	40.09. $p = .0001$

Note. $N = 257$; ¹ $\Delta\chi^2$ = Change in chi-square between the proposed models (model 2 and 3) and original (model 1). *** $p \leq .001$.

and 14 also loaded on both factors, the fit of the data worsened when the dimension was changed with respect to the original model. The final model, model 3, included 14 items in dimension 1 luck perseverance and 7 in dimension 2 illusion of control (Spanish version of *Gamblers' Beliefs Questionnaire*, GBQ-E).

Internal consistency reliability

To measure the reliability of the GBQ-E scale as internal consistency, the Cronbach alpha coefficient was used. The indices obtained were: .93 for the general scale, .93 for F1 "luck/perseverance" and .79 for F2 "control illusion". All items contributed similarly to the internal consistency of the global scale and the factors. The item-total correlations ranged from .34 to .77 (global scale), from .60 to .79 (F1) and from .38 to .63 (F2). In addition, the data showed an omega index of .80 at T1 and .93 at T2 for the luck/perseverance dimension ($MVE\ T1 = 45.36$ and $MVE\ T2 = 51.65$) and between .85 and .93 for the illusion of control dimension ($MVE\ T1 = 51.46$ and $MVE\ T2 = 45.97$).

Test-retest reliability

To verify the temporal stability of the study, the GBQ-E scale was applied again after two weeks to 130 adolescents and young people. A moderate correlation was obtained for the scores obtained at both times on the general scale ($r = .69$) and on the first ($r = .66$) and second factor ($r = .69$) ($p \leq .0001$).

Validity evidence of relationship with external variables

To obtain evidence of convergent validity, we calculated the Pearson correlations of the GBQ-E scale and its factors with the SOGS and MAGS and their dimensions, as well as with the frequency of gambling.

The GBQ-E scale and its factors correlated positively and significantly with the SOGS-RA and MAGS scales and their dimensions (see Table 5), that is, the higher the score on the GBQ-E scale and its dimensions, the higher the score on the problem gambling screening scales.

Moreover, the total GBQ-E score is positively associated with the severity of gambling ($r = .36$, $p \leq .0001$).

To test whether cognitive distortions predicted problem gambling or being at risk/in transition, several logistic regression models were applied. The hierarchical binomial logistic regression model of the DSM variable was statistically significant ($\chi^2 = 53.045$, $p = .0001$). Sex was entered in the first block as a control variable because significant differences were found in the DSM, and the GBQ-E total score was entered in the second block. Nagelkerke's R^2 coefficient showed that 11.1% of the DSM variation was explained by sex. Once the total GBQ-E score was entered, the model explained 25.8%. Sex ($B = 1.889$, $ET = .516$, $p = .0001$) and cognitive distortions about gambling ($B = .040$, $ET = .008$, $p = .0001$) significantly explained classification as a person with gambling problems. Thus, being male ($OR = 6.615$, 95% CI: 2.405, 18.197) and having distorted beliefs ($OR = 1.041$, 95% CI: 1.026, 1.057) increased the risk of being a problem gambler.

The multinomial logistic regression model of the MAG variable was also statistically significant ($\chi^2 = 81.460$, $p = .0001$). Nagelkerke's R^2 coefficient indicated that 10.9% of the variation of the MAG variable was explained by sex. This percentage of explained variance rose to 21.2% on entering the total GBQ-E score. Sex and cognitive distortions about gambling significantly explained classification as a person with gambling problems (Sex: $B = -1.911$, $ET = .521$, $p = .0001$; GBQ-E: $B = .041$, $ES = .008$, $p = .0001$) or being at risk/in transition (Sex: $B = -1.263$, $ET = .300$, $p = .0001$; GBQ-E: $B = .024$, $ES = .006$, $p = .0001$). Thus, being male and having distorted beliefs increased the risk of being a problem gambler (Sex: $OR = 0.148$, 95% CI: 0.053, 0.411; GBQ-E: $OR = 1.042$, 95% CI: 1.026, 1.058) or at risk/in transition (Sex: $OR = 0.283$, 95% CI: 0.157, 0.510; GBQ-E: $OR = 1.024$, 95% CI: 1.013, 1.036).

In the case of the SOGS-RA, sex and age were included in the first model because significant differences were found, and the GBQ-E score was included in the second model. The global multinomial logistic regression model

Table 5

Correlation coefficients of the GBQ-E and its factors (F1: Luck/Perseverance and F2: Illusion of control) with the SOGS-RA, MAG scales and their two subscales (DSM and MAGS)

	SOGS-RA	MAGS	MAG	DSM
GBQ-E	.35***	.40***	.30***	.42***
GBQ-E F1	.37***	.41***	.32***	.42***
GBQ-E F2	.26***	.30***	.21***	.33***

Note. SOGS-RA: South Oaks Gambling Screen revised for adolescents (Winters et al., 1993); MAGS: Massachusetts Gambling Screen (Shaffer et al., 1994). MAG: MAGS subscale; DSM: MAGS subscale, DSM -IV criteria; GBQ-E F1: Luck/Perseverance; GBQ-E F2: Illusion of Control. $p \leq .001$.

of the SOGS-RA variable was statistically significant ($\chi^2 = 95.734$, $p = .0001$). Nagelkerke's R^2 coefficients indicated that 10.9% of the variance of the SOGS-RA variable was explained by sex and age, rising to 23.9% when the GBQ-E total score is introduced. Sex, age and cognitive distortions about gambling significantly explained being classified as a problem gambler (Sex: $B = -1.984$, $ET = .486$, $p = .0001$; Age: $B = .153$, $ET = .075$, $p = .040$, GBQ-E, MAG: $B = .047$, $ES = .007$, $p = .0001$). Being male, older age, and having distorted beliefs increased the risk of being a person with gambling problems (Sex: $OR = 0.137$, 95% $CI: 0.053, 0.356$; Age: $OR = 1.165$, 95% $CI: 1.007, 1.349$; GBQ-E: $OR = 1.048$, 95% $CI: 1.033, 1.064$). Only GBQ-E total score was a significant predictor of being a player at risk/in transition (GBQ-E: $B = .022$, $ET = .006$, $p = .0001$, $OR = 1.022$, 95% $CI: 1.011, 1.034$).

Discriminant validity evidence

To check the discriminatory capacity of the GBQ-E scale, Student's t test was performed for independent samples and ANOVAs. First, the DSM subscale of the MAGS was used to classify participants' gambling behaviour (previous year). As already indicated, 33 potential subjects with gambling problems were identified using the cut-off point of 5 (Shaffer et al., 1994). Significant differences were found in the GBQ-E scores and dimensions obtained by both groups. Players with gambling problems obtained higher scores than players without gambling problems, thus showing more cognitive distortions towards gambling (see Table 6).

The second MAG subscale identified 29 subjects with gambling problems, 65 in transition and 421 without problems. The figures found in the SOGS-RA were 42 with

Table 6

Comparison of mean scores on the GBQ-E scale and its two factors according to the classification based on DSM and MAG and SOGS-RA

		<i>N</i>	<i>M</i>	<i>SD</i>	<i>t/F</i>	<i>p</i>	<i>d</i>
GBQ-E/DSM	Without gambling problems	482	56.12	23.76	-6.58	.0001	1.18
	With gambling problems	33	84.27	23.87			
GBQ-E F1/DSM	Without gambling problems	482	33.20	16.68	-7.05	.0001	1.27
	With gambling problems	33	54.45	17.85			
GBQ-E F2/DSM	Without gambling problems	482	22.92	8.96	-4.31	.0001	.78
	With gambling problems	33	29.82	7.61			
GBQ-E/MAG	Without gambling problems	421	54.38	23.78	28.89	.0001	1.08
	With gambling problems	29	82.07 ^a	24.72			
	In transition	65	70.12 ^a	20.84			
GBQ-E F1/MAG	Without gambling problems	421	32.06	16.61	31.17	.0001	1.18
	With gambling problems	29	53.79 ^a	17.35			
	In transition	65	42.20 ^{ab}	16.07			
GBQ-E F2/MAG	Without gambling problems	421	22.32	9.04	16.27	.0001	.78
	With gambling problems	29	28.28 ^a	8.87			
	In transition	65	27.92 ^a	6.77			
GBQ-E/SOGS-RA	Without gambling problems	417	53.98	23.25	36.57	.0001	.90
	With gambling problems	42	83.05 ^a	22.35			
	At risk	56	68.50 ^{ab}	23.15			
GBQ-E F1/SOGS-RA	Without gambling problems	417	31.67	16.24	40.71	.0001	.93
	With gambling problems	42	53.55 ^a	17.10			
	At risk	56	41.93 ^{ab}	16.35			
GBQ-E F2/SOGS-RA	Without gambling problems	417	22.31	8.93	17.02	.0001	.63
	With gambling problems	42	29.50 ^a	7.98			
	At risk	56	26.57 ^a	8.02			

Note. GBQ-E F1 = Luck/Perseverance Factor; GBQ-E F2: Illusion of Control. ^a Without gambling problems, ^b Pathological, ^c At risk.

gambling problems, 56 at risk and 417 without problems. The ANOVAS showed significant differences in the means obtained in GBQ and its two dimensions by the groups established with MAG and SOGS-RA. To check which groups showed differences, the Bonferroni post hoc analysis was performed. The results showed the same pattern for the two scales (MAG and SOGS-RA). The group of young people “without gambling problems” maintained significant differences with the groups with “gambling problems” and “at risk/in transition”. In addition, gamblers at risk differed from those with gambling problems on the GBQ-E scale and the F1 for the SOGS-RA scale and the F1 according to the MAG (see Table 6).

The results also revealed differences in the GBQ-E depending on the type of game (non-gamblers = 0, chance = 1, strategy = 2, both types of game = 3) ($F_{(3,510)} = 12.98$, $p = .0001$). Participants who played both game types ($M = 64.22$, $SD = 22.74$) showed higher GBQ-E scores than non-players ($M = 49.08$, $SD = 24.20$) and game-of-chance players ($M = 54.08$, $SD = 25.16$). Furthermore, GBQ-E scores were significantly higher in strategy games ($M = 62.13$, $SD = 26.18$) than in non-players.

Relationship of GBQ-E with the social desirability scale

Following the recommendations of the original authors (Steenbergh et al., 2002), to obtain more evidence on the validity of the scale, we examined the relationship between the GBQ-E scale and the social desirability scale (Crowne & Marlowe, 1960). The correlations indicated a negative and significant association with the total scale ($r = -.16$, $p = .0001$), the luck factor ($r = -.17$, $p = .0001$) and the illusion of control ($r = -.12$, $p = .007$). Participants with higher cognitive distortions had lower social desirability. There were also significant and negative correlations between the social desirability scale and the MAGS global scale ($r = -.13$, $p = .004$), its dimensions, MAG ($r = -.10$, $p = .018$) and DSM ($r = -.13$, $p = .003$), and the SOGS-RA scale ($r = -.09$, $p = .046$).

Discussion

The aim of the study was to validate the GBQ (21 items) (Steenbergh et al., 2002), one of the most commonly used measures of cognitive distortions related to problem gambling (Goodie & Fortune, 2013). Different sources of validity were analyzed to provide more evidence of the adequacy of this Spanish version of the GBQ-E. The bifactorial structure (luck/perseverance and illusion of control) of the original scale has been confirmed in different countries (Marchetti et al., 2016; Pilatti, Cupani, Tuzinkievich & Winfree, 2016; Steenbergh et al., 2002; Wong & Tsang, 2012). In this study with a Spanish population of adolescents and young people, the forced

EFA confirmed the structure of 21 items and two factors, although three items (9, 19 and 6) did not load in the same dimension as the original version. In our case, the CFAs on the original structure of the scale (model 1) and the forced CFA (model 2) did not show good fit. In the model 3 CFA, item 19, which was initially in the illusion of control dimension, was located in luck/perseverance, increasing the scale's fit indices, as had already been found in a previous study with a Hispanic population (Winfree, Meyers & Whelan, 2013). Items 6 and 9 remained in their original dimensions of luck/perseverance and illusion of control, respectively. These findings suggest that the same general constructs exist across gambling cultures and populations.

This study showed that between 5.6% and 8.2% of the young participants had gambling problems and between 10.9% and 12.6% were gamblers at risk or in transition. These data are similar to those previously found in Spain with the SOGS-RA (6.3%) (Oksanen et al., 2021) and lower than those found with the DSM (17.6%) (Jiménez-Murcia et al., 2021). Most participants classified as problem gamblers or at risk/in transition played both games of chance and strategy. The internal consistency of the general scale and its factors were high and similar to the original version, suggesting that this instrument is suitable for measuring distorted beliefs about gambling in this sample of adolescents and young people.

Evidence on convergent validity was also provided. The positive association between the total scores of the GBQ-E and those obtained in instruments that measure gambling problems and frequency (SOGS-RA, MAG and its DSM and MAGS subscales) (r between .21 and .42) indicated that a greater distortion in the luck/perseverance and illusion of control factors may be associated with a greater drive to participate in games. The results also indicated that the GBQ-E was linked to a higher probability of being classified as having problem gambling according to the DSM, MAGS and SOGS-RA (OR = 1.04) and being at risk according to the MAG and SOGS-RA (OR = 1.02). These data confirm that a high level of cognitive distortion is related to having more gambling problems (Tang & Oei, 2011). Thus, whether the player's drive is motivated by internal states or external triggers, the impulses are often generated when the level of arousal interacts with the erroneous beliefs associated with gambling (Ciccarelli, Griffiths, Nigro & Cosenza, 2017; Ciccarelli et al., 2021).

In addition, we found a general pattern confirming the differences between the scores obtained on the GBQ-E scale and its two dimensions by participants without gambling problems, with gambling problems and at risk, according to MAGS and SOGS-RA. The average number of cognitive distortions was higher in people with gambling problems or at risk than in players who did not have problems (Yakovenko et al., 2016). This study, in line

with previous research, shows empirical evidence of the association between cognitive distortions and gambling-related problems (Donati, Ancona, Chiesi & Primi, 2015; Pilatti et al., 2016; Steenbergh et al., 2002; Winfree et al., 2013).

The study has some limitations: the cross-sectional design does not allow confirmation of causality between players' beliefs and gambling problems; the incidental sample limits the generalization of the results to other populations and the results have been influenced by the social desirability bias, although the correlations indicate this to be marginal, accounting for only between 2.9% and 1.4% of the variance of the GBQ-E. In addition, because some forms of gambling were not included in the SOGS-RA classification, some participants could play other games that were not registered. Nevertheless, the GBQ-E scale shows good psychometric properties, adequate validity and reliability. For this reason, the GBQ-E is recommended as an appropriate instrument for the evaluation of cognitive distortions associated with games of chance in adolescents and young people. As far as we know, this study fills a gap given the absence of a measure assessing cognitive distortions in Spanish adolescents and young people. This resource will thus help researchers understand the factors involved in initiating and maintaining excessive gambling. Authors such as Canale et al. (2016) point out that education related to the cognitions associated with gambling is an essential resource for the prevention of this problem. For all these reasons, it can be concluded that the scale has wide clinical application in the early detection of cognitive biases, in the formulation of more effective prevention and intervention plans, and in the monitoring of changes in the distortions of patients produced by the treatment.

