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ORIGINAL

On the prevention of electronic cigarette use in adolescents

Sobre la prevención del uso de Cigarrillos Electrónicos en adolescentes

JOSÉ LUIS CARBALLO *; FRANCISCO PASCUAL PASTOR **.

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** Presidente del Comité Nacional para la Prevención del Tabaquismo. Coordinador Unidad Conductas Adictivas Alcoi, Alicante.

The significant and rapid growth in the use of e-cigarettes in recent years is raising concerns from both scientific and professional perspectives. E-cigarettes in their different forms (e.g., vapes) are defined as electronic delivery systems for nicotine, flavouring substances or tetrahydrocannabinol (THC) and cannabinoid (CBD) oils. The devices heat a liquid to produce an aerosol that people inhale into their lungs. Although they were initially designed as a possible aid to quit smoking or to reduce smoking risks associated with conventional cigarettes, they have also been shown to have potential consequences in terms of physical (e.g., respiratory problems) and psychological health (e.g., addictive behaviours), especially among the adolescent population (Wold et al., 2022). The question therefore arises as to whether the possible benefits of e-cigarettes in risk reduction and their use as a treatment, as supported by some studies (Lindson et al., 2024), are greater than the risks and consequences increasingly reported in the literature on e-cigarette smoking (The Lancet Regional Health – Europe, 2024).

The use of these devices has increased worldwide among adults, children and young people (WHO, 2022). A global systematic review analyzing the prevalence of e-cigarette smoking in people under 20 years of age found a general prevalence (defined as any lifetime use) of 17.2%, rising to 32% in those younger than 16, with a current use (defined as use in the last 30 days) of 7.8% (Yoong et al., 2021). According to the ESTUDES survey (OEDA, Spanish Observatory on Drugs and Addictions, 2023), the prevalence in Spain is even higher, with 54.6% of adolescents between 14 and 18 years of age having tried them at some point in their lives and 26.3% using them within the last 30 days. In under 10 years, their use has risen by 40%. As for content, most report using them with flavouring substances (more than 25%), followed by those who smoke them with nicotine (more than 17%), with nicotine and cannabis (2%), and finally, only with cannabis (0.5%). Furthermore, the perceived risk of using e-cigarettes of 38% is the lowest of all drugs assessed by ESTUDES. This low perception of risk could be one of the factors increasing the likelihood

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of use, given that the marketing campaigns for these products have aimed at promoting their use as healthier than tobacco, as a harmless or even as a therapeutic alternative (D'Angelo et al., 2021).

At the same time, in recent years, tobacco use has fallen in the adolescent population in Europe and Spain (WHO, 2022; Brime & Villalbí, 2023). Some authors have argued that the use of electronic cigarettes may have contributed to this reduction (Greenhalgh et al., 2021). However, recent data collected in England indicate a very significant rise in the use of e-cigarettes, in disposable format, among the young population (18-24 years), without any appreciable association with a reduction of tobacco use at the same rate (Jackson et al., 2024). The authors also wonder whether people who start using e-cigarettes would be tobacco users if vapes did not exist, given that the data came from a population of people who never regularly smoked.

In any case, given the novelty of these devices, research that will allow us to unravel the relationship between the use of e-cigarettes and cigarette smoking is still pending. The gateway hypotheses to tobacco do not seem well-founded since although meta-analyses of prospective cohort studies indicate that the use of e-cigarettes is linked to a higher risk of starting to smoke in the future (Khouja et al., 2021), a cause-and-effect association cannot be established. The research to date has many biases and methodological flaws that prevent this type of relationship being established (Chan et al., 2021). According to other approaches, the available evidence points to a common vulnerability in people who may become nicotine users, whether in the form of e-cigarettes or conventional ones (Etter, 2018). Indeed, many surveys indicate the coexistence of both types of use in regular smokers. For all these reasons, many questions remain to be answered in order to explain the relationship between both behaviours and thus allow the development of more effective prevention strategies, for example.

The approaches in the field of smoking prevention can be useful if the similarity of both behaviours is taken into account. To date, the regulations on the use, marketing and advertising of e-cigarettes are less strict than those applied to tobacco, despite the fact that consensus documents have been recommending for years that they be equated with tobacco (National Committee for the Prevention of Smoking, 2020), irrespective of whether the capsules used in these devices contain nicotine or not. Prevention must be managed through various approaches and contexts. In the case of tobacco, effective environmental prevention strategies already exist (Becoña Iglesias, 2021), such as raising prices, reducing public spaces for smoking, improving the protection of minors from these devices, controlling advertising and the use of generic packaging, monitoring the tobacco industry's strategies for attracting young people, controlling the sale of vaping-related products, and also increasing school prevention programs.

Similarly, it is also necessary to develop universal, selective and indicated prevention programs in the school context. Since it is the place where adolescents interact the most, where they establish interpersonal relationships and develop socio-emotional skills (Fonseca-Pedrero et al., 2023), the educational environment is ideal for implementing prevention programs. Although there are currently no specific programs for the prevention of e-cigarette use that have been empirically tested, there is evidence of the effectiveness of some preventive actions against tobacco use in the school context. Preventive interventions combining social competence and influence training have been shown to be the most effective measures in this context for smoking prevention (Thomas et al., 2013). According to Griffin and Botvin's (2010) classification, social competence programs are based on Bandura's (1976) social learning theory, by which children learn to use drugs through modelling, imitation and reinforcement. Programs would therefore benefit from the inclusion of such components as problem-solving and decision-making training, strategies for increasing self-control and self-efficacy, stress-coping strategies, and social skills training. These would be supplemented by other activities drawn from social influence programs, such as resistance and refusal skills to cope with peer pressure and other high-risk situations.

Arising from other theoretical approaches, such as Azjen's (1991) Theory of Planned Action, the perception of behavioural control and the subjective norm of smoking, i.e., the perception of behaviour in society, are two important elements for designing preventive interventions in adolescents (Topa & Moriano, 2010). A core element is self-efficacy training, which can serve to build confidence in making decisions and resisting risky behaviours, such as the use of e-cigarettes. It is also important that prevention programs address the reasons why adolescents might use e-cigarettes and their beliefs around what constitutes nicotine addiction or susceptibility to marketing (e.g., attractive flavours) as a means of allowing young people to reflect on the perceptions underlying their decisions to use e-cigarettes. To be successful, programs should also address peer pressure, harm/risk perceptions, and other key reasons why adolescents are particularly drawn to these newer tobacco products, as well as the aforementioned refusal skills (Liu et al., 2020).

On the other hand, and particularly in cases where smoking is already present, Bricker et al. (2010) argued that the use of the motivational interview approach is a good tool to guide preventive programs in adolescents. This motivational approach uses a therapeutic style that seeks commitment to change, avoids confrontation by working with people's ambivalence and increases their self-efficacy. These are less invasive actions with greater autonomy and independence for adolescents in their decision-making. It is precisely from this perspective that brief interventions (BI)

to prevent substance use in the school context become useful, given their active approach to increasing the willingness to change in people who smoke and have not considered changing. In a meta-analysis carried out on the effects of this type of BI (Carney et al., 2016), the results indicated that brief interventions in the school context had a significant effect on reducing the use of alcohol and other substances compared to those adolescents who did not receive any type of intervention.

In conclusion, although we know about effective prevention strategies for smoking and the use of other drugs, there is a need for research into their usefulness in preventing e-cigarette use. Evidence is needed to inform decisions by policy makers, practitioners and researchers about the types of health promotion programs or other activities that should be implemented to support e-cigarette prevention or cessation among adolescents (Barnes et al., 2023). At the same time, regulations and strategies for environmental prevention need to evolve to the level of those already applied to tobacco.

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ORIGINAL

Latent classes of gambling in youths: The role of comorbidity, alexithymia and stressful life events by sex

Clases latentes de juego problemático en jóvenes: El papel de la comorbilidad, la alexitimia y los acontecimientos vitales estresantes en función del sexo

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Abstract

Alexithymia is related with propensity towards impulsive behavioral responses, rather than cognitive regulation of stressful events. Youth is a particularly vulnerable time for the confluence of these variables, which may impact the severity of gambling disorders (GD). However, sex differences have hardly been explored. This study aimed, firstly, to explore the frequency of GD among young people, as well as the presence of GD with other comorbid addictions. Secondly, latent classes were examined on the basis of gambling risk and their relationship to other addictive behaviors, alexithymia and stressful life events. Thirdly, we analyzed whether class membership was predicted by sex and age. The sample was composed of 360 participants between the ages of 18 and 35, the majority female. The results obtained revealed that alcohol abuse was the most prevalent addictive behavior both for problem and non-problem gamblers of both sexes. Group membership analyses showed the presence of two latent classes based on gambling risk. One of them was characterized by gambling risk, comorbidity, alexithymia, and stressful life events, and mainly predicted by being male. The other model was characterized by no gambling risk, lower levels of stressful life events and alexithymia, and mainly predicted by being female. This second profile presents a risk of alcohol abuse and compulsive buying. We highlight the need to introduce a gender perspective both in the interpretation of research findings and in the clinical application of treatments.

Keywords: gambling, young adults, sex, comorbidity, alexithymia, stressful life events

Resumen

La alexitimia se relaciona con la propensión a las respuestas conductuales impulsivas, en lugar de una regulación cognitiva de los acontecimientos estresantes. La juventud es una etapa de especial vulnerabilidad para la confluencia de estas variables, pudiendo repercutir en la severidad del trastorno de juego (TJ). No obstante, las diferencias entre sexos apenas han sido exploradas. Este estudio tuvo como objetivo, en primer lugar, explorar la frecuencia de TJ en los jóvenes, así como la presencia de TJ con otras adicciones comórbidas. En segundo lugar, se examinó el riesgo de juego y su relación con las otras conductas adictivas, la alexitimia y los acontecimientos vitales estresantes. En tercer lugar, se analizó si la pertenencia a una determinada clase latente era predicha por el sexo y la edad. La muestra estaba compuesta por 360 participantes, con edades comprendidas entre los 18 y 35 años, siendo la mayoría mujeres. Los resultados obtenidos revelaron que el abuso de alcohol era la conducta adictiva más prevalente, tanto para los jugadores problemáticos como para los no problemáticos de ambos sexos. Los análisis de pertenencia de grupo mostraron la presencia de dos clases latentes en base al riesgo de juego. El primero de ellos se caracterizaba por el riesgo de juego, la comorbilidad, la alexitimia y los acontecimientos vitales estresantes, y estaba principalmente predicho por la condición sexo-varón. El otro modelo se caracterizaba por la ausencia de riesgo de juego, niveles más bajos de acontecimientos vitales estresantes y alexitimia, y se predice principalmente por la condición sexo-mujer. En este segundo perfil se halló riesgo de abuso de alcohol y de compra compulsiva. Señalamos la necesidad de introducir una perspectiva de género tanto en la interpretación de los resultados de la investigación como en la aplicación clínica de los tratamientos.

Palabras clave: trastorno de juego, jóvenes, sexo, comorbilidad, alexitimia, acontecimientos vitales estresantes

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The Diagnostic and Statistical Manual of Mental Disorders, 5th edition [DSM-5] (American Psychiatric Association [APA], 2013) defines gambling disorder (GD) as a problematic, persistent, and recurrent behaviour that leads to clinically significant deterioration, and which often disrupts the person's daily life. Studies indicate that the prevalence and addictiveness of gambling disorder increase as gambling becomes more accessible, faster, more attractive, and more available, characteristics that have been specially enhanced in the new modality of online gambling (Griffiths et al., 2006). A prevalence study conducted by Chóliz et al. (2021) found that people under 35 years of age participate more in online gambling than the adult and older population, which are more prone to traditional offline gambling, indicating that online gambling is currently the main modality of problem gambling for young adults.

A systematic review in European countries estimates the prevalence of young people meeting the criteria for problem gambling to range between 0.2 and 12.3%, despite the variation between assessment instruments, time frames, and cut-offs (Calado et al., 2017). In Spain, the national prevalence study of behavioural addictions among people aged 15 to 64 years shows that 1.6% of them had a possible problem gambling, and 0.6% had a possible GD (Delegation of the Spanish Government for the National Plan on Drugs, 2020). In addition, men show a higher prevalence and proneness to gambling than women, with a greater propensity for sensation-seeking and risk-taking behaviours (Wong et al., 2013). Despite this fact, in gender perspective research, male gender mandates have been identified as a risk factor for addiction, not the fact of being male per se. From this viewpoint, the consequences to which young women and men are exposed in consumption spaces, as well as in relation to addictive behaviours are very different. As a result, despite the higher prevalence in men, being a woman increases the risk of being socially stigmatised (Rodríguez et al., 2019).

There is ample evidence indicating that problem gambling is more likely to occur among younger ages (Abbott et al., 2014; Calado & Griffiths, 2016; Castrén et al., 2013; Costes et al., 2011). Chóliz et al. (2021) observed that in Spain, young adults (26-35 years old) were the age group most involved in gambling behaviours, when compared to the youngest (< 26) and elderly people (> 65 years). Youths that meet the criteria for GD score higher on other comorbid addictive behaviours such as alcohol, drugs, video gaming, or compulsive spending when compared to at-risk and non-gamblers (Jauregui et al., 2016), with a particularly high prevalence between 18- to 25-year-olds (Sussman & Arnett, 2014). In fact, Estévez et al. (2021) found that the psychopathological profile is more severe among young people with co-occurring gambling and other addictive behaviours. For its part, a alcohol

consumption has become a widespread and relatively normative behaviour in the youth culture, often associated with functions such as socialisation, frequent binge drinking before the age of 25 constitutes a subsequent risk factor for alcohol dependence and has also been shown to have a close positive relationship with problematic gambling behaviours (Jun et al., 2019). In this sense, studies carried out with adolescents from the general population point out that those classified as problem gamblers were more likely to be involved in all types of gambling and to report higher rates of comorbid use of tobacco, alcohol and other substances (De Luigi et al., 2018). In contrast, Sanscartier et al. (2019) found that higher-risk gamblers were more prone to report anxious-depressive symptomatology, whereas lower-risk gamblers were more likely to use drugs and alcohol. Meanwhile, Martínez-Loredo et al. (2019) explored gender-specific latent classes among adolescents based on their risk of suffering substance use and gambling activities, noting that the female class mainly comprised of gamblers, in contrast to the male class of gamblers, reported some degree of alcohol use and engaged in more chance-based gambling typologies. Therefore, previous evidence still shows mixed findings indicating the need for further studies.

On another hand, there is ample evidence supporting that alexithymia plays a central role in the aetiopathogenesis of addictive disorders, including GD (Marchetti et al., 2019). Alexithymia has been defined as a multifaceted personality construct that represents a deficit in the cognitive processing of emotions and affective awareness, highlighting the difficulty in identifying, recognizing, and describing feelings (Marchetti et al., 2019). It has been suggested that people with high levels of alexithymia may use behavioural rather than cognitive responses to manage their emotional states (Zdankiewicz-Scigala & Scigala, 2018). In this sense, gambling may arise as an attempt to regulate subjective emotional states and the loss of impulse control when gambling (Bibby & Ross, 2017). Besides, Estévez et al. (2021) found that alexithymia mediated the relationship between insecure attachment styles and addictions (i.e., gambling behaviour, spending, gaming, and the use of alcohol and drugs). However, to the best of our knowledge, alexithymia has scarcely been explored as a predictor of class membership as a function of sex in young adults with risky gambling patterns.

Likewise, stressful life events have been related to higher frequency and severity of gambling among adults diagnosed with GD (Elman et al., 2010; Stor et al., 2012). Youth with gambling-related problems have also shown a greater number of adverse life events compared to those who did not gamble (Bergevin et al., 2006). Consistently with the above, people with high levels of alexithymia have been found to experience more severe post-traumatic symptoms after events with a high emotional impact (Frewen et al.,

2006). Moreover, post-traumatic disorders are significantly more recurrent in young people in treatment for addiction compared to those who do not gamble and they are associated with a worse prognosis and a costlier treatment (Wang et al., 2020). In turn, attempts to classify people who gamble indicate that the clusters with the highest difficulties in emotion regulation, problem-solving, and both life and emotional stress, tend to show greater psychopathological comorbidity and gambling severity than other clusters marked by traits such as excitement, socialization, or sensation-seeking (Jiménez-Murcia et al., 2019). Estévez et al. (2021), in a recent study of comorbidity in a young population with GD diagnosis, reported that higher scores in coping and emotion-regulation difficulties were closely associated with the comorbid presence of GD and other substance and behavioural addictions. However, while most of the studies have been conducted in clinical samples, little is known about whether the interrelationship of stressful life events and alexithymia would constitute a risk factor for the general population of young adults with problematic gambling use patterns.

Objectives

In recent years, research examining predisposing risk factors for GD has gained attention due to its increased prevalence and psychosocial implications, particularly among youths. Nonetheless, we found a paucity of studies analysing latent class groups based on gambling risk and even fewer using sex as a predictor of problematic gambling. Furthermore, to the best of our knowledge, the scientific literature does not provide information about the predictive role and interaction of alexithymia, stressful life events and comorbid addictive behaviours with respect to class membership of youth gamblers from the general population. The latter is something we highlight given the benefits in terms of prevention amongst an age group that has been identified as particularly vulnerable for the onset and development of GD. Lastly, we also stress the need to explore comorbidities such as eating disorders or compulsive buying, which have been less studied to date in relation to problem gambling.