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Conflict of interests

The authors of the manuscript declare no conflicts of interest.

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Polydrug use of tobacco and cannabis: Relationship with self-perceived health and mood state in adolescents in Central Catalonia- DESKcohort Project

Policonsumo de tabaco y cannabis: Relación con la salud autopercebida y el estado de ánimo en adolescentes de la Catalunya Central-Proyecto DESKcohort

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Abstract

The objective was to estimate the prevalence of polydrug use of tobacco and cannabis and to see its relationship with self-perceived health and mood state in adolescents from Central Catalonia in the 2019-2020 academic year. A cross-sectional study was carried out with a sample of 7,319 students, who answered a self-administered questionnaire. The dependent variables were the polydrug use of tobacco and cannabis and polydrug use of tobacco and high-risk cannabis. The main independent variables were self-perceived health status and mood state. Frequencies and percentages were analyzed for the prevalence analysis, and the Chi-square test was used. Poisson regression models were adjusted with robust variance, obtaining Prevalence Ratios. The prevalence of polydrug use of tobacco and cannabis was 3.5% and polydrug use of tobacco and high-risk cannabis was 2.5%. In boys, attending higher academic courses (4th of ESO (aPR: 3.88; 95% CI: 2.14-7.05) vs. CFGM (aPR: 8.67; CI95%: 4.51-16.67), having worse self-perceived health (aPR: 4.79; CI95%: 3.24-7.08) and worse mood state

Resumen

El objetivo fue estimar la prevalencia del policonsumo de tabaco y cannabis y ver su relación con la salud autopercebida y el estado de ánimo en los adolescentes escolarizados de la Catalunya Central en el curso 2019-2020. Estudio transversal con una muestra de 7.319 estudiantes, que contestaron un cuestionario auto administrado. Las variables dependientes fueron el policonsumo de tabaco y cannabis y policonsumo de tabaco y cannabis de riesgo. Las variables independientes principales fueron la salud autopercebida y el estado de ánimo. Para el análisis de prevalencia se analizaron frecuencias y porcentajes, y se usó la prueba de Chi-cuadrado. Se ajustaron modelos de regresión de Poisson con varianza robusta, obteniendo Razones de Prevalencia. La prevalencia del policonsumo de tabaco y cannabis fue de 3,5% y del policonsumo de tabaco y cannabis de riesgo 2,5%. En los chicos, cursar un curso académico superior (4º de ESO (RPa: 3,88; IC95%:2,14-7,05) vs. CFGM (RPa: 8,67; IC95%:4,51-16,67), tener peor salud autopercebida (RPa: 4,79; IC95%:3,24-7,08) y un peor estado de

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(aPR: 1.47; CI95%: 1.05-2.08) act as factors associated with polydrug use of tobacco and cannabis. The results for girls, and risky use of cannabis follow a similar pattern. Among the main conclusions we observe is that there are no differences in self-perceived health and mood state when comparing polydrug use of tobacco and cannabis and polydrug use of tobacco and high-risk cannabis, so risk reduction strategies must be applied whether the use of cannabis is occasional or problematic.

Keywords: polydrug use, tobacco, cannabis, mood state, self-perceived health

Adolescence is a stage of life in which some behavioural traits acquired during childhood are consolidated and others originating in their environments of influence are incorporated (Rodrigo et al., 2004). Some of these, including the use of tobacco and cannabis, can be considered high risk since they can lead to health, economic and social problems in later life (Suls & Rothman, 2004). According to data from the survey on drug use in secondary education in Spain (ESTUDES) 2018/2019, 26.7% of secondary school students aged 14 to 18 smoked tobacco in the last 30 days, with about a third of them smoking daily (9.8%) (Plan Nacional Sobre Drogas, 2020). Regarding the use of illicit psychoactive substances, cannabis is the most prevalent among high school students aged 14 to 18, with 19.3% having used cannabis in the last 30 days, and 3.4% of them using cannabis in a problematic way (Plan Nacional Sobre Drogas, 2020).

Previous studies have shown that tobacco and cannabis use are interrelated (Degenhardt et al., 2009). The likelihood of cannabis use is 2.8 times higher among the school population if tobacco is smoked (Plan Nacional Sobre Drogas, 2020). Traditionally, the age of onset of cannabis use has been later than that of tobacco. This is now changing, to the point where the gateway to smoked drugs is no longer tobacco but cannabis itself (Degenhardt et al., 2009). Often we also find the co-use of the two substances (Isorna & Amatller, 2017; Lanza et al., 2021; Meier & Hatsukami, 2016; Patton, Coffey, Carlin, Sawyer & Lynskey, 2005; Rial et al., 2018). In this case we are talking about polydrug use, understood as the use of several substances during the same period of time (last month) regardless of whether they were used simultaneously or alternately (Esteban, Lozano, Saltó & Zabala, 2015).

Several studies have shown that the relationship between the use of tobacco and cannabis could be partially explained by the influence of factors such as genetic predisposition, peer group influence, availability, the importance of common routes of administration, the interactions between active ingredients and additives in both products, and financial factors, among others (Agrawal, Budney & Lynskey, 2012; Llivina, 2000; Patton et al., 2005). Although physical problems are almost non-

ánimo (RPa: 1,47; IC95%:1,05-2,08) actúan como factores asociados con el policonsumo de tabaco y cannabis. En chicas y por consumo de riesgo de cannabis siguen un patrón similar. Entre las principales conclusiones observamos que no hay diferencias en la salud autopercibida y el estado de ánimo en el policonsumo de tabaco con cannabis y con cannabis de riesgo, por lo que deben existir estrategias de reducción de riesgos tanto si el consumo de cannabis es puntual como si el consumo de cannabis es problemático.

Palabras clave: policonsumo, tabaco, cannabis, estado de ánimo, salud autopercibida

existent during adolescence (Nuviala, Cruces, Martínez & Abad, 2009; Piko, 2007), self-perception of health can provide information on it indirectly (Goldberg, Guéguen, Schmaus, Nakache & Goldberg, 2001; Tamayo-Fonseca et al., 2013). Furthermore, it is at this stage when mental health problems start to be detected (Braddick, Carral, Jenkins & Jané-Llopis, 2009; Ortuño-Sierra, Fonseca-Pedrero, Paíno & Aritio-Solana, 2014). Both self-perceived health and mental health have been related to substance use. People with current depression or a history of depression are often smokers who are more dependent on nicotine, more likely to experience negative emotional states after nicotine withdrawal, and more likely to relapse to smoking after nicotine withdrawal than the general population. In addition, a higher score on depression scales is associated with a greater likelihood of starting to smoke in adolescence (Bakhshaie, Zvolensky & Goodwin, 2015; Gurrea & Pinet, 2004; Reid & Ledgerwood, 2016; Shahab, Andrew & West, 2014). We also found a strong association between high-risk cannabis use, understood as use that creates problems for the users themselves or their environment (Plan Nacional Sobre Drogas, 2020), and poor mental health (Degenhardt et al., 2013; Hall & Degenhardt, 2009; Mangot-Sala et al., 2019; Van Gastel et al., 2013). However, most research on adolescents has focused on analyzing the effects of cannabis or tobacco separately, with few studies estimating the effects of polydrug use and high-risk cannabis use and linking polydrug use of tobacco and cannabis to physical and mental health in adolescents. Thus, the aim of this study was to estimate the prevalence of polydrug use of tobacco and cannabis and to investigate its relationship with self-perceived health and mood state in adolescents attending high school in central Catalonia in the 2019-2020 academic year.

Methods

Study design

This was a cross-sectional study based on data from the DESKcohort project (www.deskcohort.cat) with a convenience sample of 7,319 students (47.9% boys and 52.1% girls) in the 2nd and 4th years of compulsory

secondary education (ESO), 2nd year of upper secondary (Bachillerato) and 2nd year of intermediate level vocational training (CFGM) with students aged between 12 and 18 years in central Catalonia. During the 2019-2020 academic year, they completed a computerized, self-administered questionnaire (DESK questionnaire), covering aspects related to health and its determinants: sociodemographic data; state of health, sleep and mood state; eating habits; physical activity and free time; screen and new technology use; use of tobacco, cannabis, alcohol and other drugs; relationships with others and sexuality. The design of the questionnaire was based on other similar and validated questionnaires, which enables the comparability of results obtained. Completion took approximately 40 minutes, and the questionnaire was administered by personnel external to the school who also provided the instructions and answered possible doubts.

Instruments

Dependent variables:

- The dependent variable was polydrug use of tobacco and cannabis. This was measured through two patterns of cannabis use; cannabis use at 30 days and high-risk cannabis use. The polydrug use variable was constructed to cover daily tobacco smoking and cannabis use in the last 30 days. The variable polydrug use of tobacco and high-risk cannabis was constructed to cover daily smoking and the CAST score. CAST is a screening instrument shown to have good psychometric properties to assess the severity of cannabis dependence, taking into account different aspects of validity in young people. It consists of six questions seeking to identify patterns of risky behaviour associated with cannabis use in the last year. Those with a score of 7 or higher are classified as potential problem users (Cuenca-Royo et al., 2012).

Independent variables:

Health and mood state:

- To measure physical health status, the variable self-perceived health status was used. This was assessed with the following question: "How would you say your health is in general?". Five Likert-type response options were offered from excellent to poor. Given that most young people have excellent or very good health, it was dichotomised as: excellent/very good or good/fair/poor.
- To measure the state of mental health, the variable mood state was used. This was assessed with the following questions: "How often do you feel: a) too tired to do things? b) with sleeping problems? c) left out, sad or depressed? d) with no hope for the future? e) nervous or tense?". For each item, 5 Likert response

options were offered from never (1) to always (5). The mood state variable was constructed as the sum of the five items mentioned above (min.=5; max.=25). The mean was calculated for the total sample and responses were dichotomised so that scores above the mean were classified as poor mood state and lower scores as good mood state.

- To determine underweight, normal weight, overweight/obesity, the body mass index (BMI) was used, which was defined using age and sex specific BMI cut-offs. To find out their weight and height, they were asked: "Approximately, how many kilos do you weigh without clothes (Kg)?" and "approximately how many centimeters tall are you without shoes (cm)?" According to the BMI result, it was classified as: underweight, normal weight, overweight/obesity.

Sociodemographic variables:

- Sex (boy, girl, other).
- Academic year (2nd year compulsory secondary education, 4th year compulsory secondary education, 2nd year upper secondary education or 2nd year vocational training).
- Neighborhood's socioeconomic status. The adolescent version of the McArthur Subjective Socioeconomic Status Scale was used. (Goodman et al., 2001). Students were asked: "Now imagine that this ladder represents the status of people in your neighbourhood. At the top of the ladder are the people who have the highest standing in their neighborhood. At the bottom are the people who have the lowest standing in their neighborhood. Considering the living standard of people in your neighborhood, where would you place yourself on this ladder? (from 1 to 10)". Based on the answers obtained, students were distributed into tertiles categorised as: disadvantaged, intermediate, advantaged).

Physical activity

- Physical activity. Students were asked: "How often do you usually do more than 10-15 minutes of physical activity at a time in your free time? This was more specifically detailed as a) vigorous physical activity: exercises that make the heart beat fast, b) moderate physical activity: exercises that are not strenuous, do not require as much effort or c) light physical activity: exercises that require minimal effort". For each item, the following response options were offered: once a day, between 4 and 6 times a week, between 2 and 3 times a week, once a week, and on no day of the week. The answers obtained were distributed according to WHO recommendations on physical activity (at least one hour a day of vigorous or moderate physical activity), being dichotomised as meeting or not meeting WHO recommendations.

Ethical considerations

When a school agreed to participate, a consent form was sent for distribution to its students. In compliance with Spanish law, parental authorization was required for the participation of students under 14 years of age. Participation in the study was voluntary and could be withdrawn whenever the participant wished without having to give explanations. The study guaranteed the ethical and legal conditions specified in the Declaration of Helsinki (Asociación Médica Mundial, 2013). The project was approved by the ethics committee of the University of Vic - Central University of Catalonia (96/2019).

Statistical analysis

First, a descriptive table was provided to show the characteristics of study participants by gender. The chi-square test was used to reveal any statistically significant differences between the characteristics of the participating boys and girls. Second, the prevalences of tobacco and cannabis use, high-risk use of cannabis, and polydrug use of tobacco and cannabis in boys and girls were calculated with confidence intervals (95% CI). To see if the prevalence of polydrug use of tobacco and cannabis, and polydrug use of tobacco and high-risk cannabis varied in relation to each independent variable, these prevalences were calculated with 95% CI, and Poisson regression models were adjusted with robust variance, obtaining prevalence ratios (PR) 95% CI (Espelt, Mari-Dell'Olmo, Penelo & Bosque-Prous, 2017). The final models included only those variables associated in a statistically significant way in the multivariate models. Analyses were performed using STATA16 software.

Results

7,319 students participated in the study, with 52.1% being girls. Students in the 2nd year of compulsory secondary education represented the 36.6%, the 36.7% were enrolled in the 4th year, 20.7% in the 2nd year of upper secondary education and the remaining 6% in vocational training. The 57.4% declared to have excellent or very good health when asked for self perceived health. In terms of mood state, 52.1% reported having a poor mood state (below average). For BMI, we found 3.0% to be underweight, 78.1% to have normal weight, and 18.9% to be overweight or obese. Finally, we found that 51.8% of students did not follow the WHO's physical activity recommendations. We found statistically significant differences between sexes in all variables except for socioeconomic status, which may have conditioned the rest of the results (Table 1).

Table 2 shows the prevalence of tobacco and cannabis use, as well as the polydrug use of these substances. Girls were more seen to smoke daily than boys [8.3% (95% CI: 7.5-9.2) vs. 6.7% (95% CI: 5.9-7.5)]. Conversely, cannabis use in the last month was higher in boys, being

9.8% (95%CI: 8.8-10.8) while in girls it was 7.4% (95%CI: 6.6-8.2).. High-risk cannabis use (CAST ≥ 7) was 4.3% (95% CI: 3.6-5) and 3.6% (95% CI: 3-4.2), respectively. Regarding polydrug use, 3.7% (95% CI: 3.1-4.4) of boys and 3.4% (95% CI: 2.8-4) of girls smoked tobacco daily and consumed cannabis in the last 30 days, and 2.7% (95% CI: 2.2-3.3) of boys and 2.3% (95% CI: 1.8-2.8) of girls smoked daily and had high-risk cannabis use (Table 2).