On that bases, the present research aimed, in the first place, to explore the frequency of possible GD in young people from the general population, as well as the presence of GD with other comorbid addictive behaviours (i.e., alcohol addiction, drug addiction, compulsive buying, and eating disorder). In the second place, it aimed to analyse class membership based on the risk of GD, and its relationship with the aforementioned addictive behaviours and psychological variables (i.e., alexithymia and stressful life events). Finally, we wanted to know whether class membership was predicted by sex and age.

Method

Participants

The sample consisted of 360 Spanish participants aged between 18 and 35 years. Their average age was 22.93 years ($SD = 3.30$) and 77.6% were women, 22.2% were men, and 0.3% were another gender. Most of the sample had university studies (72.7%), followed by General Certificate of Education (17%), Vocational training (9.4%), and, less frequently, Primary Education (0.3%) and Compulsory Secondary Education (0.6%). Participants were mainly studying (51.4%), studying and working (25%), or only working (20.2%).

Instruments

Problem gambling

Problematic gambling behaviour was assessed by the *South Oaks Gambling Screen* [SOGS] (Lesieur & Blume, 1987). The Spanish version was adapted by Echeburúa et al. (1994). The SOGS is a screening tool for gambling that was developed for its detection in clinical populations. It consists of 20 items, whose content is related to gambling patterns, sources of money to gamble, debt repayment, and involved emotions. Scores above 4 points suggest the possible presence of GD so answers are classified in a dichotomous variable (i.e., No risk of gambling < 4 and risk of gambling ≥ 4). Regarding its reliability, the SOGS has high internal consistency, with a Cronbach alpha of .94. Its 4-week test-retest reliability was .98 ($p < .001$), and its convergent validity with the DSM-IV criteria was .94. In this study, Cronbach's alpha for the SOGS was .60.

Alcohol, drugs, compulsive buying, and eating disorders

MULTICAGE CAD-4 (Pedrero-Pérez et al., 2007). This instrument assesses addictive behaviours, with or without substance. It contains 32 items, divided into eight factors of four items each, including: Alcohol Abuse or dependency, GD, drugs, Eating Disorders, Internet Addiction, Video Game Addiction, Compulsive Spending, and Sex Addiction. In this study, we used four of those eight factors (i.e., Alcohol Abuse, drugs, Compulsive Spending, and Eating Disorders). The items have a dichotomous response option (i.e., *yes* or *no*). The responses were classified as three-level variables indicating the risk of alcohol abuse, drugs abuse, compulsive spending and eating disorder (i.e., No risk = 0 or 1, Probable risk = 2 and Quite probable risk ≥ 3). The internal consistency of the MULTICAGE CAD-4 is satisfactory (Cronbach's alpha for the total scale was $\alpha = .86$ whereas the subscales show values greater than .70). The 20-day test-retest reliability was $r = .89$. The criterion validity was also adequate (it detects between 90 and 100% of already diagnosed cases). In the current study,

Cronbach's alpha was .60 for alcohol abuse, .63 for drugs, .67 for compulsive buying, and .60 for eating disorders.

Alexithymia

Toronto Alexithymia Scale-20 (TAS-20; Taylor et al., 1985, adapted to Spanish by Martínez-Sánchez, 1996). Alexithymia is measured through three main factors: (1) Difficulty Identifying Feelings, which refers to problems identifying emotions, which are notoriously confused with physical symptoms, (2) Difficulty Describing Feelings, by which individuals are unable to communicate their feelings and use emotional vocabulary, (3) Externally-Oriented Thinking, by which individuals tend to neglect their inner emotional states. The scale comprises 20 items, and responses are scored on a 6-point Likert scale ranging from 0 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency is good for the overall scale ($\alpha = .83$ for the original and $\alpha = .81$ for the Spanish adaptation). In this study, Cronbach's alpha was .85.

Stressful life events

Centrality of Event Scale [CES; Berntsen & Rubin, 2006, adapted to Spanish by Fernández-Alcántara et al., 2015). The scale assesses aspects directly related to the processing of traumatic events. Before completing the scale, participants were asked to write down in a space the most traumatic or stressful event in their life to base their response on that event when completing the scale. It consists of 20 items rated on a 5-point Likert-type response ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The internal consistency was satisfactory both for the original scale and the Spanish adaptation ($\alpha = .94$). In the current study, Cronbach's alpha was .93.

Procedure

This is a cross-sectional research design. There were two main ways of data collection. One of them was carried out with students from the Complutense University of Madrid. The other was carried out using non-probabilistic sampling through the snowball method, including the diffusion of the questionnaire on social networks (e.g., WhatsApp, Instagram, Facebook, journals, or websites with divulgation purposes).

For the entire sample, the survey was completed via an online link to the questionnaire or via a QR code that gave access to the same questionnaire. To access the questionnaire, participants had to be over 18 years old, have read the study information and accepted the informed consent. The duration of the questionnaire was about 30 minutes.

The questionnaire included general information about the main goals of the study. It was made clear that there were no right or wrong answers and that participants could email the main researcher if they needed further information about the study. Confidentiality, anonymity, and

voluntary participation were ensured for all participants. The participants did not receive any compensation for participating. The study was approved by the Review Board.

Analytical procedure

As preliminary analyses, missing data patterns and normality of the continuous variables were explored. The MCAR Little test for missing data was non-significant, $\chi^2(987) = 1054.04, p = .068$. Therefore, it was assumed that the data were missing at random and no imputation was performed. The assumption of normality of the continuous variables (i.e., age, stressful life events, and alexithymia) was explored with the skewness and kurtosis levels (see Table 2). These data showed that both indicators were lower than $|2|$ for all three variables, which follows Cain et al.'s (2017) criteria to assume normality.

The hypotheses were tested by latent class analysis (LCA) with Mplus 7.11 (Muthén & Muthén, 1998–2013). For this purpose, the three-step procedure described by Asparouhov and Muthén (2014) was followed. First, the number of latent classes was calculated, comparing models with 1 to 3 classes, including risk of addiction to gambling, alcohol, drugs, compulsive buying, and eating disorders. Model comparison was applied attending to Akaike's Information Criterion (AIC), the Bayesian Information Criterion (BIC), the mean-adjusted Bayesian Information Criterion (aBIC), the entropy, the Lo-Mendell-Rubin adjusted likelihood ratio test (LMRa), and the bootstrap likelihood ratio test (BLRT). AIC, BIC, and aBIC indicated model maladjustment, so lower values were considered indicators of better fit (Hu & Bentler, 1999). Specifically, BIC was observed to be the most reliable of these three indicators (Nylund et al., 2007), so it was considered as the primary indicator for decisions of model fit. LMRa and BLRT test differences on loglikelihood between models with $K - 1$ classes and K classes, and significant tests indicated that the K -class model increased model fit (Nylund et al., 2007). The entropy ranged between 0 and 1, so values close to 1 showed a more precise level of profile classification (Celeux & Soromenho, 1996).

Besides, a multigroup analysis was performed to test if the composition of the latent classes vary between sexes (i.e., females and males). In doing so, the final model of the first step was fixed to be equal across sex (Configural model) and that model was compared to a nested model in which classes were allowed to differ by sex (Sex-variant model). Non-invariance was assumed when the sex-variant model compared to the configural model did not show significant model fit increment based on the Satorra-Bentler scaled chi-square difference test (Satorra & Bentler, 2010).

Second, the most likely class membership was explored to describe the composition of each latent profile in the final model. To this end, the average probability of endorsing each category of each indicator variable was examined, as well as

odd ratio tests on these probabilities across classes to examine whether they differ in regard to the degree of gambling risk, alcohol and drug abuse, compulsive buying and eating disorder (Wang & Wang, 2012). Third, the relationship of the antecedents (i.e., age and sex) and the psychological outcomes (i.e., stressful life events and alexithymia) with class membership was explored following the suggestions of Lanza et al. (2013). Thus, as the latent class is not an observed variable, this process empirically estimates the class-specific distribution of the distal variable and the latent class variable considering the logistic regression coefficients reflecting their association combined with the marginal distribution of the distal variable (Lanza et al., 2013).

Results

The frequency of GD and the comorbidities (i.e., alcohol addiction, drug addiction, compulsive buying, and eating disorder) is displayed in Table 1. Most of the sample showed no risk of GD, and alcohol consumption risk was the most frequent comorbidity in the sample.

As a first step in the LCA, the model fit indexes of the models, the entropy, and model comparisons were computed. The models with 1, 2, and 3 latent classes were compared (see Table 3). The AIC, BIC, and aBIC showed that the 2-class model reduced model error, and LMRa and BLRT were significant, indicating that this model significantly increased model fit compared to the 1-class model. Although the entropy of the 3-class model was higher than that of the 2-class model, the 3-class model significantly reduced model fit based on LMRa and BLRT, whereas AIC, BIC, and aBIC indicated a worse model fit. Consequently, the 2-class model was established as the final model. Besides, the multigroup analysis was carried out to compare the class composition by sex (i.e., females vs. males). The results of this analysis indicated that the configural model in which the composition of the classes was fixed to be equal for males and females ($\chi^2[299] = 549.70$; AIC = 2134.76, BIC = 2215.84, aBIC = 2149.22) the sex-variant model ($\chi^2[283] = 475.71$; AIC

= 2132.63, BIC = 2283.20; 2159.48) did not significantly differ on model fit ($\chi^2[16] = 2.40$, $p = .999$) so invariance was assumed between sex groups.

As the second step in the LCA, the characteristics of each class in the final 2-class model were explored (see Table 3). Class 1 differed of Class 2 on the degree of risk of gambling, alcohol and drug abuse and compulsive buying, but not the risk of eating disorder. In Class 1 there was approximately a 40% of probability of risk of gambling while, in Class 2, there were no cases of risk of gambling

Table 1
Frequencies of risk of addiction to gambling, alcohol, drugs, compulsive buying, and eating disorder

Variable	Frequencies	
	n	%
Addiction to gambling		
No risk	320	90.9
Risk	32	9.1
Alcohol		
No risk	232	68.8
Probable risk	70	20.8
Quite probable risk	35	10.4
Drugs		
No risk	298	88.7
Probable risk	24	7.1
Quite probable risk	14	4.2
Compulsive buying		
No risk	284	84.1
Probable risk	39	11.5
Quite probable risk	15	4.4
Eating Disorder		
No risk	261	79.3
Probable risk	49	14.9
Quite probable risk	19	5.8

Note. The sum of alcohol, drugs, compulsive buying, and eating disorder is not exact due to missing data.

Table 2
Model fit indexes and comparisons

Model	AIC	BIC	aBIC	Entropy	LMRa	BLRT
1-Profile model	1848.04	1882.81	1854.26	NA	NA	NA
2-Profile model	1793.37	1866.78	1806.50	.64	73.41***	74.66***
3-Profile model	1794.60	1906.65	1814.65	.76	18.45	18.76

Note. AIC = Akaike's Information Criterion; BIC = Bayesian Information Criterion; aBIC = sample-size-adjusted Bayesian Information Criterion; LMRa = Lo-Mendell-Rubin adjusted likelihood ratio test of K - 1 versus K profiles; BLRT = bootstrap likelihood ratio test of K - 1 versus K profiles; NA = Not applicable.

*** $p < .001$.

Table 3
Final model estimates in probabilities

	Class 1 High risk (n = 68, 19%)	Class 2 Low risk (n = 284, 81%)	Odds ratio comparison
Addiction to gambling			
No risk	.62***	1.00***	NC
Risk	.38***	.00	
Alcohol			
No risk	.37***	.79***	6.37*
Probable risk	.41***	.14***	3.90
Quite probable risk	.22**	.07**	
Drugs			
No risk	.67***	.96***	11.52
Probable risk	.16**	.04*	NC
Quite probable risk	.17**	.00	
Compulsive buying			
No risk	.61***	.85***	3.49*
Probable risk	.32***	.10***	1.22
Quite probable risk	.07	.05**	
Eating disorder			
No risk	.54***	.93***	11.26
Probable risk	.29***	.06**	30.88
Quite probable risk	.17**	.01	

Note. NC = Comparison was not computed, as one of the categories had a frequency of zero in one of the latent classes.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4
Differential relationship with psychological variables by class membership

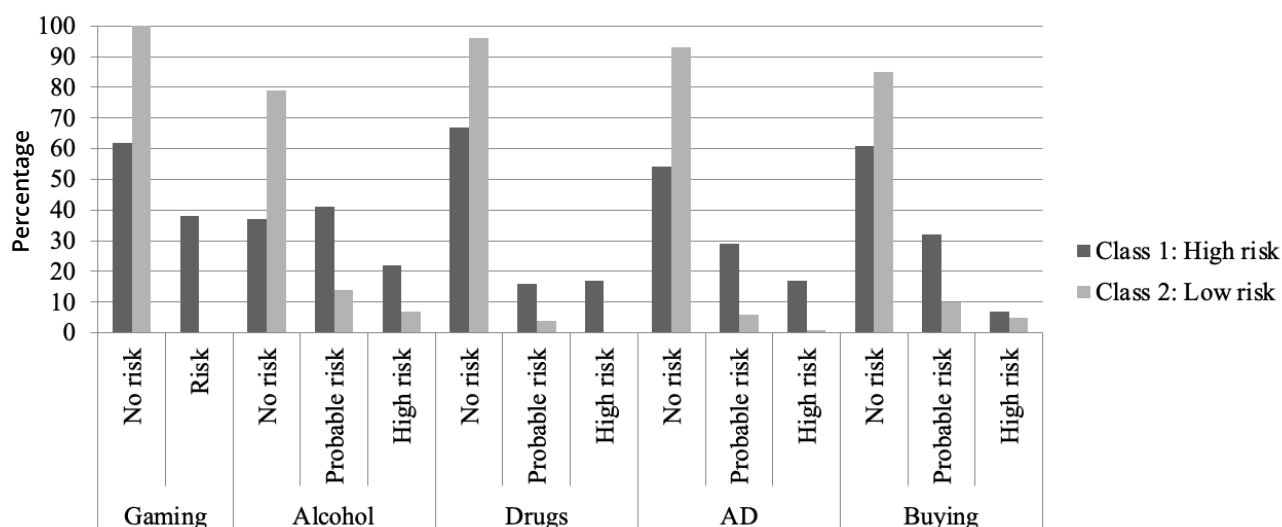
Psychological variable	High-risk class		Low-risk class		Class comparisons	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	χ^2	<i>p</i>
Alexithymia	53.07	1.96	46.69	1.06	7.27	.007
Stressful life events	3.59	0.09	3.31	0.05	6.01	.014

Probable and quite probable risk of addiction to alcohol and compulsive buying were more prevalent in Class 1 than in Class 2. Concretely, people of Class 1 had 63% odds of probable and quite probable risk of alcohol, while people of Class 2 had a 21% of probability of these levels of risk of alcohol abuse. Regarding compulsive buying, the odds of Class 1 of probable or quite probable compulsive buying were 39% against 15% of Class 2. Class 1 and Class 2 also significantly differed in the prevalence of quite probable risk and of drug abuse. While Class 1 had a 17% of probability of quite probable risk of drug abuse, the probability in Class 2 was zero. Based on these results, Class 1 was called “Higher risk of behavioural and substance addiction; High risk” and Class 2 was called “Lower risk of behavioural and substance addiction; Low risk”.

Third, the relationship between the antecedents and class membership and between class membership and the psychological variables was explored. Regarding the antecedents, multinomial logistic regressions using the three-step procedure showed that age was not related to class membership ($\beta = -0.12$, $SE = 0.06$, $p = .059$, $d = -.10$). Class membership was predicted by sex because males were significantly more likely to belong to Class 1 than to Class 2 than females ($\beta = 2.39$, $SE = 0.52$, $p < .001$, $d = .24$).

Regarding the psychological variables, the multinomial logistic regressions showed that belonging to the High-risk class was significantly related to higher alexithymia ($\beta = -0.02$, $SE = 0.01$, $p = .021$, $d = .20$) and stressful life events events ($\beta = 0.92$, $SE = 0.28$, $p = .001$, $d = .19$) than belonging to the Low-risk class (see Table 4).

Figure 1
Probabilities of each category by class. AD = Alimentary disorder



Discussion

The present study aimed to examine the possible presence of problem- and non-problem gambling, as well as the frequency of drug use, compulsive buying, alcohol abuse, and eating disorders in a sample of young adults of the general population. According to the results, the great majority showed no risk of gambling. In contrast, alcohol consumption risk was the most frequent comorbidity in the sample. These results are in line with previous literature in the area, which points out that men are more likely to show the first gambling behaviours at earlier ages than women, who start gambling at a significantly older age (Lamas et al., 2018). This could largely explain why, in a predominantly female sample such as the one in this study, most of the participants do not present at-risk- or possible-problem gambling.

Based on the results of the study, we hypothesised that males and females would differ in terms of the developmental stages that predispose to a greater vulnerability for the initiation of gambling risk behaviours. It has been stated that people are more prone to developing gambling behaviours when coping with a major life change or circumstances involving significant grief in one's life stage (Wong et al., 2013). That is, men and women could see their personal and social identities compromised at different stages of life and may, therefore, be more susceptible to the development of a gambling problem at different ages. In this sense, women's gambling behaviour has been identified as a way of avoiding or coping with their emotional states, and it has been also observed that they tend to start gambling later in life (González-Ortega et al., 2013). By contrast, males appear to be more prone to early gambling behaviours, towards adolescence, with greater difficulties in impulse control, and a strong tendency towards financial

gain, competitiveness, and sensation-seeking, as well as socialisation gambling motives (Ellenbogen et al., 2007). Young adult men, compared to young women, have also been shown to experience their unique social anxieties and pressures related to sexual competition, male rivalry, and heightened concerns about their social image, which, in turn, has been linked to the involvement in addictive behaviours in youths (Wong et al., 2013).