Table 3 shows each of the different factors associated with polydrug use of tobacco and cannabis and polydrug use of tobacco and high-risk cannabis. Students who reported poorer self-perceived health were found to have greater polydrug use of tobacco and cannabis than those

Table 1
General characteristics of the sample

	Boys		Girls		Total		p-value
	n	%	n	%	n	%	
	3505	47.9	3814	52.1	7319	100	
Academic year							
2 nd compulsory secondary education	1296	37.0	1382	36.2	2678	36.6	<0.001
4 th compulsory secondary education	1316	37.5	1374	36.0	2690	36.7	
2 nd upper secondary education	649	18.5	863	22.6	1512	20.7	
Vocational training	244	7.0	195	5.2	439	6.0	
Socioeconomic status							
Disadvantaged	1221	34.8	1375	36.0	2596	35.5	0.465
Intermediate	1180	33.7	1239	32.5	2419	33.1	
Advantaged	1104	31.5	1200	31.5	2304	31.4	
Self perceived health							
Excellent/Very good	2290	65.3	1911	50.1	4201	57.4	<0.001
Good/Fair/Poor	1215	34.7	1903	49.9	3118	42.6	
Mood state							
Good	2125	60.6	1383	36.3	3508	47.9	<0.001
Poor	1380	39.4	2431	63.7	3811	52.1	
BMI							
Underweight	120	3.5	92	2.5	240	3.0	<0.001
Normal weight	2503	74.0	2993	81.9	5326	78.1	
Overweight or obese	760	22.5	569	15.6	1522	18.9	
Physical activity							
WHO recommendations	1968	60.0	1303	37.2	3271	48.2	<0.001
Below WHO recommendations	1310	40.0	2200	62.8	3510	51.8	

Table 2
Prevalence of tobacco and cannabis use by sex

	Boys		Girls		Total	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Regular tobacco use ^a	234	6.7 (5.9-7.5)	317	8.3 (7.5-9.2)	551	7.5 (6.9-8.1)
Cannabis last month ^b	343	9.8 (8.8-10.8)	281	7.4 (6.6-8.2)	624	8.3 (7.9-9.2)
High-risk cannabis use ^c	150	4.3 (3.6-5.0)	137	3.6 (3.0-4.2)	287	3.9 (3.5-4.4)
Polydrug use of tobacco and cannabis ^d	131	3.7 (3.1-4.4)	129	3.4 (2.8-4.0)	260	3.5 (3.1-4.0)
Polydrug use of tobacco and high-risk cannabis ^e	94	2.7 (2.2-3.3)	87	2.3 (1.8-2.8)	181	2.5 (2.1-2.8)

Note. ^aRegular tobacco: smokes tobacco habitually every day. ^bCannabis last month: has smoked cannabis in the last 30 days. ^cHigh-risk cannabis use: CAST score of 7 or more. ^dPolydrug use of tobacco and cannabis: smokes tobacco habitually every day and has smoked cannabis in the last 30 days. ^ePolydrug use of tobacco and high-risk cannabis: smokes tobacco habitually every day and has a 7 or higher CAST score.

who considered that they had better health, especially boys [8.1% (95% CI: 6.7-9.7) in boys and 5.8% (95% CI: 4.9-7.0) in girls vs 1.4% (95% CI: 1.0-2.0) in boys and 0.9% (95% CI: 0.5-1.5) in girls], as well as polydrug use of tobacco and high-risk cannabis [6.3% (95% CI: 5.7-8.0) in boys and 4.2 % (95% CI: 3.4-5.3) in girls vs 0.8% (95% CI: 0.5-1.2) in boys and 0.3% (95% CI: 0.1- 0.6) in girls]. Regarding their mood state, we observed that the students with the worst mood state had higher prevalences of polydrug use of tobacco and cannabis [5.8% (95% CI: 4.7-7.2) boys and 4.3% (95% CI: 3.6-5.2) in girls], as well as in polydrug use of tobacco and high-risk cannabis [4.8% (95% CI: 3.8-6.0) in boys and 3.2% (95% CI: 2.6-4.0) in girls]. In addition, it was found that students in vocational training were those with the highest prevalence of tobacco and cannabis polydrug use [11.5% (95% CI: 8.0-16.1) in boys and 17.9% (95% CI %: 13.2-24.0) in girls], as well as polydrug use of tobacco and high-risk cannabis [9.0% (95% CI: 6.0-13.3) in boys and 12.8% (95% CI: 8.8-18.3) in girls] (Table 3).

Table 3
Prevalence of factors related to polydrug use of tobacco and cannabis^a and polydrug use of tobacco and high-risk cannabis^b

	Polydrug use of tobacco and cannabis ^a				Polydrug use of tobacco and high-risk cannabis ^b			
	Boys		Girls		Boys		Girls	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Self-perceived health								
Excellent/Very good	2290	1.4 (1.0-2.0)	1911	0.9 (0.5-1.5)	2290	0.8 (0.5-1.2)	1911	0.3 (0.1-0.6)
Good/Fair/Poor	1215	8.1 (6.7-9.7)	1903	5.8 (4.9-7.0)	1215	6.3 (5-7.8.0)	1903	4.2 (3.4-5.3)
Mood state								
Good	2125	2.4 (1.8-3.1)	1383	1.7 (1.1-2.5)	2125	1.3 (0.9-1.9)	1383	0.6 (0.3-4.0)
Poor	1380	5.8 (4.7-7.2)	2431	4.3 (3.6-5.2)	1380	4.8 (3.8-6.0)	2431	3.2 (2.6-4.0)
Academic year								
2nd compulsory secondary	1296	1.0 (0.5-1.7)	1382	0.8 (0.4-1.4)	1296	0.9 (0.5-1.6)	1382	0.6 (0.3-1.2)
4th compulsory secondary	1316	4.2 (3.2-5.4)	1374	3.8 (2.9-4.9)	1316	3.1 (2.3-4.2)	1374	2.5 (1.8-3.4)
2nd upper secondary	649	5.4 (3.9-7.4)	863	3.6 (2.5-5.1)	649	2.9 (1.9-4.5)	863	2.2 (1.4-3.4)
Vocational training	244	11.5 (8.0-16.1)	195	17.9 (13.2-24.0)	244	9.0 (6.0-13.3)	195	12.8 (8.8-18.3)
Socioeconomic status								
Disadvantaged	1221	4.4 (3.4-5.7)	1375	3.9 (3.0-5.0)	1221	3.8 (2.8-5.0)	1375	3.6 (2.7-4.7)
Intermediate	1180	3.7 (2.8-5.0)	1239	3.5 (2.6-4.6)	1180	2.7 (1.9-3.8)	1239	1.7 (1.1-2.6)
Advantaged	1104	3.0 (2.1-4.2)	1200	2.7 (1.9-3.7)	1104	1.4 (0.8-2.3)	1200	1.4 (0.8-2.3)
BMI								
Underweight	120	3.3 (1.2-8.6)	92	1.1 (0.1-7.4)	120	4.2 (1.7-9.6)	92	2.2 (0.5-8.3)
Normal weight	2503	3.9 (3.2-4.7)	2993	3.4 (2.8-4.1)	2503	2.9 (2.3-3.6)	2993	2.3 (1.8-2.9)
Overweight or obese	760	3.7 (2.5-5.3)	569	3.5 (2.3-5.4)	760	2.0 (1.2-3.2)	569	1.9 (1.1-3.4)
Physical activity								
WHO recommendations	1968	3.3 (2.6-4.2)	1303	2.3 (1.6-3.3)	1968	2.2 (1.6-2.9)	1303	0.9 (0.5-1.6)
Below WHO recommendations	1310	4.3 (3.4-5.6)	2200	3.8 (3.0-4.6)	1310	3.2 (2.4-4.3)	2200	2.8 (2.2-3.5)

Note. ^aPolydrug use of tobacco and cannabis: smokes tobacco habitually every day and has smoked cannabis in the last 30 days. ^bPolydrug use of tobacco and high-risk cannabis: smokes tobacco habitually every day and has a 7 or higher CAST score.

After analyzing the adjusted prevalence ratios (aPR), the factors associated with polydrug use of tobacco and cannabis in boys were found to be: being in a higher academic year, having worse self-perceived health and worse mood state (table 4). Specifically, attending the 4th year of compulsory secondary education (aPR: 3.88; 95% CI: 2.14-7.05), 2nd year upper secondary education (aPR: 4.89; 95% CI: 2.61-9.15), taking vocational training (aPR: 8.67; 95% CI: 4.51-16.67) compared to being in year 2 of compulsory secondary education; having good, fair or poor self-perceived health (aPR: 4.79; 95% CI: 3.24-7.08) compared to having excellent or very good self-perceived health; and having poor mood state (aPR: 1.47; 95% CI: 1.05-2.08), compared to having good mood state. Among the girls, we found being in a higher academic year and having poor self-perceived health as associated factors.

Specifically, attending 4th year of compulsory secondary education (aPR: 4.13; 95% CI: 2.16-7.89), 2nd year of upper secondary education (aPR: 3.90; 95% CI: 1.97-7.73), taking vocational training (aPR: 15.82; 95% CI: 8.10-30.90) compared to 2nd year compulsory secondary education; and having good, fair or poor self-perceived health (RPa: 4.86; 95% CI: 2.95-8.02) compared to having excellent or very good self-perceived health.

In terms of polydrug use of tobacco and high-risk cannabis, the associated factors in boys were: being in a higher academic year, having worse self-perceived health and poor mood state. Specifically, attending 4th year of compulsory secondary education (aPR: 3.02; 95% CI: 1.60-5.70), 2nd year upper secondary education (aPR: 2.65; 95% CI: 1.29-5.44) and taking vocational training (aPR: 6.71; 95% CI: 3.35-13.43) compared to being in the 2nd

Table 4
Prevalence ratios (PR) of polydrug use of tobacco and cannabis^a and polydrug use of tobacco and high-risk cannabis^b

	Polydrug use of tobacco and cannabis ^a				Polydrug use of tobacco and high-risk cannabis ^b			
	Boys		Girls		Boys		Girls	
	PR (95% CI)	aPR (95% CI)	PR (95% CI)	aPR (95% CI)	PR (95% CI)	aPR (95% CI)	PR (95% CI)	aPR (95% CI)
Self-perceived health								
Excellent/Very good	1	1	1	1	1	1	1	1
Good/Fair/Poor	5.59 (3.79-8.25)	4.79 (3.24-7.08)	6.2 (3.8-10.1)	4.86 (2.95-8.02)	7.95 (4.78-13.24)	6.21 (3.73-10.34)	13.55 (5.92-30.99)	9.25 (3.97-21.53)
Mood state								
Good	1	1	1		1	1	1	1
Poor	2.41 (1.71-3.40)	1.47 (1.05-2.08)	2.62 (1.67-4.09)		3.62 (2.34-5.61)	2.23 (1.44-3.45)	4.93 (2.48-9.79)	3.05 (1.51-6.14)
Academic year								
2 nd compulsory secondary	1	1	1	1	1	1	1	1
4 th compulsory secondary	4.16 (2.28-7.58)	3.88 (2.14-7.05)	4.75 (2.49-9.07)	4.13 (2.16-7.89)	3.36 (1.77-6.37)	3.02 (1.60-5.70)	3.79 (1.82-7.89)	2.80 (1.33-5.86)
2 nd upper secondary	5.37 (2.86-10.09)	4.89 (2.61-9.15)	4.51 (2.28-8.93)	3.90 (1.97-7.73)	3.16 (1.54-6.47)	2.65 (1.29-5.44)	3.38 (1.53-7.43)	2.21 (0.99-4.96)
Vocational training	11.44 (6.01-21.77)	8.67 (4.51-16.67)	22.55 (11.64-43.66)	15.82 (8.10-30.9)	9.73 (4.88-19.41)	6.71 (3.35-13.43)	19.68 (9.32-41.55)	11.15 (5.18-23.9)
Socioeconomic status								
Disadvantaged	1		1		1		1	
Intermediate	0.84 (0.57-1.24)		0.88 (0.59-1.30)		0.71 (0.46-1.12)		0.47 (0.28-0.78)	
Advantaged	0.67 (0.44-1.03)		0.67 (0.44-1.04)		0.38 (0.21-0.67)		0.39 (0.23-0.68)	
BMI								
Underweight	1		1		1		1	
Normal weight	1.16 (0.43-3.10)		3.16 (0.44-22.44)		0.69 (0.28-1.70)		1.07 (0.26-4.32)	
Overweight or obesity	1.10 (0.39-3.09)		3.23 (0.43-23.81)		0.47 (0.17-1.27)		0.88 (0.20-3.94)	
Physical activity								
WHO recommendations	1		1		1		1	
Below WHO recommendations	1.31 (0.92-1.86)		1.63 (1.08-2.47)		1.46 (0.96-2.23)		3.01 (1.62-5.57)	

Note. ^aPolydrug use of tobacco and cannabis: smokes tobacco habitually every day and has smoked cannabis in the last 30 days. ^bPolydrug use of tobacco and high-risk cannabis: smokes tobacco habitually every day and has a 7 or higher CAST score.

year of compulsory secondary education; having good, fair or poor self-perceived health (aPR: 6.21; 95% CI: 3.73-10.34) compared to having excellent or very good self-perceived health; and having poor mood state (aPR: 2.23; 95% CI: 1.44-3.45) as opposed to good mood state. The same associated factors were found in girls and boys: being in a higher academic year, having poor self-perceived health and poor mood state. Specifically, attending the 4th year of compulsory secondary education (aPR: 3.79; 95% CI: 1.82-7.89), 2nd year upper secondary (aPR: 3.38; 95% CI: 1.53-7.43) and taking vocational training (aPR: 19.68; 95% CI: 9.32-41.55) compared to being in the 2nd year of compulsory secondary education; having good, fair or poor self-perceived health (aPR: 9.25; 95% CI: 3.97-21.53) compared to having excellent or very good self-perceived health; and having poor mood state (aPR: 3.05; 95% CI: 1.51-6.14) compared to having a good mood state (Table 4).

Discussion

The main results of our study show that the prevalence of polydrug use of tobacco and cannabis and polydrug use of tobacco and high-risk cannabis is similar in both sexes. Attending a higher academic course (particularly vocational training), having poor self-perceived health and poor mood state could act as factors associated to polydrug use of tobacco and cannabis and also polydrug use of tobacco and high-risk cannabis. In addition, results indicate that there are no differences in the associated factors of polydrug use of tobacco and cannabis and the ones associated with polydrug use of tobacco and high-risk cannabis.

The results of this study show how polydrug use increases with age. Reports on substance use in Spain have revealed similar results, showing that the prevalence of use of the two psychoactive substances (legal and illicit) rises from 12.2% at 14 years to 21% at 18 years (Plan Nacional Sobre Drogas, 2020); specifically, in terms of the prevalence of polydrug use of tobacco and cannabis among Spanish students between the ages of 14 and 18, this has been reported as 0.3% (Álvarez et al., 2016). In our study, however, we found a higher prevalence (3.5%), coinciding with previous studies in the same area involving other substances, where higher consumption was also found. It seems that in this environment, data consistently show greater substance use (Obradors-Rial, Ariza & Muntaner, 2014). We found similar prevalences of polydrug use in both sexes. However, further studies are needed to verify the relationship between polydrug use and gender (Hernández-Serrano, Gras & Font-Mayolas, 2018). Another result that needs to be highlighted is the difference of substance use based on the type of education. Results show how students attending vocational training (specifically those in the Spanish CFGM

system) report higher prevalences of polydrug use. These results may be due to the potential risk factor represented by the low level of involvement of the school and the fact that teacher follow-up is less close (Álvarez et al., 2016), these characteristics are intrinsic of training programmes involving older students.