On the other hand, alcohol was the comorbidity with the highest prevalence and risk in this study for both problem gamblers (who were predominantly male) and non-problem gamblers (who were mostly women). Alcohol, is one of the substances most consumed by young women, which is easy to obtain and of legal consumption, making it more socially normalised behaviour among female youth population (National Institute on Drug Abuse [NIDA], 2021; Rodríguez et al., 2019). A recent study examining the impact of gender on substance abuse in young people, found that alcohol abuse was slightly higher among females than males, which was not the case for cannabis (Pérez de Albéniz-Garrote et al., 2021). Moreover, Jauregui et al. (2016) concluded that the sample of people with GD scored significantly higher in all study variables (i.e., anxious-depressive symptomatology, emotion dysregulation, and drugs) except for alcohol, which had similar rates among non-gamblers. Meanwhile, a recent study by Martínez-Loredo et al. (2019) explored latent classes as a function of gambling and substance use in adolescents, pointing out that female adolescents with gambling problems also reported some degree of alcohol use unlike the boys. However, we have not found studies exploring latent classes based exclusively on gambling risk considering young adult female population, which could constitute a different profile

of both adolescents and women with GD. In the second place, a profile model analysis was carried out, using as a clustering measure the scores obtained in gambling behaviour (i.e., presence or non-risk of problem gambling). The results have shown the existence of two groups. The first group, which we called the “High-risk” profile (Class 1), is made up of participants with possible gambling problems, higher comorbidity with other addictive behaviours (i.e., alcohol, eating disorder, compulsive buying, and drug abuse), as well as higher rates in alexithymia and stressful life events. In contrast, the second group, which we called the “Low-risk” profile (Class 2), is composed of participants without risk of gambling, drug abuse, or eating disorders, as well as significantly lower scores in stressful life events and, particularly, in alexithymia. In this second group, there were some cases of risk or possible alcohol abuse and compulsive buying, but they were fewer compared with the High-risk profile. When we introduced sex as a predictive variable of the latent class model, we observed that being male led to a higher probability of belonging to the High-risk profile (Class 1), whereas being female was more predictive of the Low-risk profile (Class 2). Age was not found to be a predictor of the profile model.

The results are in line with previous literature. For instance, Jiménez-Murcia et al. (2020), in a study of clustering of treatment-seeking patients, found that the most severe GD profiles showed a higher impact and number of stressful life events, as well as an earlier onset of gambling activity. In addition, Estévez et al. (2021) observed that the group of at-risk problem gamblers, compared to the group of non-problem gamblers, revealed higher scores of alexithymia, which has been also associated by other authors with greater severity and intensity of gambling behaviour (Maniaci et al., 2017). Concerning comorbidity, Kovács et al. (2020) proved that the comorbid presence of GD and alcohol use disorder expressed a more maladaptive personality profile than the exclusive presence of alcohol abuse. Moreover, Svensson and Sundqvist (2019) mentioned in their study certain risk factors that predict GD in students: being male, stressful life events, impulsivity, depression, drug abuse, and escape-avoidant coping (Elman et al., 2010; Sharman et al., 2019). Other studies have also shown the co-existence of gambling and sex addiction, overeating, or shopping (Etxandi et al., 2021). According to Griffiths (1994), cross-addiction (i.e., a concept that implies that if a person has developed an addictive disorder, that person is at a higher risk of developing another addiction) occurs both in adolescents and adults, and it is mostly a male condition, which the results of this study also reinforce. However, the findings of the present study are novel because, to the best of our knowledge, no studies have examined the comorbidity of problem gambling in relation to eating disorders, compulsive shopping and substance use in young boys.

The study also explored a second profile, which we called “Low-risk” profile (Class 2), with no risk of gambling or drug use, lower scores in stressful life events and, even lower scores in alexithymia, and predominantly composed of women. However, although at a slightly lower degree than in the “High-risk” profile (Class 1), we also found cases of possible shopping and alcohol addiction in this group. Indeed, these results are quite consistent with studies on addictive behaviours in young women, which reveal that compulsive buying is mostly a female pathology (Pérez de Albéniz-Garrote et al., 2021). Nevertheless, some studies have found a similar prevalence in both sexes (Roberts & Roberts, 2012). Further studies are therefore needed to clarify this issue. Moreover, Macía et al. (2023) through a study of latent classes based on risk for eating disorders and addictions in youths observed that young women with eating disorders had the highest scores on alexithymia and stressful life events compared to the other two groups: “men with addictions” and “healthy women”. The findings of this study, in contrast, suggest that men with gambling problems have the highest comorbidity, alexithymia and stressful life events. Therefore, based on what has been mentioned in the previous literature, as well as in the results of this study, alexithymia and stressful life events are likely to constitute a transdiagnostic risk for the development and maintenance of impulsive risk behaviour for both sexes. However, we hypothesise that if we had taken shopping, eating disorders or alcohol as profile grouping variables rather than gambling, the female sex condition might have been a predictor of the “higher-risk” group (rather than the male sex, as in this study), an aspect we certainly suggest exploring for future lines.

Limitations

The present paper is not without some limitations. Firstly, the cross-sectional design of the present study does not allow establishing causal interpretations and the direction of the effects, so longitudinal designs are needed in future research to achieve an in-depth understanding of the interaction between the variables. Moreover, the findings obtained in this study are based on sex differences, so it would be appropriate to carry out studies based on gender differences for a better understanding of the social conditions, consequences, and particular needs of women and men when dealing with addiction, and not only the biological differences between the sexes. Despite this, although the results are based on sex, we have attempted to disaggregate and discuss the results with a gender perspective. On the other hand, considering that the sample was obtained via online, there could be biases related to social desirability (especially high in young people), low effort or attention when answering and/or random responses. Lastly, latent class analyses have been conducted with a general and young sample, therefore, the results are neither generalisable to young people in treatment

for severe problem gambling nor to older people. However, the subclinical sample of this study does allow us to observe vulnerability factors in youths, which may precede the development of more severe addictive behaviors in the future. This is particularly beneficial for preventive purposes.

Conclusion

As a conclusion, these results may be of interest for developing prevention programs and policies in youth population. On the one hand, this study highlights that alcohol consumption is the most prevalent risk behaviour among young women and men, both for problem and non-problem gamblers. On the other hand, according to these results, young men are more prone to problem gambling and simultaneous co-morbid addictive behaviours, especially drug consumption, compared to young women. In contrast, young women are slightly less predisposed to addictive behaviours in general, but the results of this study suggest that there is also a risk of alcohol abuse and compulsive buying among women. This has important ramifications because it is not the addiction itself a pathology to which men are more naturally predisposed than women, but rather the more normalised, accessible, and less socially sanctioned an addictive behaviour is, the more likely might be to occur in women.

In this line, we propose that treatments should consider social stigmatisation, the difficulty of recognising the problem and the negative consequences for youth men and women when an addictive behaviour is considered masculine (e.g. gambling) or feminine (e.g. compulsive shopping). Finally, on the basis of the results of this study, we conclude that alexithymia and stressful life events in young people are associated with problem gambling behaviours. The onset of gambling in young people has been associated with an increased likelihood of developing GD in adulthood, as well as with greater severity of the disorder. Therefore, targeting and preventing predisposing risk factors in young age groups could be a protective factor for the future development of GD and its comorbid addictive behaviours (i.e., drugs, alcohol, compulsive shopping and/or eating disorders).

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Conflict of interests

All authors declare nor conflicts of interest neither financial interest.

Ethics approval

The Institutional Review Board of the University of Deusto approved the study (ETK-17/20-21). This study was performed in line with the principles of the Declaration of Helsinki.

Consent

Informed consent was obtained from all individual participants included in the study.

Data

The datasets generated during and/or analysed during the current study are not publicly available due to confidentiality reasons.

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ORIGINAL

Implementation of quality standards in drug demand reduction: Insights from FENIQS-EU project and ways forward

Implementación de estándares de calidad en la reducción de la demanda de drogas: Perspectivas del proyecto FENIQS-EU y caminos a seguir

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Abstract

Quality standards have been recognized as an important tool for improving the quality of drug use prevention, treatment, and harm reduction services and for bridging the gap between science and practice. The aim of this paper is to describe the state of implementation of quality standards in drug demand reduction in the European Union and to identify barriers, needs, and challenges to implementation and future pathways. Between June and November 2021, an online survey ($n = 91$) and follow-up interviews ($n = 26$) were conducted with key informants - experts in drug demand reduction and quality assurance. Data were analyzed using descriptive statistics and thematic analysis. The survey showed that most countries have implemented the European Drug Prevention Quality Standards (EDPQS) in the prevention domain and the Minimum Quality Standards (MQS) in drug demand reduction. A variety of standards are applied in the treatment area and the EQUUS minimum quality standards are widely known. The application of quality standards is least reported in the harm reduction service area. Mentioned challenges and barriers to implementation included lack of funding, unrecognized importance of evaluation, professional competencies, and system fragmentation. Mentioned supportive factors included appropriate materials and training, as well as political support and professional networks. The study shows that quality standards are inconsistently implemented in all areas of drug demand reduction. According to respondents, implementation could be improved by advocating for the need to implement quality standards, ensuring sustainable funding for interventions, and providing education and training.

Keywords: quality standards, implementation, drug demand reduction, alcohol, drugs, Europe

Resumen

Los estándares de calidad constituyen una herramienta para mejorar la calidad de la prevención, el tratamiento, y la reducción de daños del uso de drogas y para unificar ciencia y práctica. Este artículo tiene como objetivo describir el estado de la implementación de los estándares de calidad en la reducción de la demanda de drogas en la Unión Europea e identificar las barreras, las necesidades y los desafíos para su implementación. Entre junio y noviembre (2021) se realizó una encuesta en línea ($n = 91$) y entrevistas de seguimiento ($n = 26$) con informantes clave, expertos en reducción de la demanda de drogas y sistemas de garantías de calidad. Se emplearon estadísticos descriptivos y análisis temáticos. La mayoría de los países ha implementado los Estándares europeos de calidad en prevención de drogas (EDPQS) en el ámbito de la prevención y las Normas mínimas de calidad (MQS) en la reducción de la demanda de drogas. En el área de tratamiento, los estándares mínimos de calidad EQUUS son ampliamente conocidos. La aplicación de estándares de calidad es menor en la reducción de daños. Se identificaron distintos retos y barreras: la falta de financiación e importancia concedida a la evaluación, las competencias profesionales y la fragmentación del sistema. Los factores de apoyo fueron materiales y formación, apoyo político y redes profesionales. Los estándares de calidad no se implementan en todas las áreas de reducción de la demanda de drogas. Los informantes clave sugirieron la necesidad de fomentar la implementación de los estándares de calidad, asegurar financiación y formación.

Palabras clave: estándares de calidad, implementación, reducción de la demanda de drogas, alcohol, drogas, Europa

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In the past decades researchers, practitioners and policymakers have recognised the importance of effective Drug Demand Reduction (DDR) interventions. The main European strategic document in this field, the EU Drugs Strategy 2013-2020 (Council of the European Union, 2012) identified two policy fields: drug demand reduction and drug supply reduction. Drug demand reduction was described as a range of equally important measures: prevention (environmental, universal, selective and indicated), early detection and intervention, risk and harm reduction, treatment, rehabilitation, social reintegration and recovery. The objective of these measures was to contribute to the reduction of illicit drug use, delay the age of the onset, and to prevent and reduce problem drug use, dependence and related health and social risks and harms. In the meanwhile, newly adopted EU Drug Strategy 2021-2025 (Council of the European Union, 2020) made a distinction between drug demand reduction and harm reduction activities and introduced a change within priorities. Three policy areas were identified: I. Drug supply reduction: Enhancing security, II. Drug demand reduction: prevention, treatment and care services and III. Addressing drug related harm. The objectives of the drug demand reduction area stayed the same as in the previously mentioned document, with the exception that drug related risks and harms were placed within a separate area. In that context, addressing drug related harm focuses on measures and policies that prevent or reduce the possible health and social risks and harm for various target groups, such as users, society and prison settings. Risk and harm reduction interventions and measures to protect and support people who use drugs (such as prevention of drug-related infectious diseases, prevention of overdose and drug-related deaths, promotion of civil society organisation and enabling sustainable funding, and providing alternatives to coercive sanctions) became priority areas.

Both EU Drug Strategies (Council of the European Union, 2012, 2020) emphasise the importance of implementing Quality standards (QS) as a way for the improvement of the quality of drug services and to bridge the gap between science and practice (Council of the European Union 2012, 2020). Various Quality Assurance (QA) and Quality Control mechanisms should ensure the quality of drug prevention, treatment and harm reduction and Quality Standards (QS) are regarded as one of the crucial tools in this process (European Monitoring Centre for Drugs and Drug Addiction [EMCDDA], 2011a; Ferri et al., 2018). QS provide guidance on general principles and rules that should be followed when implementing recommended interventions and practices (Brunsson and Jacobsson, 2000; according to Ferri & Bo, 2012). Some examples of QS, based on the Council of the European Union Minimal Quality Standards include following recommendation: “Prevention interventions form part of a coherent long-

term prevention plan, are appropriately monitored on an ongoing basis allowing for necessary adjustments, are evaluated and the results disseminated so as to learn from new experiences.”; “Risk and harm reduction measures, including but not limited to measures relating to infectious diseases and drug-related deaths, are realistic in their goals, are widely accessible, and are tailored to the needs of the target populations.”; “Treatment and social integration interventions and services are based on informed consent, are patient-oriented, and support patients’ empowerment.” (Council of the European Union, 2015: 4-6).

Several benefits have been linked to QS implementation such as reducing the gap between available evidence and practice, improving the quality of service delivery, enhancing transparency towards service users and civil society, and facilitating evaluation and feedback (Autrique et al., 2016). Although QS are aspirational (World Health Organization [WHO] & United Nations Office on Drugs and Crime [UNODC], 2020) and need to be seen as guiding principles (EMCDDA, 2014), it is important to guarantee appropriate implementation (Ferri & Bo, 2012). QS promote quality by translating knowledge into practice and by including all relevant stakeholders into the implementation process, which facilitates successful QS implementation (Ferri & Griffiths, 2021).

Quality standards differentially respond to interventions, services and people (Burkhart, 2015) and can be intended for stakeholders involved in various phases of intervention development, such as planning, funding, delivery, monitoring, and evaluation. QS can be related to content issues, processes, or structural aspects of QA (EMCDDA, 2017a), which makes the implementation process quite complex and challenging.

In the last few years, a wide range of international QS have been developed in the area of DDR, such as the European Drug Prevention Quality Standards (EDPQS) (EMCDDA, 2011b), the European minimum Quality Standards in drug demand reduction (EQUS) (Schaub et al., 2013; Uchtenhagen & Schaub, 2011), the EU Council conclusion on Minimum Quality Standards in drug demand reduction (MQS) (Council of the European Union, 2015), the UNODC/WHO International Standards on Drug Use Prevention (UNODC & WHO, 2018), the WHO/UNODC International Standards for the Treatment of Drug Use Disorders (WHO & UNODC, 2020). Other standards are more topical and refer to specific interventions (e.g. Standards and Goals of Therapeutic Communities (World Federation of Therapeutic Communities, n.d.) or limited to a specific country or region. A previous overview of QA in DDR in Europe (Ferri et al., 2018) emphasized that though evidence-based interventions are becoming more acceptable, implementation issues have not been addressed in a sufficient way. QS are often non-binding for national governments and present the political will of a certain

community to address interventions with an evidence-based approach (Ferri & Griffiths, 2021). Adoption of QS is also challenging due to the high heterogeneity of interventions and services, as well as the diversity of stakeholders involved in it (Autrique et al., 2016). Several factors have been identified that contribute to successful QS implementation, such as expert consensus, training, accreditation, certification and evaluation whether providers understand the rationale behind the standard (EMCDDA, 2012, 2014). The complexity of the above-mentioned factors leads to variations in QS implementation between and within countries, as well as between DDR areas (EMCDDA, 2022).

Although QS have been recognised as an important quality assurance tool by a wide range of researchers, experts and policy makers, few information is available on the degree of implementation and local factors affecting it for better or worse (EMCDDA, 2022). In addition to having a clearer picture of the implementation of QS, it is also important to understand the factors that facilitate or hinder the implementation process. Understanding these factors could help to improve the quality of service delivery, increase the degree to which QS are implemented in daily practise, improve accountability, and create minimum quality guarantees across and within countries. Consequently, this paper aims to describe the situation in implementing quality standards by DDR areas - prevention, treatment/social reintegration and harm reduction - and to identify barriers, needs and challenges in implementing QS in Europe.

Methods

Participants and procedure

This study was conducted between June and November 2021 as part of the Further ENhancing the Implementation of Quality Standards in drug demand reduction across Europe (FENIQS-EU) project that aims to improve the implementation of QS in drug demand reduction across Europe, with more services, organizations, and countries applying QS in daily practice. To achieve these aims, multiple research methods were used.