Higher polydrug use of tobacco and cannabis has been associated with poorer self-perceived health as well as poorer mood state (Tucker et al., 2019). Other authors have shown that good self-perceived health has been linked to lower tobacco and substance use among adolescents (Johnson & Richter, 2002; Milligan et al., 1997). Regarding to self-perceived health, it has been found that tobacco use has an inverse linear effect, whereas the fewer days or fewer cigarettes smoked per day have been associated with better self-perceived health (Johnson & Richter, 2002).

Regarding mood state, there is evidence that people with poor mood state smoke more tobacco (Bakhshaie et al., 2015; Gurrea & Pinet, 2004; Shahab et al., 2014) or cannabis (Degenhardt et al., 2013; Hall & Degenhardt, 2009; Mangot-Sala et al., 2019). Although the evidence is not entirely conclusive, several publications establish significant associations between substance use and poor adaptation to situations of general anxiety and the use of deficient emotional regulation strategies (Álvarez et al., 2016; Degenhardt, Hall & Lynskey, 2003; Iglesias, 2007). Likewise, the presence of antisocial behaviours increases the likelihood of substance use (Álvarez et al., 2016; Hindocha, Brose, Walsh & Cheeseman, 2020; Blasco, Pérez, Martínez & Amado, 2019). Nevertheless, there is little evidence linking mood state to polydrug use.

Regarding physical exercise, no link was found in our study, but we did higher prevalence of polydrug use of tobacco and high-risk cannabis in that those who do not follow WHO's physical recommendations. No other indicators of physical health, such as BMI, were associated to any polydrug use.

The evidence regarding the impact of socioeconomic status on substance use in young people has been studied before, but the results have not been conclusive. The most relevant socioeconomic factors are the level of education (lower educational level increases the probability of substance use) and employment status (adolescents whose parents are unemployed are at greater risk of tobacco and cannabis use). Both variables show a clearer relationship with substance use than level of income (Esteban et al., 2015). In the present study, greater polydrug use was observed in young people with lower socioeconomic status, contrary to what was found in other studies from similar environments (Santamarina, Serral, Pérez & Ariza, 2017). More specifically, the ESTUDES survey (Plan Nacional Sobre Drogas, 2020) reported that students in families with an average financial situation were those who used the most tobacco and cannabis. The difficulty in measuring the socioeconomic status of young

people continues to be a challenge, as several authors have already pointed out (Cheng & Goodman, 2015; Ensminger et al., 2000; Hanson & Chen, 2007; Obradors-Rial, Ariza, Rajmil & Muntaner, 2018).

Among the limitations of the study, its cross-sectional nature stands out first of all. This does not allow direct causal relationships to be established from our results, only associations (Martínez et al., 2019). Another limitation to take into account is that the variables are self-reported, and social desirability or difficulty in remembering one's behaviours can have an impact on the responses, although there is evidence that the use of self-reported questionnaires is a reliable method to measure substance use in adolescents (Legleye, Piontek & Kraus, 2011; Moncada & Perez, 2001). Likewise, it should be taken into account that only CAST and the McArthur subjective socioeconomic status scale are validated instruments, the rest being questions that expert researchers have used in numerous studies for many years. No issues were detected regarding these variables and they have proven to be informative variables for the intended use in this study. Lastly, another limitation of the study is that only one variable is used to measure self-perceived health; this could be improved in future studies by adding a scale that measures more components of health in general. However, dichotomous classifications of self-perceived health and mental health (Ahonen, Nebot & Giménez, 2007; Monteagudo et al., 2013; Vázquez et al., 2013) have been shown to be good indicators of health and have been used in numerous studies. The strengths of the study are the size of the sample, the representativeness of the central Catalonia region, and the fact that this study is the first wave of the cohort and may be the basis for possible future subsequent interventions and follow-ups in this population.

Although the results should be interpreted in view of its cross-sectional design, two main conclusions may be drawn. On the one hand, there are no differences in terms of self-perceived health and mood state when comparing polydrug use of tobacco and cannabis to polydrug use of tobacco and high-risk cannabis, so risk reduction strategies should be in place whether cannabis use is occasional or problematic. On the other hand, most authors have studied substance use in young people independently. There is a lack of conclusive empirical data regarding the study of the factors associated with the simultaneous use of tobacco and cannabis, but the data shows that polydrug use at this stage is a reality and that it is necessary to continue monitoring the development of how both substances are used in order to detect changes in a timely manner, such as the gateway to smoked drugs among possible polydrug use. The present study provides new evidence that may be useful in the design of interventions to prevent the combined use of substances at this stage. Specifically, it is necessary for clinicians to incorporate preventive interventions into their daily practice, taking into account those groups that engage

in more polydrug use (vocational training students) and that polydrug use increases with age.

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Conflict of interests

The authors of this manuscript declare no conflicts of interest. Albert Espelt is associate editor of the Addictions Journal but was not involved in the editorial process.

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ORIGINAL

Attitudes associated with risky injection practices in people who inject drugs in Palma de Mallorca

Actitudes asociadas a las prácticas de inyección de riesgo en personas que se inyectan drogas en Palma de Mallorca

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Abstract

The goal of this study was to explore the attitudes of people who inject drugs (PWID) and carry out risky practices, identifying underlying factors in their speech that sustain those attitudes. We proposed a qualitative research design with PWID focus groups ($n = 34$) and interviews with experts ($n = 3$). The interviews were recorded, transcribed, and analyzed following the principles of grounded theory and thematic analysis methodology. A total of 17 risk categories were identified and grouped into six dimensions: Drug Consumption, Knowledge, Trust In Other People, Access To Unused Syringes, Personal Situation, and Random. These dimensions would modulate the magnitude of the attitudes towards the different risky injection practices or act as barriers that limit the intention of PWID to inject themselves in a safe way. The analysis of the narratives suggests that many PWID have developed slightly negative, neutral, or even positive attitudes towards some risky injection practices, mainly towards carrying them out in certain situations and even when knowing of their negative consequences. Characterizing the attitudes associated with risky injection practices not only contributes to understanding them more thoroughly but will also allow preventive programs to be better suited to the specific needs of PWID.

Keywords: people who inject drugs, attitudes, risky practices, qualitative research, HIV

Resumen

El objetivo de este estudio fue explorar las actitudes de las personas que se inyectan drogas (PID) y realizan prácticas de inyección de riesgo, identificando los factores subyacentes a su discurso que sustentan esas actitudes. Se planteó una investigación cualitativa con un diseño de grupos de discusión con PID ($n = 34$) y entrevistas a expertos(as) ($n = 3$). Los grupos y entrevistas fueron grabados, transcritos y analizados bajo el enfoque de la teoría fundamentada y el método del análisis temático. Se identificaron 17 categorías de riesgo, agrupadas en seis dimensiones: Consumo de drogas, Conocimiento, Confianza en otras personas, Acceso a jeringuillas nuevas, Situación personal y Azar. Estas dimensiones modularían la magnitud de las actitudes hacia las distintas prácticas de inyección de riesgo o actuarían como barreras que socavan la intención de las PID de inyectarse de manera segura. El discurso analizado sugiere que muchas PID han desarrollado actitudes poco negativas, neutras o incluso positivas hacia algunas prácticas de inyección de riesgo, principalmente hacia su realización en situaciones determinadas y aun conociendo las consecuencias negativas que estas entrañan. Proponer una descripción diferenciada de las actitudes asociadas a las prácticas de inyección de riesgo no sólo contribuye a profundizar en su explicación, sino que permitirá una mayor adecuación de los programas preventivos a las necesidades específicas de las PID.

Palabras clave: personas que se inyectan droga, actitudes, prácticas de riesgo, investigación cualitativa, VIH

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The Balearic Islands are one of the regions in Spain in which the use of injected drugs is most prevalent; this is especially true of Mallorca, where this investigation was carried out. In 2020, 25.87% of heroin users and 58.33% of heroin and cocaine users starting treatment in this autonomous community stated injection to be their main route of administration (Pla d'Addiccions i Drogodependències de les Illes Balears [PADIB], 2020). Despite the preventive programs in place, the prevalence of serious infections such as HIV or hepatitis C (HCV) remains high in this population (Observatorio Español de las Drogas y las Adicciones [OEDA], 2021). The data indicates that a large percentage of injectors continues to engage in risky practices; both direct —injecting by sharing or using syringes previously used by other people— and indirect —sharing or using paraphernalia for preparing, distributing and/or cleaning previously used by other people, such as water, filters, containers and/or syringes—. While it is true that there are several behavioural interventions that have been proven effective in reducing this type of practices, further studies are needed to determine which key aspects make them more effective and to enable their adaptation to specific subgroups of the injector population (Elkbuli, Polcz, Dowd, McKenney & Prado, 2019). Understanding how people who inject drugs (PWID) perceive the risk practices associated with the injection route is essential to understanding why these continue to occur and to improving the effectiveness of the preventive programs to be developed.

Attitudes and risky injection practices

While attitudes form a critical part of some of the most widely used psychosocial theories in the field of injection behaviours (Wagner, Unger, Bluthenthal, Andreeva & Pentz, 2010), and various authors have pointed out the importance of involving them in the design of prevention programs for PWID (Gagnon & Godin, 2009; Norton et al., 2008), this construct does not seem to be taken into account in practice. It was not considered in the review by Wagner et al. (2010), the most recent to date, which extensively analyzed the influence of different cognitive-behavioural variables in the field of health psychology on risk injection practices. There are no recent studies, in Western populations, with a main focus on attitudes towards risky injection practices, that of Norton et al. (2008) remaining the most relevant. There are more studies focussing on related variables, whether specific beliefs, attitudes towards other attitude objects or other psychological constructs such as: the perceived consequences of avoiding risky injection practices (Wagner et al., 2011); the perceived benefits and/or barriers of performing safe injection practices (Bonar & Rosenberg, 2014; Cox et al., 2008; Harris & Rhodes, 2012); the risk of infection, vulnerability to and/or perceived severity of

HIV/HCV (Bailey et al., 2007; Rácz, Gyarmathy, Neaigus & Ujhelyi, 2007; Wilson & Bryant, 2010); knowledge about HIV/HCV (Dunn et al., 2013; Giannou et al., 2017; Jost et al., 2019; Mah et al., 2017) or attitudes towards HIV/HCV and its treatment (Bachireddy, 2013; Dahlman & Fornvik, 2015); towards using sterile syringes (Gagnon & Godin, 2009); towards the acquisition of new syringes (Zaller et al., 2012); towards taking methadone (Zaller, Bazazi, Velazquez & Rich, 2009); towards supervised injection rooms (Butler, Chapman & Terry, 2018) or towards death (Miller, 2006, 2009). This limitation is greater in Spain, where there is little research describing the current reality of injection practices and none that seeks to understand the relationship between attitudes and injected consumption.

The present study

The objective of this study was to explore the attitudes of those PWIDs who perform risky injection practices, identifying the factors underlying their discourses that support these attitudes. For this, a qualitative methodology was proposed involving focus groups and interviews with experts in order to obtain first-hand information without prior determinants. Being of an exploratory nature, the design used did not make it necessary to establish prior hypotheses.

Method

Participants

The study participants were: (a) PWID users of a syringe exchange program, who participated in the focus groups ($n = 34$) and (b) experts, who were interviewed ($n = 3$). The participating PWIDs were 28 men and 6 women, aged between 24 and 59 years and of Spanish nationality. Their injection histories ranged from 2 to 40 years and nearly all, including the youngest, were in or had experienced stressful life events such as: loss of family support, homelessness, joblessness, and/or imprisonment. Most reported having HCV. None stated that they were HIV carriers. As for the experts, they had all worked for more than 10 years in PWID care services in management and direct care positions. In both cases, the sample size was defined following the theoretical saturation criterion (Strauss & Corbin, 2015), which establishes the need to continue data collection until new categories no longer emerge, and that those already identified are adequately developed.

Procedure

The PWID sample was selected by direct recruitment among users of a Doctors of the World needle exchange program implemented in the areas of the city of Palma most frequented by this population. All PWIDs who came to the service on selected days were informed of the study, with all those showing interest in participating

being recruited. A difficulty in obtaining the sample was that a large number of those promising to participate finally did not attend the appointment. Inclusion criteria were: regularly injecting drugs (at least once every month in the last year) and speaking and understanding sufficient Spanish. The exclusion criterion was not being in suitable physical or mental condition to participate in the groups on the scheduled day. Participants received €10 for expenses and transport. Experts were selected on the basis both of their profile and the potential ease of arranging the interviews. Verbal consent was recorded.

Data collection

Seven focus groups were held (Table 1), some of which were segmented by gender (being male) and age of the participants (being older or younger than 35 years). Additionally, and with the aim of triangulating the information collected, three interviews were conducted with experts. All groups and interviews were directed by the first author—with appropriate training and experience in qualitative research—following a previously prepared script. The data collection process ended when it was verified that no new contributions relevant to the object of study appeared.

Table 1
Characteristics of the Focus Groups (FG) by Gender and Age of participants and Segmentation carried out

FG	Sex		Age range	Segmented by	
	M	F		Sex	Age
1	7	1	25 - 59		
2	4	2	37 - 52		> 35
3	2		29 - 34	♂	≤ 35
4	4	1	42 - 51		> 35
5	4		39 - 51	♂	> 35
6	2	2	24 - 44		
7	5		27 - 34	♂	≤ 35

Data analysis

Both for narrative analysis and for categorization of variables, the procedures recommended by grounded theory (Strauss & Corbin, 2015) and the method of thematic analysis (Braun & Clarke, 2006) were followed; these recommend identifying and inductively exploring the themes, concepts and relationships that arise during narrative analysis instead of using those predetermined in the literature.

The focus groups and interviews were recorded and transcribed. Statements relevant to the object of study were grouped in 1,033 verbatim accounts. Microsoft Office Excel was used for data processing. Successive categorization

processes were carried out leading to the identification of various categories and dimensions of risk. Subsequently, it was analyzed which verbatim accounts reflected attitudes towards the different risky practices and whether they were associated with any of the identified dimensions. The accounts were reduced to minimum units of significance with the aim that all of them were mutually exclusive, that is, that each account could only be included in one risk category and reflect a single attitude. Initial categorization and analysis, carried out by the first author, were reviewed jointly by the research team, reaching a consensus in those cases in which discrepancies arose.

Results

Seventeen risk categories were identified, grouped into six dimensions (Table 2), with a variable relative frequency in each risky practice (Figure 1). These dimensions would modulate the magnitude—valence and/or intensity—of the attitudes towards the different risky injection practices or would act as barriers, undermining the intention to inject safely. Tables 4 and 5 show, respectively, the frequency and relevant examples of verbatim accounts that reflect attitudes towards the different risky practices and their association with the dimensions of risk identified.

Below, the different risky practices are characterized according to their underlying attitudes and the most relevant dimensions to which they are linked. These practices are grouped into three categories: the first two correspond respectively to so-called direct and indirect practices, based on their greater or lesser capacity to transmit HIV/HCV and in accordance with the usual classification procedure; a third category is added, frequently ignored in the literature, referring to the reuse of syringes by the users themselves.