First, Country drug reports (EMCDDA, 2019) and countries' Best practice workbooks (EMCDDA, 2020) were consulted to identify available QS initiatives in the European Union (EU) and the United Kingdom (UK). In addition, with support from the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), key informants (individuals most knowledgeable about national implementation of QS) from the EMCDDA's REITOX National Focal Points were identified.

Second, an online survey was set up, consisting of three versions: Prevention, Treatment/Social reintegration, Harm reduction. Of note is that Harm reduction was included within the drug demand reduction field as per

the EU Drugs Strategy 2013-2020, given that the updated 2021-2025 was not available at the time of the project submission to the funding authority in 2019. Questions in the online survey focused on the use of QS (whether QS is implemented in the country or not), if "yes", to what extent QS is implemented, coverage of the MQS (Council of the European Union, 2015), main reasons for implementation, challenges and barriers to implementation, support needs, and examples of good QS implementation practices. In addition, contacted participants were able to recommend other key informants to the EMCDDA National Focal Points, who were later asked to provide information on national implementation of QS. The *online survey* was administered using the Survey Monkey tool. An email with a link to the survey was sent to all identified key informants. After a first wave of the survey (between June 10, 2021 and September 13, 2021), the number of responses was limited, not allowing to draw firm conclusions. To collect more information, project partners and International Advisory Board (IAB) members identified additional key informants for the online surveys (mainly from established Non-Governmental Organisations (NGOs) in the field, other relevant country institutions, and the academic community), and it was decided to launch a second wave of the survey (between September 17, 2021, and October 15, 2021). The second wave focused on obtaining information about countries for which there were either no data at all or no data for some of the DDR areas. Third, *follow-up interviews* were conducted with key informants from countries that confirmed broader implementation of QS and agreed to participate. The idea was to learn more about the practice of implementing QS in different countries. Related to that, the focus of the follow-up interviews was to review compliance with MQS, discuss the situation in the countries historically and critically, and provide additional information on specific implementation issues. The interviews were conducted through videoconference from September 17, 2021, to November 24, 2021.

All participants were country representatives (from EMCDDA National Focal Points) or other key informants (recommended for contact by EMCDDA National Focal Point experts) who were able to provide information on whether or not QS are being implemented in their country and, if so, to provide an overview of the level of QS implementation in a particular drug demand reduction area, as well as information on the needs, barriers, and challenges to implementing QS. Approximately 230 key informants were identified and contacted in the European Union (EU) and the United Kingdom (UK). A total of 91 surveys was completed and information was collected for 27 countries. Most participants worked as experts in the EMCDDA National Focal Point and, to a lesser extent, in other relevant national institutions, established NGOs in the field, or academic institutions (universities or institutes).

Information on QS implementation by DDR area was as follows: prevention (n = 35), treatment/social reintegration (n = 25) and harm reduction (n = 31) surveys. The number of completed surveys per country and per DDR area is shown in Figure 1.

A total of 26 follow-up interviews were conducted: 8 in the area of prevention, 9 around treatment/social reintegration area and 9 around harm reduction (shown in Table 1). In three countries, a follow-up interview was conducted with a key informant who reported about treatment/social reintegration as well as harm reduction.

Ethical approval for the study was obtained from the Ethical Committee of the Faculty of Psychology and Educational Sciences, Ghent University (reference number 2021-101). For participation in the online survey, consent was obtained online from participants after the aims of the study had been explained to them and before the survey was taken. To participate in the interviews, participants received an information sheet and signed an informed consent form before participating in the follow-up interviews.

Table 1
Conducted follow-up interviews

Prevention	Treatment/Social reintegration	Harm reduction
Cyprus	Austria	Croatia
Germany	Belgium	Czech Republic
Greece	France	Denmark
Italy	Ireland	Luxembourg
Latvia	Italy	Portugal
Netherlands	Lithuania	Slovakia
Sweden	Luxembourg	Slovenia
UK	Netherlands	Netherlands
	UK	UK

Instruments

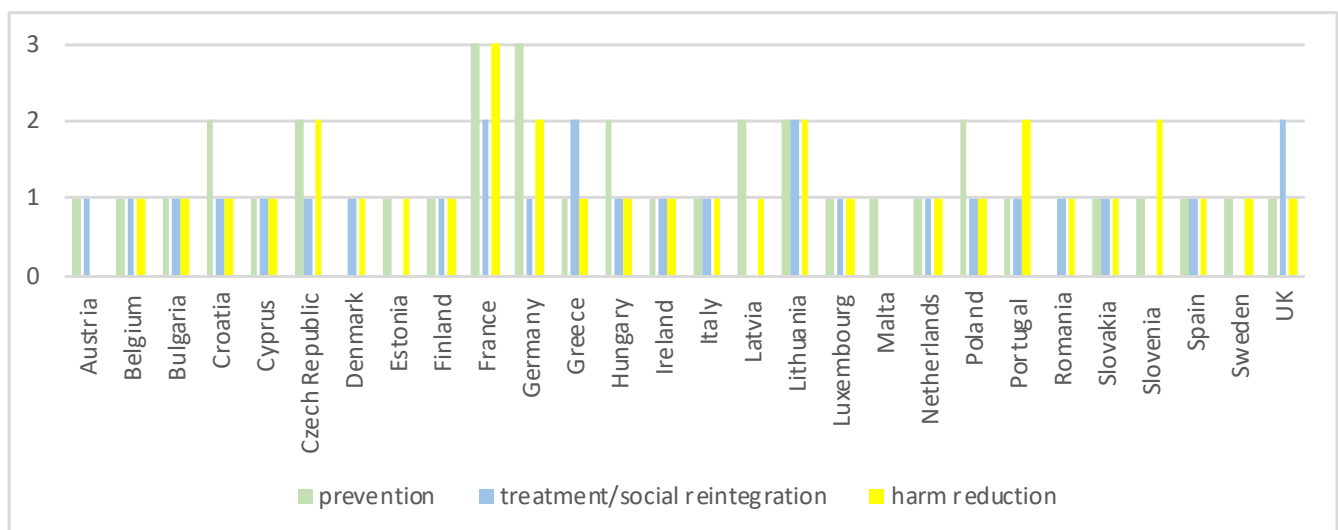
Online survey in three versions: Prevention, Treatment/Social reintegration, Harm reduction

The objective of the survey (60 questions in total) was to collect information on the level of implementation of some recent international QS, but also on national QS implementation in each country. The survey was anonymous, although participants could provide contact information and reveal their identity. Survey questions focused on the professional background of study participants (e.g., affiliation, professional position, years of experience), though these questions were not mandatory. In a second section, implementation of some widely known QS were assessed for all/specific drug demand reduction areas:

1. EU Minimum Quality Standards for drug demand reduction interventions (MQS) (Council of the European Union, 2015) – all DDR areas.
2. European minimum Quality Standards in Drug Demand Reduction (EQUS) (Uchtenhagen & Schaub, 2011) - all DDR areas.
3. European Drug Prevention Quality Standards (EDPQS) (EMCDDA, 2011b) – prevention.
4. UNODC & WHO International Standards on Drug Use Prevention (UNODC & WHO, 2018) - prevention area.
5. WHO & UNODC International Standards for the Treatment of Drug Use Disorders (WHO & UNODC, 2020) – treatment/social reintegration, harm reduction.
6. Standards and Goals for Therapeutic Communities (World Federation of Therapeutic Communities, n.d.) – treatment/social reintegration area.

Respondents provided the following information on the implementation of each QS in their countries: DDR area, adoption (yes/no), implementation period, territorial

Figure 1
Number of surveys completed per country and per DDR area



level of QS implementation (national, regional (e.g., state or county), local (e.g., city or local community), domains where QS was implemented (health, social welfare, law enforcement, justice, education, other), and assessment of the extent of QS implementation (yes, fully; yes, to some extent). Participants could also indicate adoption of other national or international QS implemented in their country in any of the DDR areas.

The final section consisted of questions addressing barriers, needs and challenges in implementing QS. In addition, participants could mention examples of inspiring QS implementation practices in their country and briefly describe these. At the end of the survey, participants also had the opportunity to recommend other key informants in their country and to indicate whether they were willing to participate in a follow-up interview.

Follow-up interviews

The interview was semi-structured (approximately 30 minutes long), and respondents were asked to describe the process of implementing QS, identify factors that support the implementation process of QS (strengths), and identify challenges or barriers to implementing QS in their countries. Respondents were also asked what they thought the progress in implementing QS would be over the next two years in their countries.