Sharing or using syringes previously used by other people

Despite the fact that this practice has been shown to be the least prevalent and the one that has declined the most over the years, all participating PWIDs commented on how they periodically see people doing it, and nine of them (26%) reported having done it recently (five with friends and four with their partners), this being the case of four of the nine participants aged under 35 years (three with friends and one with their partner).

Although a priori, the attitude towards this practice is very negative and all PWIDs would prefer to inject themselves with their own syringes, there are situations that undermine their intentions, mainly those related to the dimensions of Drug Consumption and Access To Unused Syringes. PWIDs obtain syringes from various sources, mainly by buying them in pharmacies or on the informal market, or by getting them for free in exchange programs. Despite this, there was consensus that it can sometimes be

Table 2*Dimensions and Categories associated with risky injection practices with their respective descriptors and frequency of mention*

Dimensions	Categories	Descriptors
Drug Consumption 26,94% (142) ^a (22)	Rituals (36)	Purchase, preparation, and group consumption. Invitations.
	Withdrawal syndrome (21)	Associated with heroin use.
	Craving (20)	Mostly associated with cocaine use.
	Intoxication (20)	Defined as being 'stoned', 'spaced-out' or 'high' and mostly associated with cocaine use.
	Experience (14)	Not injecting for long time.
	Frequency (9)	Increased injection frequency.
Knowledge 24,48% (129)	HIV/HCV (123)	Erroneous beliefs or inaccurate information about transmission, development, and treatment of the two infections.
	Other consequences (6)	Mistaken beliefs and inaccurate information about other infections and injuries.
Trust In Other People 21,06% (111) ^a (64)	Type of relationship (27)	Injecting with partners, friends, or acquaintances.
	Appearance (20)	Injecting with people with the same perceived or declared HIV/HCV serological status.
Access To Unused Syringes 15,75% (83)	Availability (42)	Closed needle exchange programs or pharmacies. No lending in the informal market.
	Money (33)	Lack or scarcity of money. Resource prioritization.
	Effort (8)	High investment time.
Personal Situation 10,06% (53)	Socio-relational (33)	Having financial, legal, family, or partner problems, homelessness, etc.
	Health status (20)	Being infected with HCV, HIV, or being co-infected.
Random 1,71% (9)	Mistakes (6)	Self and external mistakes and distractions.
	Unexpected (3)	Unplanned events.

Note. The percentages refer to the incidence of each risk dimension in the relevant textual corpus extracted from the focus groups (FG). In parentheses, the number of significant units coded (verbatim accounts).^a Number of verbatim accounts directly encoded in a dimension.

Figure 1

Illustration of the dimensions associated with the different risky practices shown in size proportional to their incidence in the relevant textual corpus extracted from the focus groups. Those dimensions with minimum incidence were eliminated because they are of illegible size

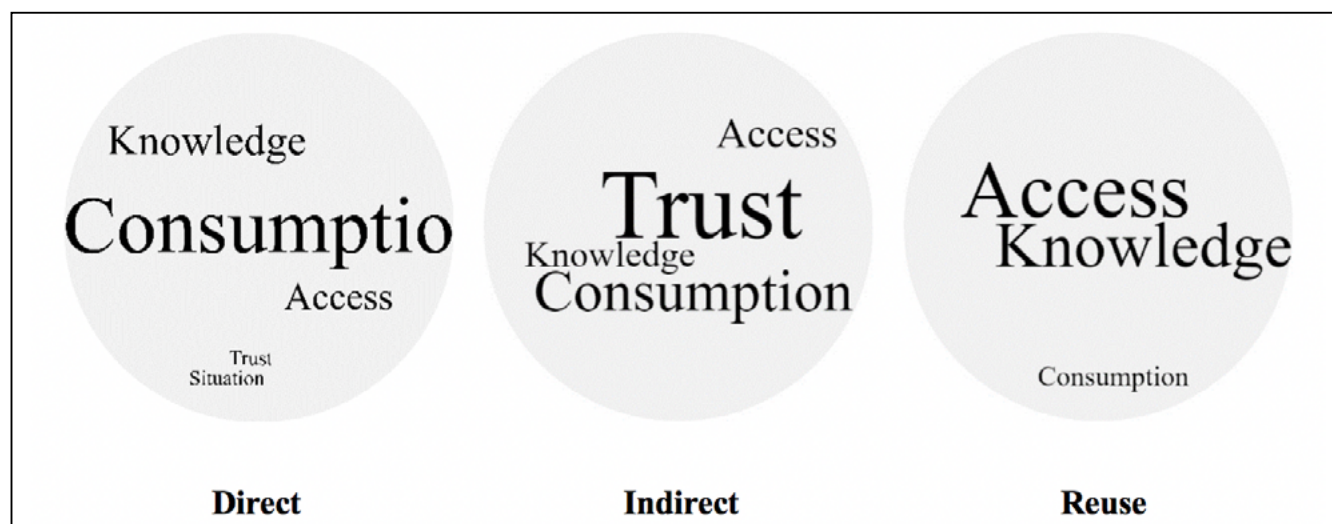


Table 3

Frequency of verbatim accounts that reflect attitudes towards the different risky injection practices classified by their Attitude Objects and by the Risk Dimensions with which they are associated

Attitude object	Risk dimension						No dimension ^b
	Consumption	Knowledge	Trust	Access To Syringes	Personal Situation	Random	
Risky practices ^a (N _t 142)	(33)	(40)	(13)	(9)	(28)	(0)	(19)
Direct practices (N _t 154)	(22)	(25)	(26)	(13)	(9)	(4)	46
Indirect practices (N _t 172)	(27)	(24)	(65)	(2)	(2)	(2)	50
Reuse (N _t 83)	(8)	(23)	(0)	(24)	(0)	(0)	28

Note. The number of significant units coded (verbatim accounts) appears in parentheses. N_t = Total number of verbatim accounts in the textual corpus. ^a Verbatim accounts reflecting general attitudes towards risky practices. ^b Verbatim accounts reflecting attitudes not associated with any dimension of risk.

Table 4

Illustration of verbatim accounts reflecting attitudes towards the different risky injection practices classified by their Attitude Objects and the Risky Dimensions with which they are associated

Direct practices	
Consumption	
	<i>'If you are going through a tough withdrawal, your mind is set to get high, if you don't have a needle, you get it from wherever' (Participant 8, male, 34 years old).</i>
Knowledge	
	<i>'If anyone asks me for the syringe, I give it because I don't have the disease; I have HCV, which basically everyone has' (Participant 23, male, 44 years old).</i>
Trust	
	<i>'I don't worry about it the next day either because I did it with my wife' (Participant 27, male, 30 years old).</i>
Access to Syringes	
	<i>'I do whatever I can to get a needle, waiting for the van to come and give me one, or to have money to buy it, or that someone does a favour to me and lends me one, well... that requires a time and effort that I might not have, because what I really want is to shoot up' (Participant 10, male, 46 years old).</i>
Personal Situation	
	<i>'You know you have diseases and that you've lost everything, so you just don't care anymore, what's one disease more?' (Participant 18, female, 42 years old).</i>
Indirect practices	
Consumption	
	<i>'If I am treating you, you don't complain where the cooker comes from or where I'm going to give it to you or anything ... that's what treating somebody means, you should be happy that I am treating you' (Participant 16, male, 29 years).</i>
Knowledge	
	<i>'People only see danger if there's blood, they think that just because we've got a new needle nothing will happen to them' (Participant 21, male, 49 years old).</i>
Trust	
	<i>'If you're preparing a shot and you tell me that the needle is new, I am not going to worry, but also because we trust each other' (Participant 25, female, 24 years old).</i>
Access To Syringes	
	<i>'Mostly, we prepare and share with new syringes, but we don't always have a new one or not everyone keeps a new one' (Participant 25, female, 24 years old).</i>
Reuse	
Consumption	
	<i>'Me, for example, I've had drugs and continued to shoot up with the same syringe until I ran out, and maybe I did that ten times ... when you've got drugs you use the same syringe until it runs out' (Participant 28, male, 27 years old).</i>
Knowledge	
	<i>'Well, I've caught HCV from reusing my needles because it seems you can get it with your own same blood' (Participant 28, male, 27 years old).</i>
Access To Syringes	
	<i>'If you're going to shoot up again and you have one euro, you're not going to spend it on a new syringe, you're going to buy a Pepsi and use the same one ... you buy something else before changing the syringe' (Participant 16, male, 29 years old).</i>

difficult to obtain a new syringe when it is most needed. In addition, the degree of difficulty or perceived effort to obtain it may be negatively related to the commitment to do so. On the other hand, craving for cocaine and, above all, heroin withdrawal, were described as unbearable states that lead people to do anything in order to use. Injecting more frequently would not only imply a greater dependence on the substances used, but also an increase in the number of occasions in which a PWID may be involved in risky situations. This is especially relevant in the use of cocaine, which, in contrast to heroin, causes very brief euphoric effects that lead people to inject repeatedly and to binge.

Although the risk of injecting with someone else's syringe is widely known, in certain contexts, the attitude towards this practice may be less negative or even neutral, being fundamentally mediated by the dimensions of Knowledge, Trust In Other People, and Personal Situation.

It is common to consume with people with whom you have emotional ties, such as friends, partners or family members, sharing not only the drugs but also the injection materials and, sometimes, no risk is perceived in doing so. Trust may be mediated by the length of the relationship and by the fact of having already been injected together in the past. It is also common to make the decision whether or not to engage in risky practices based on the serological status of the other person, either perceived or declared. The only action taken to confirm serostatus would be to ask, on the assumption that, if infected, the person would say so. The use of different strategies to minimize risks was confirmed, such as the choice of injection partners with the same serological status or that people with HIV inject last. Regarding the personal situation of PWIDs, participants highlighted the negative emotional states in which many PWIDs are immersed—in indifference, bitterness, giving up or hopelessness—due to stressful life events which would lead them to neglect their health. There were differences in the perception of severity of HIV and HCV. While HCV infection was seen to be normalized as a result of its very high prevalence and the pharmacological advances making a cure possible, HIV continued to be a disease to be feared, with most of participating PWIDs expressing concern about the possibility of becoming infected. Thus, above all, having HIV or being coinfecting would lead some PWIDs to develop the complex emotional states mentioned above and/or to consider that certain self-care practices would no longer make sense.

The attitude towards giving used syringes to other people would be often more favourable, with the responsibility of prevention being transferred to others, although always observing the rule of first disclosing one's serological status.

Sharing or using paraphernalia for preparing, distributing and/or cleaning previously used by others

These practices were quite widespread and standardized. It was recognized that although there is a safe way to carry out these processes, it is not always implemented. Again, the dimensions Drug Consumption and Access To Unused Syringes—and other paraphernalia—limit PWID's efforts to protect themselves. Some consumption rituals take on special relevance, especially in contexts of need, as they are subject to certain norms of behaviour that make self-care difficult. This is the case of invitations or joint purchase of drugs that are only divided after the preparation process with the aim ensuring exact shares. Difficulties were reported in controlling the injection material and avoiding their own and others' mistakes when being "high" and consuming in a group.

In addition, the attitudes towards indirect practices were more frequently slightly negative or neutral, being mediated by the dimensions of Knowledge, Trust In Other

People, and Personal Situation. Many PWIDs would not be aware—as is the case of two of the participants under the age of 35—or would underestimate the real risk that this type of practice entails. Even being aware of the risk, the only protective measure that many PWIDs would take when consuming in a group would be to ask others if the materials being used were new, trusting in their honesty and control of the situation. Trust also guided the decisions of those PWIDs who, consuming in a group, did not have new paraphernalia to prepare and/or distribute the doses.

Reusing own needles

This practice, often ignored in the literature, not only leads to injuries or other types of serious infections but also prevents many PWIDs from prioritizing the acquisition of new syringes at all times, leading to not having them when they are most needed, especially when consuming in a group.

It is undoubtedly the most widespread and standardized practice. Again, the dimensions of Drug Consumption and Access To Unused Syringes limited self-care. A precarious financial situation can lead to not having enough money at a given time to buy a syringe, but above all to having to ration it, prioritizing other needs or interests.

Although the attitude towards using new syringes would be very favourable, so would be the attitude towards reusing one's own syringes, fundamentally mediated by the Knowledge dimension and seen mainly as a measure of protection. Paradoxically, many of the participating PWIDs believed that it was possible to contract HCV by reusing their own syringes or had doubts about it, and four reported having been infected in this way.

Discussion

The main contribution of this study is to propose a differentiated description of attitudes towards different risky injection practices; this contributes not only to a greater understanding of these attitudes but will also allow preventive programs to be better adapted to the specific needs of the PWID at whom they are directed, as argued by Elkbuli et al. (2019). In addition, the set of factors associated with risky injection practices is shown from the perspective of the PWIDs themselves, as recommended by authors such as Clua (2021).

Seventeen categories of risk were identified, grouped into six dimensions: Drug Consumption, Knowledge, Trust In Other People, Access To Unused Syringes, Personal Situation, and Random. These dimensions would modulate the magnitude—valence and/or intensity—of the attitudes towards the different risky practices or would act as barriers undermining the intention to inject safely.

The narratives analyzed suggest that many PWIDs have developed slightly negative, neutral, or even positive

attitudes towards some risky practices, mainly towards carrying them out in certain situations —the magnitude of the attitudes can vary in the different injection episodes as they are relative phenomena that can be influenced by context—. This study identified three dimensions —Knowledge, Trust In Other People, and Personal Situation— that would mediate in the formation of such attitudes of a more favourable nature, influencing the cognitive, emotional and procedural processes that support them. It is clear that the lack of basic knowledge will lead many PWIDs to develop unrealistic attitudes, assuming erroneous beliefs related to infection to be valid. Nevertheless, knowledge alone of the negative consequences entailed by some practices does not necessarily result in the development of negative attitudes towards them. As suggested by Gyarmathy et al. (2010), PWIDs may take risks selectively, that is, they may not only be evaluating the risks associated with the different injection practices per se, but also those associated with the specific individuals involved. Trust is key in this process (Cepeda et al., 2011; Seear et al., 2012) by creating a sense of security in the recipient, who transfers responsibility for control and prevention to their counterpart. The personal identity and social environment of PWIDs would also affect their perception of risk. Von Hippel, Brener and Horwitz (2018) found that risky practices were performed to a greater extent by those PWIDs who implicitly and positively identified themselves as injectors. Another example is the perceived ubiquity of HCV risk (Rhodes & Treloar, 2008), a phenomenon causing some PWIDs to accept or ignore this infection, considering it an inevitable consequence —or identity trait— of being an injector. Finally, with respect to the personal situation of PWIDs, it is known that moods and emotions can have systematic effects on the beliefs or evaluations regarding an attitude object (Ajzen & Fishbein, 2005), and that attitudes are linked together in broader cognitive systems that influence each other reciprocally (Fabrigar, MacDonald & Wegener, 2005). Following this approach, PWIDs could develop less negative or neutral attitudes influenced by their negative moods or by other interconnected attitudes. Extreme feelings of life dissatisfaction (German & Latkin, 2012), and the internalization of the social stigma of being an injector and/or having HIV (Bayat et al., 2020) are likely to entail less concern for health and self-care. Miller (2006) documented attitudes of indifference toward death in heroin users for reasons such as having no hope for the future, escaping from an unbearable situation, or the desire to relieve pain. In this sense, risk injection practices could reflect indifference to the possibility of harming oneself or even a form of passive suicidal behaviour (Pilowsky, Wu, Burchett, Blazer & Ling, 2011).

Developing negative attitudes towards different risk injection practices will not always be enough to employ safe

practices consistently, which is the real challenge for most PWIDs. Norton et al. (2008) already suggested that only the most extreme negative attitudes could sustain self-care over time. Given the frequency with which injecting drug use occurs —potentially several or many times a day, every day— proximate predictors of risk behaviours, including attitudes, may vary across injecting episodes (Wagner et al., 2010). Moreover, since there are multiple behavioural options in an injection episode, multiple attitudes may be involved. For Wagner et al. (2011), PWIDs with negative attitudes who take risks at a certain moment could be adjusting their behaviour by valuing as feasible and more imminent other negative consequences associated with not carrying out risky practices such as having withdrawal symptoms, missing an opportunity to consume or offending injection partners.

This study identified four dimensions —Drug Consumption, Access To Unused Syringes, Personal Situation, and Random— that could act as barriers undermining the intention of PWIDs to inject safely, inhibiting those with negative attitudes towards risky injection practices from acting in a manner consistent with their attitudes. PWIDs will take greater risks if these risks are accepted and taken in their social network of consumption (Latkin, Kuramoto, Davey-Rothwell & Tobin, 2010) and when their dependence on the substances used is more severe —the greater the dependence, the greater the impulsiveness and loss of control (Wang & Maher, 2019)—. The Personal Situation dimension was included again as it seems that certain circumstances, which Mateu-Gelabert, Friedman & Sandoval (2007) called Periods Of Involution, could hinder self-care by promoting episodes of high psychological distress (Mackesy-Amiti, Boodram & Donenberg, 2020) and resource constraint.

Regarding limitations and future lines of research, this study focused on attitudes towards risky practices related to HIV and HCV infection, without taking into account other types of injection practices related to other no less important risks such as overdose (Espelt et al., 2017) or skin infections (Valencia et al., 2021). Conversely, although the special vulnerability of women injectors has already been described (Collins, Boyd, Cooper & McNeil, 2019), female participation in the discussion groups was minimal, thereby preventing possible gender-dependent categories and attitudes from being explored. In addition, only the factors underlying the narratives of the participating PWIDs were investigated, without taking into account other variables that may influence the perception of risk, such as personality traits or psychological disorders (Mackesy-Amiti, Donenberg & Ouellet, 2014; Roy et al., 2015). Regarding the methodological limitations, it should be noted that the sample did not meet the statistical criteria of representativeness; nevertheless, this was not the intention as the information that we tried to obtain was

discursive. It is recommended that the perception of those PWIDs who do not use or cannot access syringe exchange programs, or those who are HIV-positive, be investigated more thoroughly in order to analyze their specificities. In addition, the selected method may have prompted biased responses in the participants due to aspects such as social-desirability bias or fear that confidentiality would not be respected. In order to minimize the influence of the researcher, general questions were asked about consumption and injection practices, explaining that the personal behaviour of the participants was not the focus, but rather their expert opinion. Participants addressed the topics at hand while reflecting on attitudes in their speech. Many responded by narrating their own experiences, which enriched their contributions. It should be noted that different studies have highlighted the acceptable levels of reliability and validity of self-report data in drug users (Dyal, Kral, Gonzalez, Wenger & Bluthenthal, 2015; Napper, Fisher, Johnson & Wood, 2010).

In conclusion, starting from the perspective of PWIDs themselves, our study identifies a set of factors and dimensions associated with risky injection practices, exploring their ability to influence the attitudes and self-care intentions of PWIDs. We believe that deepening our knowledge regarding the predictors of this class of practices may facilitate a greater adaptation of preventive programs to the specific needs of PWIDs.

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Conflict of interests

No conflicts of interest are reported by any member of the research team.

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ORIGINAL

Advantages of telephone assistance on adherence to treatment in patients with alcohol and other addictions during the Covid19 pandemic

Beneficios de la atención telefónica durante la pandemia covid19 en la adherencia terapéutica en pacientes con alcoholismo y otras adicciones

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Abstract

The Covid19 pandemic has led to many publications about its influence on the treatment and evolution of individuals with a substance use disorder, leading to contradictory results. In this study, the adherence and abstinence rates of patients who started treatment in an Addictive Behavior Unit during the pandemic are analyzed, compared with others who attended the previous year and comparing those who were attended in person or by phone. The results indicate that during the Covid19 period, patients had greater adherence to treatment after one month of follow up and when attended to by phone. At 3 and 12 months, greater adherence was maintained, although it was not statistically significant. Regarding abstinence, the small sample size made it difficult to obtain significant differences. The conclusion is that, despite a quantitative decrease in the number of patients beginning drug treatment, in qualitative terms the pandemic led to greater adherence in the short and medium term. Telephone attention can play an important and positive role at this point, complementary to other resources and interventions.

Keywords: substance addiction, substance abuse treatment centers, covid19 pandemic, telephone interview, treatment adherence and compliance, telemedicine

Resumen

La pandemia por covid19 ha generado muchas publicaciones acerca de su influencia en el tratamiento y evolución de personas con un trastorno por uso de sustancias, con resultados contradictorios, a veces basadas en datos y otras en inferencias indirectas de otros datos. En este trabajo se estudia la adherencia y tasas de abstinencia de pacientes que inician tratamiento en una Unidad de Conductas Adictivas durante la pandemia, respecto a otros que acudieron el año previo y comparando los que hicieron visita presencial o telefónica. Los resultados indicaron mejor adherencia al mes de seguimiento en los pacientes del periodo covid19 y en los que fueron atendidos telefónicamente. A los 3 y 12 meses se mantuvo una mejor adherencia, aunque no significativa estadísticamente. Respecto a la abstinencia, el pequeño tamaño de la muestra dificultó obtener diferencias significativas. Se concluye que la pandemia, aunque ha significado una disminución del número de inicios de tratamientos por consumo de sustancias, también ha repercutido en una mayor adherencia a corto y medio plazo. La atención telefónica puede jugar un papel importante y positivo en este aspecto, complementario a otros recursos e intervenciones.

Palabras clave: adicción a sustancias, centros de tratamiento de abuso de sustancias, pandemia covid19, entrevista telefónica, adherencia y cumplimiento del tratamiento, telemedicina

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The global scale of the COVID-19 pandemic and its impact on health services in particular is evident. At the psychological level, there is speculation about the role of stress (Clay & Parker, 2020) and the availability of coping behaviours (Fullana, Hidalgo-Mazzei, Vieta & Radua, 2020) among the general population in the way they adapt to a lockdown situation.

These behaviours may include changes in the use of alcohol and drugs. Indeed, there is evidence of such changes, although not always involving greater substance use. Online surveys in the general population have found increases in Internet addiction and drinking (Sun et al., 2020), and in anxiety, depression and risky alcohol use, especially among young people (Ahmed et al., 2020). Various studies have found a heterogeneous trend in alcohol use, with some people increasing their consumption while others have reduced it (Chodkiewicz, Talarowska, Miniszewska, Nawrocka & Bilinski, 2020; Garnett et al., 2021). However, studies with larger samples covering different European countries (Kilian et al., 2021) or in Australia (Callinan et al., 2021) indicate a trend towards decreasing alcohol use in the general population.

Regarding patients undergoing treatment for a substance use disorder (SUD), it has been pointed out that this population is particularly vulnerable to the psychological effects of the COVID-19 pandemic (Dubey et al., 2020; Dunlop et al., 2020), and recommendations on the need to adapt and improve the interventions carried out in this population have been made. For example, the importance of supporting telemedicine, home hospitalization, liaison psychiatry, or harm reduction has been noted (López-Pelayo et al., 2020), as has the need to adapt opioid agonist dispensing treatments during a pandemic (Kar et al., 2020).

However, studies on whether this vulnerability is reflected in an increase in substance use among patients are scarce and contradictory: in some studies, some patients used more and others less, as is the case in the general population (Kim et al., 2020). Increased drinking may be indirectly inferred in other studies through findings involving a higher percentage of positive toxicological controls (Barrio et al., 2021). Yet other studies have observed stability in alcohol use, despite the increase in symptoms of anxiety and depression in a significant number of patients (Blithikioti, Nuño, Paniello, Gual & Miquel, 2021). Some of these studies suffer from the lack of a control group or the sample bias resulting from voluntary online surveys.

In general, there is no shortage of articles reflecting on possible psychosocial risk factors, with predictions and advice arising from the pandemic, or carried out with online surveys. Nevertheless, direct objective data on the real impact of the COVID-19 pandemic on patients under treatment for SUD are scarce.

Furthermore, as has been the case with health services in general or mental health services in particular, addiction treatment services have had to adapt to the COVID-19 pandemic, leading to the appearance of innovations that can improve access to treatment (Samuels et al., 2020), such as online support in the follow-up of patients with SUD (Bergman & Kelly, 2021).

Different studies have shown that the use of the telephone can be effective in treating patients with depression (Castro et al., 2020) or SUD (Jackson, Booth, Salmon & McGuire, 2009; McKay, Lynch, Shepard & Pettinati, 2005), and it also appears that telephone follow-up may decrease the readmission rate and severity of addiction, although it does not significantly decrease alcohol use (Horng & Chueh, 2004).

Taking into account the scarcity of empirically based literature and the contradictory results obtained to date on whether or not the use of alcohol and other substances rose, fell or remained the same in patients treated for SUD, we set ourselves two research aims:

- i. The role that the COVID-19 pandemic may play at the beginning of treatment for patients with SUD, in their adherence (attendance at scheduled visits) and abstinence, which are central elements in improving their mental and social state (Killaspy, Banerjee, King & Lloyd, 2000). To this end, the number of patients with SUD requesting treatment at an Addictive Behaviour Unit (ABU) during the COVID-19 pandemic period and their sociodemographic and clinical characteristics was compared to those in a pre-pandemic period of the same duration. Their adherence to treatment and abstinence rates at one month, three and twelve months were also compared.
- ii. The efficacy of telephone counselling was studied by comparing the differences in adherence and abstinence, at one month and at three months, between patients with SUDs attending in person in the traditional face-to-face manner and those who were attended to in a non-face-to-face manner by telephone.

Material and method

During the COVID-19 lockdown, patients were attended to by telephone or in person, depending on the phase and intensity of lockdown. In the subsequent follow-up, telephone and face-to-face visits were alternated and combined depending on the clinical situation and needs of the patient. The initial visit to our ABU, part of a general hospital's outpatient department, and to those restarting treatment after abandoning it more than one year earlier is referred to as patient reception. Receptions were carried out by a psychologist from the team, making an initial diagnostic assessment, collecting the relevant socio-

demographic and clinical information for the treatment, agreeing on and explaining the initial therapeutic strategy to the patient and programming follow-up treatment at the ABU. This initially consisted of a visit by a psychiatrist after two weeks, with a prescription of the appropriate pharmacological treatment, the performance of a general analysis and weekly toxicological and nursing controls, and a subsequent follow-up at one, three, six and twelve months by a psychologist and/or psychiatrist. All patients so programmed were diagnosed with SUD. Cases without this diagnosis were referred to other specialized services to attend to their problems.

Two sub-studies were carried out with different but related samples:

In Study 1, all patients consecutively attending a reception visit in the period between March 15 and May 31, 2019 were compiled retrospectively. The same procedure was used for patients received in the same period of 2020.

Patients diagnosed with SUD and recommended for subsequent treatment in the ABU itself were included. Those referred to other units or services (on the basis of healthcare area, levels of demand or type of pathology) were excluded. During reception, sociodemographic and clinical data were collected. Follow-up was carried out at one, three and twelve months, with an assessment of compliance with follow-up visits and abstinence from the main drug at three months and using the available data from the latest possible follow-up. The characteristics of the patients at reception and in their follow-up between both periods (2019 and 2020) were compared. These data were collected by the professionals who carried out the reception and follow-up visits and were recorded in a computerized medical record.

In Study 2, all patients who had a first visit scheduled on Tuesdays and Thursdays in the period after the start of the COVID-19 pandemic, between March 24 and September 7, 2020, in the same ABU, were compiled retrospectively by the same professional so as to minimize sample variability. Data from receptions repeated in the same period (or with a face-to-face reception of patients that had previously been attended to by telephone or vice versa) were excluded. Sociodemographic data and those regarding compliance with follow-up visits and abstinence from the main drug up to 3 months were gathered. A data comparison was made between patients with face-to-face and telephone reception.

The sociodemographic data of reception and follow-up visits of both studies was compiled retrospectively from the medical records in an anonymous manner. All patients met criteria (abuse and dependence) for substance use disorder (SUD) according to ICD-10. Abstinence from the main drug was measured through clinical observations, weekly toxicological controls and collateral information.

Statistical analysis

Description of the sample variables assessed: frequencies and percentages for the qualitative variables, and measures of central tendency for the quantitative variables.

To compare the qualitative sociodemographic and clinical characteristics between the groups starting treatment in 2019 and during the pandemic, in 2020, the χ^2 (chi square) test was used.

Student's t-test for independent groups was used to compare the quantitative variables between both groups.

Results

Study 1. Comparison between receptions 2019 versus 2020

A total of 195 patients were recruited who met the selection criteria (they were not referred to other services and had an SUD diagnosis).

152 (78%) attended reception during the period from March 15 to May 31, 2019, and 43 (22%) during the same period in 2020.

Table 1 shows the sociodemographic characteristics of both groups of patients. As can be seen, a strong pattern emerged of living in a family, with a medical history, living in a flat or house, average educational level, alcohol as the main drug, daily consumption frequency and good health.

The first difference in the period studied between 2019 and 2020 was the decrease in the number (a third) of patients who attended reception.

It may also be observed that in 2020, compared to 2019, more patients were referred from a medical service and fewer came on their own initiative, and that there was a rise in the percentage of patients with a legal record and a fall in the percentage of those with a family history of drug addiction.

No differences were observed in age, sex, main drug for which the patient attended, or the other socio-demographic and clinical variables.

The follow-up of up to twelve months (see Table 2) showed significant differences only in the greater percentage of patients in 2020 who continued being treated at one month and three months, although this difference disappeared later, after one year. Regarding the use of the drug for which they started treatment, no significant differences were observed either at three months or at the last visit for which information was available (at one year, or the last visit in cases of treatment drop-out), perhaps due to the small sample size. In any case, patients from 2020 did not relapse more than those from 2019; conversely, they had slightly higher abstinence rates at three months and when dropping out of follow-up (or at one year of follow-up).

Table 1*Comparison of sociodemographic, clinical and background variables according to the year of admission (2019 vs 2020). Study 1*

		2019 (n = 152)	2020 (n = 43)	Total (n = 195)
Age		46.7±13.2	45.6±14.2	46.5±13.4 ns
Sex	Men	108 (71%)	29 (67.4%)	137 (70.2%) ns
Origin	Own or family	54 (35.53%)	8 (18.60%)	62 (31.79%)
	Medical context	89 (58.55%)	34 (79.07%)	123 (63.08%)
	Social services, legal, others	9 (5.9%)	1 (2.3%)	10 (5.1%) *
Living arrangements	Alone	31 (20.4%)	11 (25.6%)	42 (21.5%)
	Relatives	91 (59.9%)	24 (55.8%)	115 (59%)
	Friends and others	30 (19.7%)	8 (18.6%)	38 (19.5%) ns
Home	Flat or house	146 (96%)	42 (97.6%)	188 (96.4%) ns
Educational level	Low	16 (10.5%)	9 (20.9%)	25 (12.8%)
	Medium	95 (62.5%)	25 (58.1%)	120 (61.5%)
	High	41 (26.97%)	9 (20.93%)	50 (25.6%) ns
Employment situation	Employed	78 (51.3%)	15 (34.9%)	93 (47.6%)
	Retired/Disabled	31 (20.4%)	10 (23.3%)	41 (21.03%)
		43 (28.3%)	18 (41.9%)	61 (31.3%) ns
Months worked (of the last 6)		3.1±2.9	3±2.9	3.1±2.9 ns
Legal record		13 (8.5%)	9 (20.9%)	22 (11.2%) *
Main drug	Alcohol	96 (63.2%)	28 (65.1%)	124 (63.6%)
	Cocaine	16 (10.5%)	3 (7%)	19 (9.7%)
	THC	10 (6.6%)	3 (7%)	13 (6.7%)
	Others	30 (19.7%)	9 (20.9%)	39 (20%) ns
Route of administration	Oral	95 (62.5%)	25 (58.1%)	120 (61.5%)
	Pulmonary	27 (17.7%)	9 (20.9%)	36 (18.4%)
	Intranasally	18 (11.8%)	2 (4.6%)	20 (10.2%)
		12 (7.8%)	7 (16.2%)	19 (9.7%) ns
Frequency of consumption last 30 days	Daily	81 (53.2%)	24 (55.8%)	105 (53.8%)
	1-3 days/week	22 (14.4%)	2 (4.65%)	24 (12.3%)
	4-6 days/week	19 (12.5%)	5 (11.63%)	24 (12.3%)
	< 1 day/week	10 (6.5%)	4 (9.30%)	14 (7.1%)
	Does not consume	20 (13.1%)	8 (18.6%)	28 (14.3%) ns
Family history of drug addiction		73 (54.8%)	13 (32.50%)	86 (44.1%) *
Health level	Good	90 (59.2%)	23 (53.49%)	113 (57.9%)
	Regular	51 (33.5%)	15 (34.88%)	66 (33.8%)
	Bad	11 (7.2%)	5 (11.63%)	16 (8.2%) ns
Previous treatments		70 (46%)	22 (51.1%)	92 (47.1%) ns

Note. Comparison of means using Student's t test for quantitative variables (Age and months worked). Frequency comparison using χ^2 . * p < 0.05; ns: p not significant.

Table 2

Comparison of the percentage of patients in follow-up at 1, 3 and 12 months and of the abstinence of the patients received, by year of admission (2019 vs 2020). Study 1

	2019 (n=152)	2020 (n=43)	Total (n=195)
1 month of follow-up	97 (63.8%)	35 (81.4%)	132 (67.6%) *
3 months of follow-up	70 (46.1%)	27 (62.8%)	97 (49.7%) *
12 months of follow-up	55 (36.2%)	14 (32.6%)	69 (35.4%) ns
Abstinence at 3 months (a)	31 (44.3%)	13 (48.1%)	44 (45.4%) ns
Abstinence at their last visit (a year or before abandoning treatment) (b)	68 (44.7%)	20 (46.5%)	88 (45.1%) ns

Note. The percentages in each line (treatment phase) refer to all patients who attended reception, starting treatment (N= 195), except (a), referring only to the 97 patients who continued in treatment at 3 months. (b) referring to the consumption of all 195 patients in the last visit for which data was available. Comparison of frequencies using χ^2 (scores express frequencies, percentages in parentheses). * $p < 0.05$; ns: p not significant.

Table 3

Changes in attendance and substance use in patients, by type of reception (face-to-face vs telephone). Study 2

Reception	Face-to-face			Telephone			Total		
Scheduled	19			41			60		
Attended reception	16 (84.2%)			31 (75.6%)			47 (78.3%) ns		
	T	Abs	H	T	Abs	H	T	Abs	H
Treatment indication	10 (62.5%)	6 (60%)	6 (60%)	19 (61.3%)	9 (47.4%)	10 (52.6%)	29 ns	15 ns	16 ns
Came to first visit	5 (50%)	2 (40%)	2 (40%)	17 (89.5%)	8 (47.1%)	9 (52.9%)	22 *	10 ns	11 ns
Follow-up at 3 months	4 (80%)	1 (25%)	2 (50%)	12 (70.6%)	4 (33.3%)	6 (50%)	16 ns	5 ns	8 ns
Follow-up at 3 months (a)		4 (40%)			12 (63.2%)			29 ns	
Abstinence at 3 months		1 (25%)			1 (8.3%)			16 ns	

Note. The percentages in each line (treatment phase) refer to the patients who continued in treatment in the previous line (treatment phase).

T: All; Abs: Abstinent at reception; M: Men; (a): of all patients receiving indication for treatment.

Comparison of frequencies using χ^2 (scores express frequencies, percentages in parentheses).

* $p < 0.05$; ns: p not significant.

Study 2. Comparison between face-to-face versus telephone reception

A sample of 60 patients scheduled for reception was recruited following the inclusion criteria (one patient was scheduled twice, first by telephone and then in person, so only the telephone visit was taken into account). Of these, 40 (66.6%) were scheduled for telephone counselling and the rest (20) in person.

The age of patients scheduled for reception was 44 ± 11 years, with no differences between the sexes, nor were age differences found between the sexes in the subgroup of patients who actually attended or in those who made an appointment to start treatment.

Patients who, after admission, were scheduled to start treatment at the ABU were significantly older than those referred to other facilities (47.7 ± 12 years vs. 41.4 ± 8 years; $t = 2$; $p < 0.05$).

Table 3 shows the progress of patients registered for reception during the period studied, by type of reception (face-to-face or telephone). Each line follows the steps of the patients studied through their treatment, with

progressive drop-out and the smaller number of patients who continued, as summarised here:

60 registered for reception → 47 attended reception (or were telephoned) → 29 were recommended for treatment in the ABU itself (not referred) → 22 attended the first follow-up visit → 16 attended the three-month visit.

As can be seen in Table 3, there were no differences between reception by phone or in person regarding the percentage of patients actually attending reception, nor in the percentage of those who were recommended for treatment in the ABU itself (the other patients were referred to other services considered more suitable for their type of psychopathology, greater proximity to their place of residence or due to the existence of a previous treatment link to the other service). Conversely, the percentage of those attending the first scheduled visit is significantly higher in patients served by telephone than in person (89.5% vs. 50%, respectively).

Among the 22 who attended the first visit after reception, there were no statistically significant differences in the attendance percentage after three months depending on

whether they attended the initial reception in person or by telephone (80% vs. 70.6% respectively). None of the seven patients who did not attend the first visit reappeared at three months.

However, this trend was the opposite of that observed upon analyzing all patients recommended for treatment in the ABU, even if they did not attend the first visit ($N = 29$): those who attended reception in person had a tendency to attend less at three months than those who did so by phone (40% vs. 63.2% respectively; $\chi^2 = 1.4$; $p = ns$), although this was not significant either.

All of this suggests that patients with face-to-face reception drop out more than telephone patients when scheduled for the first visit, but subsequently drop out less in the treatment up to three months; nevertheless, these merely seem to be trends without statistical significance given the low number of subjects.

Table 3 shows the comparison of active alcohol or drugs use at the reception stage between face-to-face and telephone patients indicated for follow-up treatment in the ABU. Consumption data at reception was only available for these 29 patients, since many patients who were referred elsewhere did not present an SUD, but rather behavioural addictions, other psychopathologies, or came to obtain information to help a family member. No differences were observed either in the frequency of use between patients attended by telephone or in person, nor in the subsamples of those who continued treatment at the first visit or at 3 months.

Information was also available on the use of alcohol or other drugs at three months among the 16 patients attending until then. Abstinence percentages were low but without statistically significant differences between patients received by telephone or in person (8.3% vs. 25%).

No differences were observed based on gender in the percentages of indications for treatment or follow-up at the first visit or at three months.

Discussion

The main finding of the study was that no worsening in adherence nor in the abstinence rate was observed in the treatment of SUDs after the COVID-19 pandemic or through telephone support instead of face-to-face attention.

The pandemic period saw a fall in the number of receptions carried out in the ABU, consistent with the reduction in care caused by the initial lockdown, the redistribution of professional resources in our health centre, and professionals requiring sick leave due to SARS-CoV2 infection or contact with the infected.

Qualitatively, there were more patients referred from other health facilities and fewer coming in on their own initiative, which could be explained by the mobility

limitations occurring during the pandemic. All this was despite the decrease in care due to COVID-19, highlighting the effort made by the health system to continue offering adequate specialized care.

Initial adherence to the ABU (first month of follow-up) was better in the 2020 pandemic period than in 2019, which was accompanied by a greater adherence to the first visit among patients received by telephone compared to those in person. These facts may indicate a greater motivation in patients who, despite the risks, decided to start treatment for their addiction in the COVID period after lockdown. It also indicates that not only is the telephone route not an impediment, but that it can facilitate treatment adherence, at least initially.

Medium-term follow-up (three months) did not reveal significant differences between the period prior to (2019) and the pandemic itself (2020) nor between patients attended by telephone or in person at reception. Nevertheless, there were trends towards greater adherence of 2020 patients and those welcomed by telephone, although the differences in adherence faded after a year. There was far greater drop-out before the first visit among patients received in person rather than by telephone. Perhaps for this reason, the subsequent drop-out rate of continuing patients, up to three months, was proportionally higher in the telephone group.

Regarding abstinence, this could only be analysed in patients who had followed the treatment, and there were no differences between patients from 2020 and 2019 at three months or until the last visit. There were also no differences in abstinence at three months between patients attended to by telephone or in person.

These data are not necessarily surprising, since it has already been said that they are in line with research in which telephone follow-up compared to standard treatments has produced higher percentages of abstinence in patients with a cocaine SUD (McKay et al., 2005) or a reduction of depressive symptoms in depressed patients (Castro et al., 2020). In some more severe or high-risk patients, a more intensive initial program may improve outcomes.

The low frequency of abstinence at 3 months among the patients of Study 2, compared to Study 1, both with respect to the patients of 2019 and 2020, is surprising. Although different samples were involved, there was a partial overlap in the recruitment period between those of the study (end of March to beginning of September 2020) and the 2020 patients of Study 1 (March to May 2020 inclusive), with the same treatments and professionals. It can be hypothesized that the Study 2 period involved greater clinical risk of relapse since it covered the summer, in which, furthermore, some treatment units were working with fewer resources (toxicological controls, hospitalizations, partial hospitalization, visits, etc.).

Conclusions

Although the two samples were different, results of the analysis coincided in that neither the pandemic nor telephone support led to worse results at three months with respect both to treatment adherence and abstinence rates. In the case of initial adherence, this was even greater during the time of the pandemic, surely due to greater motivation, and in a telephone format due to the speed and ease of access. Subsequently, adherence became more similar to that of pre-pandemic treatments.

Admittedly, less attention was provided in quantitative terms, which must be attributed both to the decrease in the availability of treatments at the ABU, to the limitations of social mobility imposed, and to the fears of patients and the self-restrictions they were able to make in postponing the search for treatments in an ABU.

Looking to the future, our experience suggests that greater flexibility in offering face-to-face treatments together with others online or by telephone, depending on the epidemiological situation or the preferences of patients, does not necessarily imply a decrease in the quality of care, and can maintain abstinence rates and treatment adherence at three months. These telephone or online formats are growing (Uscher-Pines et al., 2020) and should be promoted for economic reasons and because they offer greater flexibility and accessibility, not as a substitute but as a complement to other resources and face-to-face interventions. All this can contribute to an improvement in the overall therapeutic efficiency and in the progress of the patient, the final objective of the treatment.

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Conflict of interests

None declared.

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LETTER TO THE EDITOR

Impact of substance use on intestinal permeability in patients with schizophrenia

Impacto del consumo de sustancias sobre la permeabilidad intestinal en pacientes con esquizofrenia

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There is increasing evidence of a bidirectional relationship between the intestinal microbiota and the brain, known as the microbiome-gut-brain axis (Salavrakos et al., 2021). Patients with severe mental disorders such as schizophrenia commonly present alterations in the gastrointestinal microbiome (Borkent et al., 2022). Many factors, including substance use, can alter intestinal permeability and affect the inflammatory system, which is in turn related to the central nervous system (Wiedlocha et al., 2021). The effects of smoking, for example, can cause changes in the microbiota, increases in mucosal permeability, and poor immune responses at this level (Gui et al., 2021). However, in some diseases, such as ulcerative colitis, nicotine has been described as potentially acting as a protective factor, reducing inflammation and improving permeability (McGilligan et al., 2007), while cannabis has been shown

to play a regulatory role in inflammation and permeability of the mucosa of the gastrointestinal tract (Kienzl et al., 2020). On the other hand, alcohol use can contribute to the deterioration of the mucosa and increase the permeability of the barrier (Simeonova et al., 2018). In patients with schizophrenia, however, the impact of toxin consumption on the gut-brain axis has barely been investigated. This study therefore aimed to analyze the impact that the consumption of toxins (tobacco, cannabis and alcohol) has on intestinal permeability in patients with schizophrenia.

A cross-sectional study was performed of outpatients from Health Area IV (Oviedo) diagnosed with schizophrenia (DSM-5). Assessment was carried out through an ad hoc questionnaire (demographic and clinical information), the Positive and Negative Schizophrenia Syndrome Scale (PANSS), the Calgary Depression Scale (CDS), the CGI-S, the International Physical Activity Questionnaire

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(IPAQ), adherence to Mediterranean diet, and the Bristol Scale for assessment of constipation. Indirect markers of bacterial translocation and plasma inflammation were analyzed: soluble CD14 (sCD14), lipopolysaccharide-binding protein (LBP) and C-reactive protein (CRP). Non-normal distribution of these markers was checked using the Kolmogorov-Smirnov test, statistical correlations were analyzed using Spearman, Mann-Whitney U tests, and linear and logistic regressions were performed. The study was approved by the local research ethics committee.

Of the total sample of 98 patients [mean age (SD) = 41.97 (12.29) years; men: 60.2%], 36.7% reported being smokers [mean daily cigarette consumption (SD) = 16.31 (8.06)], 20.4% drank alcohol (≥ 1 SDU/week) [mean consumption (SD) = 0.81 (2.30)] and 14.3% reported having used cannabis in the previous month. Regarding the analytical parameters, the following mean (SD) values were obtained: sCD14 [(2.40 (0.68) $\mu\text{g/dl}$], LBP [(15.00 (5.40) $\mu\text{g/dl}$] and CRP [(0.60) (1.10) mg/dl].

Significant correlations were found between sCD14 and LBP ($r = 0.283$; $p = 0.005$) and CRP ($r = 0.310$; $p = 0.002$) and between LBP and CRP ($r = 0.576$; $p < 0.001$). As for the relationship between permeability markers and sociodemographic variables, there were no differences by sex, nor correlation with age ($p > 0.05$). Furthermore, no significant relationships were identified with age at diagnosis, years of disease evolution, body mass index, metabolic syndrome, antipsychotic treatment, nor with psychometric scales, including questionnaires on adherence to the Mediterranean diet and physical activity. Constipation was associated with a lower concentration of sCD14 ($U = 579$; $p = 0.031$).

In terms of substance use, differences close to statistical significance were only found between cannabis users and non-cannabis users in sCD14 (mean (SD) = 2.77 (0.84) vs 2.34 (0.63); $U = 388$; $p = 0.054$), but not in LBP or CRP.

Nor were differences identified in any of these markers on the basis of tobacco or alcohol use.

The linear regression with sCD14 as a dependent variable, and age, smoking, and the statistically significant variables (LBP, CRP, constipation, cannabis use) as independent variables yielded a predictive model which explained 12.1% of the variance ($F = 6.248$; $p = 0.003$). Cannabis use and the LBP marker, but not CRP, were the only variables associated with sCD14 levels in the model (Table 1).

A logistic regression was subsequently performed with cannabis use as the dependent variable, and sex, age, and statistically significant variables (adherence to the Mediterranean diet, constipation, tobacco, sCD14) as independent variables. In this case, smoking, sCD14 concentration, and weaker dietary adherence were associated with cannabis use in patients with schizophrenia (Table 1).

As conclusions of the study, our findings do not allow tobacco and alcohol use to be associated with an impact on the degree of intestinal permeability in patients with schizophrenia. Nevertheless, patients who habitually use cannabis may present greater alterations of their intestinal mucosa, identified by increased concentrations of the bacterial translocation marker sCD14, regardless of the degree of systemic inflammation.

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Table 1
Variables included in the regression models

Factors associated with sCD14								
	B	Standard error	Beta	t	p	Lower bound	Upper bound	
Cannabis use	0.538	0.186	0.289	2.899	0.005	0.169	0.907	
LBP	0.031	0.012	0.247	2.479	0.015	0.006	0.055	
Factors associated with cannabis use								
	B	Standard error	Wald	gl	p	Exp (B)	Lower bound	Upper bound
Mediterranean diet adherence questionnaire	-0.349	0.157	4.935	1	0.026	0.705	0.518	0.960
Tobacco	2.978	0.905	10.832	1	0.001	19.654	3.336	115.808
sCD14	1.330	0.507	6.889	1	0.009	3.780	1.400	10.203

Note. sCD14 = soluble CD14; LBP = lipopolysaccharide-binding protein.

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Conflict of interests

On behalf of all authors, the first signatory of the manuscript declares no conflict of interest in relation to this article.

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Todos los artículos se deben enviar a través de www.adicciones.es. En la plataforma se podrán encontrar todas las instrucciones para la preparación y subida del manuscrito. Todo el seguimiento del proceso de revisión y editorial se realizará a través de la plataforma web de la Revista Adicciones. Ésta es la única forma prevista para envío de artículos (si tiene alguna duda o problema técnico puede comunicarse con revistaadicciones@socidrogalcohol.org)

Estructura de los trabajos enviados a la revista

Para el envío de manuscritos se deben preparar y anexar los siguientes documentos:

A) *Carta de presentación* o *Cover Letter*. Deberá contener el objetivo del trabajo, la justificación del porqué se ha llevado a cabo y cuál es la aportación al conocimiento ya existentes, la posible audiencia a la que irá dirigido el estudio y la repercusión sobre la elaboración de posibles nuevos trabajos, así como una descripción de los principales hallazgos y la contribución de los mismos para generar nuevo conocimiento en el campo de las adicciones.

B) *Documento de autorización de todos los autores*. Todo manuscrito enviado para su consideración de publicación a la revista **Adicciones** vendrá acompañado de una carta firmada por todos los autores. En este documento se indicará que:

1. El manuscrito es original y no ha sido previamente publicado, completo o en parte, ni está siendo considerado para su publicación en otra revista.
2. La financiación que ha recibido el estudio realizado (directa o indirecta) y si tiene conexiones con la industria del tabaco, alcohol o industria farmacéutica, u otras relaciones que puedan llevar a un conflicto de intereses.
3. Que el manuscrito ha sido realizado, leído y aprobado por los autores tal como se envía el mismo, y que la autoría le corresponde a todos y todas los y las firmantes.
4. Que se han cumplido todos los principios éticos en relación a la protección de las personas o de los pacientes, o de los animales, cuando se trate de experimentación animal.
5. Que se acompañan todos los permisos correspondientes para reproducir material previamente publicado que se va a incluir en el manuscrito, como texto, tablas, figuras, etc.
6. Que la correspondencia referente al manuscrito remitido para su publicación se realizará con el autor de correspondencia del que se indicará el nombre, dirección, teléfono y correo electrónico y que éste se encargará a su vez de ponerse en contacto con el resto de autores y autoras para la revisión y aprobación final del artículo.
7. Que se transferirán los derechos de copyright del artículo a la revista Adicciones en caso de ser publicado el mismo en la revista Adicciones.
8. La revista Adicciones tiene como política la difusión de sus artículos por lo que los autores pueden enviar en formato electrónico sus artículos publicados a otras personas. La reproducción y difusión comercial de los artículos de la revista está restringida por los derechos de copyright y se precisa autorización de la revista para hacerlo.

C) *Página de título*. 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 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 utiliza-

do los autores es la que se enviará a las bases de datos). Se deben escribir 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 filiación de autores y autoras.

- 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.

Al final de esta página (no como ‘nota al pie’) se colocará este texto: “Enviar correspondencia a: ...”, indicando el nombre, la dirección postal, correo electrónico u otra información del autor de correspondencia, al cual la secretaría se dirigirá durante el proceso de revisión.

D) *Manuscrito*. Todas las hojas deberán ir numeradas correlativamente en la parte superior derecha. El orden de presentación seguido en el manuscrito será el siguiente:

1. En la primera página del manuscrito se indicará:
 - Título del artículo, en minúsculas (en castellano e inglés) excepto la letra inicial.
2. La segunda hoja del artículo incluirá:
 - Resumen del trabajo presentado, tanto en español como en inglés. Dicho resumen tendrá alrededor de 250 palabras. Siguiendo las normas de publicación APA, el resumen debe especificar los objetivos del estudio o investigación; una breve descripción del método utilizado; 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 necesidad de incluir referencia explícita a las divisiones de introducción, método, etc.
 - Listado de entre 5 y 7 palabras clave en español y sus equivalentes en inglés (Keywords) en minúsculas y separadas por comas que, a ser posible, se adapten a las normalmente utilizadas en los índices al uso (p. ej., términos MESH).
3. La tercera hoja dará inicio al texto del artículo. Dado que el proceso de revisión será anónimo, confidencial y ciego, se recomienda que los autores eliminen cualquier información que consideren pudiera ayudar a identificarlos, como por ejemplo, lugar de selección de participantes, institución de pertenencia del Comité Ético que ha aprobado el estudio, etc. Esta información puede ser ocultada mediante la sustitución de la misma por la expresión “[AUTHORS]” o similares. 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.

Método

Se describirá claramente el método empleado (selección de la muestra, como se recogieron los datos, instrumentos de recogida de datos o de evaluación, procedimiento, etc.). Se deben identificar los instrumentos de evaluación, tratamientos, fármacos utilizados, aparatos, sistema de evaluación, pruebas estadísticas, etc. Debe especificarse el tipo de estudio (descriptivo, epidemiológico, experimental, ensayo clínico, etc.).

Todos los trabajos que se presenten deben indicar el cumplimiento de los principios éticos necesarios para llevar a cabo la investigación y la referencia del comité de ética u oficina de investigación que haya evaluado la adecuación de dichas investigaciones al marco ético y legal correspondiente.

Es importante que estudios experimentales y ensayos clínicos estén registrados y se indique el número de registro en base de ensayos (p. ej., Clinicaltrials.gov). Deben especificarse los análisis estadísticos utilizados. Cuando estos sean muy novedosos deben describirse con detalle, e indicar el paquete estadístico utilizado con la referencia oportuna. Se recomienda encarecidamente indicar, cuando sea posible, el dato de significación exacta obtenido en los resultados (frente a fórmulas como $p < .05$ o $p < .01$) así como incluir, también cuando sea posible, estadísticos de tamaño del efecto.

Resultados

Los resultados deben presentarse en una secuencia lógica en el texto, tablas y figuras, y acorde al procedimiento descrito en el apartado del método. Se deben utilizar sólo aquellas tablas y figuras estrictamente necesarias, que expresen claramente los resultados del estudio. No se deben duplicar los datos en tablas y figuras, ni tampoco repetir en el texto todos los datos de las tablas y figuras, sólo los más importantes. Es conveniente enfatizar y resumir sólo las observaciones más importantes.

Los ensayos clínicos aleatorizados y diseños experimentales deben adecuarse a las guías CONSORT (www.consort-statement.org) y los estudios con diseños no experimentales a guías internacionales (p. ej., STROBE, <https://www.strobe-statement.org/>) para la mayor claridad de la lectura y revisión del trabajo. Igualmente, se presentarán los estadísticos del tamaño del efecto correspondiente.

Discusión

Se debe comenzar con el objetivo general del estudio. Enfatizará los aspectos nuevos e importantes del estudio y las conclusiones que se derivan del mismo. No se deben repetir en detalle los resultados presentados en la sección anterior, ni en la introducción. Se ha de destacar lo más importante y controvertido y relacionarlo con otros estudios relevantes sobre el tema. No se deben presentar suposiciones si no se ven apoyadas por los datos o la evidencia previa. Cuando sea apropiado pueden incluirse recomendaciones. Se deben indicar las implicaciones de los hallazgos y las posibles 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 indicarán las entidades financiadoras en este apartado..

Conflicto de intereses

Todos los manuscritos (artículos, revisiones, editoriales, 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 publicación de la American Psychological Association, 7ª edición (2020) (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. Se indicará en el texto del manuscrito en qué lugar deben ir situadas.

4. EL PROCESO DE REVISIÓN DEL MANUSCRITO

Los artículos son enviados a la revista a través de la www.adicciones.es. Los autores deben registrarse en la plataforma web de la revista para poder enviar sus manuscritos. A continuación, recibirán unas claves para poder entrar en la web y revisar la situación de su artículo. No obstante, el editor de la revista enviará un mensaje cuando tenga una decisión tomada o quiera aclarar alguna cuestión. Una vez recibido el manuscrito en la Redacción de la Revista Adicciones empezará el proceso de revisión.

El Editor, normalmente consultando con los Editores Asociados, puede desestimar de entrada un artículo que entienda que claramente no reúne la calidad suficiente o no entra dentro de las prioridades de la revista. El editor puede rechazar de entrada aquellos artículos que no cumplan estrictamente la normativa de la revista (APA), sin pasarlo a revisión por expertos.

Durante el proceso de envío se le solicitará a los autores que aporten el nombre de al menos dos posibles revisores para su artículo (nombre, institución, correo electrónico y ORCID. Los revisores propuestos 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 Editorial de Adicciones. La revista se reserva la decisión de utilizar o no dichos revisores propuestos.

Los manuscritos serán enviados por el Editor o los Editores Asociados a dos o más expertos en el tema (revisores), que harán los comentarios pertinentes sobre el mismo y que requerirán aquellos cambios que estimen necesarios. También pueden dar su opinión sobre la aceptación o rechazo del artículo. La última decisión, basada en el informe de los revisores, o del editor asociado que se hubiese responsabilizado de la revisión, será tomada por el Editor de la revista, que podrá consultar además a los Editores asociados. El proceso de revisión será “doble ciego”. En todo el proceso de revisión se mantendrá el principio de confidencialidad por parte de los revisores hacia el trabajo que revisan, así como la confidencialidad de los nombres de los revisores entre ellos o ante los autores del manuscrito. En este sentido las revisiones serán anónimas, confidenciales y ciegas también para los revisores que no conocerán el nombre de los autores en ningún momento.

El resultado de la revisión del manuscrito será enviado al autor de correspondencia indicando la decisión editorial. Los autores, si es el caso, deberán hacer los cambios señalados por editores y/o revisores, en un plazo máximo de dos meses, enviando:

- Una copia del manuscrito revisado resaltando los cambios.
- Una copia del manuscrito definitivo.
- Un documento de respuesta a revisores, donde se expongan de forma detallada las principales modificaciones efectuadas, así como sus propios comentarios sobre los principales aspectos de la revisión.

5. PROCESO DE PUBLICACIÓN

Una vez aceptado el artículo, se seguirá el siguiente proceso:

1. Se les remitirá una versión con posibles correcciones de formato y estilo, a la que deberán responder en un máximo de 10 días.
2. Una vez recibida respuesta por parte de los autores, se les informará de una estimación de las páginas que ocupará la versión final del artículo en la revista, y del coste de publicación del mismo.
3. Una vez se haya efectuado el pago, el artículo será traducido al inglés o español, dependiendo del idioma original.
4. Se generará un documento final o galerada que los autores también revisarán.
5. Se asignará un DOI al mismo y se publicará en avance online, hasta que se asignen páginas dentro de un volumen concreto en el que finalmente serán publicados los manuscritos.

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.

Costes de publicación

La Revista Adicciones es *Open Access*, es decir, de acceso abierto, por lo que una vez publicados los artículos estarán disponibles a través de la web y las distintas plataformas de búsqueda de forma gratuita, pudiendo ser enviados y compartidos a toda la comunidad científica. Esto supone que se deben cubrir una serie de gastos de edición, maquetación y derechos de difusión que conllevan asociados unos costes para los autores de los manuscritos. El proceso de publicación Open Access cumple con los requisitos y recomendaciones establecidos por las convocatorias de financiación científica más actuales como la Horizon 2020 y la Ley de Ciencia del Ministerio de Ciencia e Innovación de España, que promueven el acceso abierto a la ciencia.

La publicación de nuevos artículos está sujeta al pago de 50€ (IVA incluido) por página, con un descuento del 30% si el primer autor es socio de Socidrogalcohol. Para los casos en los que al menos un 50% de los autores pertenezcan a países en desarrollo según **World Bank**, se aplicará un descuento del 50%. Excepcionalmente, si existen dificultades graves de financiación y ante artículos de gran calidad, se podrá negociar una tarifa de publicación

6. COPYRIGHT

Los derechos de copyright de todos los artículos publicados en la revista Adicciones pasan a ser propiedad de la revista.

Los autores se comprometen a acompañar el manuscrito de todos los permisos correspondientes para reproducir material previamente publicado que se va a incluir en el manuscrito, como texto, tablas, figuras, etc.

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