Data analysis

To analyse the data collected during the online survey, descriptive statistics was used to determine the sample characteristics and to assess implementation of QS by DDR areas. All analyses were performed using SPSS 21.0 (IBM, Armonk, NY, USA). Interview data and open-ended responses were analysed using an inductive approach to thematic analysis, a method for analysing and identifying rich data patterns (Braun & Clarke, 2021; Joffe, 2011). This type of analysis was deemed most appropriate to capture the goal of the study without being limited to an a priori theory. The open-ended questions in the online survey were reread, notes were taken, and a preliminary coding structure was developed according to the aim of the study. Follow-up interviews were transcribed, notes were taken, and were then coded by the researchers. The coding process was conducted independently by three researchers, and then the key areas were discussed among the researchers and grouped into key themes.

Results

Implementation of quality standards by areas - prevention, treatment/social reintegration and harm reduction

In the area of prevention, nine (9) key informants provided an overview of QS implementation at the local level, nine

(9) at the regional level, and thirty-four (34) at the national level. In the area of treatment/social reintegration, six (6) key informants provided an overview of the implementation of QS at the local level, seven (7) at the regional level, and twenty-five (25) at the national level. Six (6) key informants in the area of harm reduction provided an overview of the implementation of QS at the local level, three (3) at the regional level, and twenty-seven at the national level.

Regarding QS implementation *in the prevention area*, most countries have implemented the ED PQS standards (n = 20), followed by the MQS, EQUUS, and the UNODC & WHO International Standards for Drug Use Prevention. Nine (9) countries have adopted other standards, mostly national QS. Data on prevention are not available for two (2) countries – Denmark and Romania. The number of countries implementing various international QS in the area of prevention is shown in Figure 2. Key informants reported that most QS have been implemented in the health sector, followed by education, social welfare, and law enforcement. Implementation of QS is least common in the justice domain.

Key informants in the *treatment/social reintegration area* from thirteen (13) countries stated they have implemented the EQUUS standards and twelve (12) also mentioned the implementation of MQS and the International Standards for Treatment of Drug Use Disorders. Although limited to a specific type of services, 14 countries refer to the implementation of the Standards and Goals for Therapeutic Communities and other national QS. Data are not available for five (5) countries - Estonia, Latvia, Malta, Slovenia, and Sweden. The number of countries implementing international QS in the area of treatment/social reintegration is shown in Figure 3.

In terms of policy domains in which QS have been implemented in each country, QS are primarily implemented in the health and social welfare domain followed by the education, justice, and law enforcement domain.

In the *harm reduction area*, key informants from 12 countries stated that EQUUS standards have been implemented and other QS (mostly national), while the International Standards for the Treatment of Drug Use Disorders and

Figure 2
Number of countries implementing QS in the prevention area (N = 35)

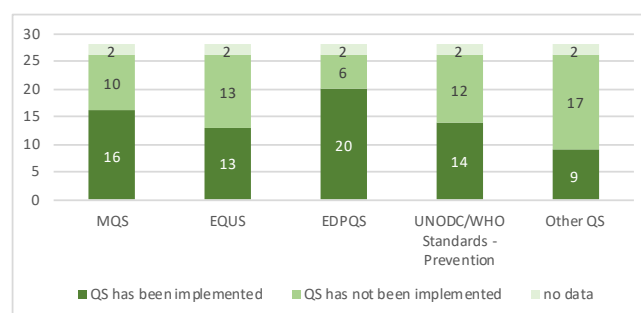


Figure 3
Number of countries implementing QS in treatment/social reintegration area (N = 25)

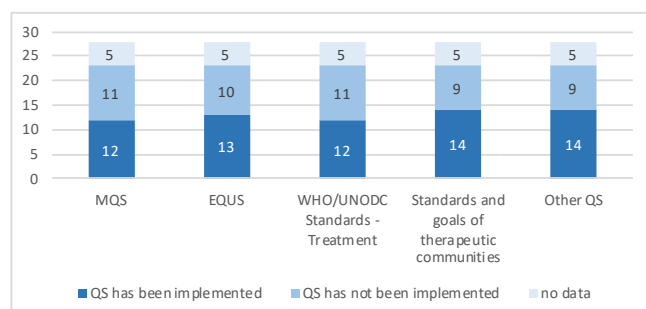
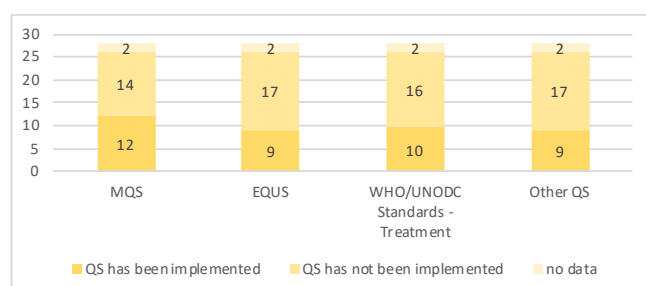


Figure 4
Number of countries implementing QS in harm reduction area (N = 31)



the MQS are applied to a lesser extent. Data are not available for two (2) countries – Austria and Malta. Most QS for harm reduction services are implemented in the health and social welfare domain, followed by the domains of law enforcement and justice. Figure 4 shows the number of countries implementing international QS in the domain of harm reduction.

Table 2
Identified themes: Open-ended questions and follow-up interviews (thematic analysis)

Areas	Themes
Needs	Mandatory QS
	Resources (materials, training, people, finance, infrastructure)
	Support at all levels (politicians, decision-makers, international organizations)
	Unrecognized importance of evaluation and monitoring
Challenges and barriers	Lack of funding
	Unrecognized importance of evaluation
	Practitioner competencies and positions
	Fragmentation and inertness of the system
Supporting factors	Materials and training
	Support and networking

Needs, barriers and challenges in QS implementation

Using a thematic analysis, several themes around three main topics were identified (Table 2).

Area 1. QS Implementation needs

According to the respondents, the development and adoption of *mandatory QS* for various health and social service systems is a recognized necessity when it comes to QS implementation. In most countries, QS implementation is not mandatory. The need for the use of strategic documents for the implementation of QS is also recognized, as well as the more systematic use of existing standards. In addition, in some countries there is a need to work on harmonizing existing QS and to include the use of QS as a funding criterion.

“[In country X] there is no one standard that everyone should apply, and everybody can invent their own.” (prevention)

Materials and training, people, finances, and infrastructure are referred to as necessary *resources* that must be considered when implementing QS. Education and training must be continuous and systematic and should include strengthening and developing advocacy skills. In addition, QS materials and guidelines should be accessible, visible, and user-friendly.

“Provide training to professionals and create the base of minimum standards which need to meet the criteria in order to get funding” (harm reduction)

Key informants stated that greater political *support* is needed at all levels. Political willingness and support are needed to recognize the importance of QS and to implement them effectively. In addition, the need for collaboration among stakeholders and cooperation with international organizations was recognized by key informants. To provide support for the implementation of QS, some key informants believe that it is necessary to establish a specific institution (e.g., pre-certification counselling, development audit, quality methodologists and consultants) and scientific organisations that will promote QS implementation at the national level.

“...It is necessary to advocate effective prevention and application of standards among politicians. Also, the NGO sector needs to advocate that prevention is important even though the results may not be seen immediately.” (prevention)

Some key informants indicated that the *importance of evaluating, and monitoring* services provided in all DDR areas is not sufficiently recognized. This raises the need for continuous evaluation and the development of an effective evaluation system.

“There is no culture of evaluating [of] delivered interventions, not only in drug prevention but in prevention in general.” (prevention)

Area 2. Challenges and barriers related to the implementation of QS

Insufficient and discontinuous funding was regarded as a challenge/barrier by respondents in all DDR areas. For prevention, for example, some key informants indicated that there is no fixed funding for prevention and that non-governmental organizations (NGOs) mostly carry out their activities on the basis of calls for proposals from various ministries. In terms of funding, key informants pointed out that practitioners are underpaid for their work. In the area of harm reduction, the creation of secure and stable funding for services is recognized as a challenge.

“There is no funding for harm reduction, hence there are no QS.”
(harm reduction)

The *unrecognized importance of evaluation* was also identified as a challenge or barrier, as some countries do not see the need and value of evaluation, regardless of the DDR area.

“[What is missing is] ongoing evaluation during treatment and flexible adoption of strategies to be enhanced.” (treatment/social reintegration)

Numerous challenges and barriers affect the *competence and position of practitioners*. In some countries, there is a lack of prevention work or lack of support to prevention workers, particularly in evaluating these programmes. From the perspective of some key informants, EDPQS was perceived as a very bureaucratic process. The weak position of professional associations was also seen as a challenge. In some DDR areas, practitioners are leaving the field and, as a consequence, others are overwhelmed with the work.

“Overworked staff. [There is] no time or energy to invest in their knowledge regarding QS implementation. Mostly social workers [have] no time and resources to participate at the conferences or new educations. [...] Budget is ensured for activities with clients, not for further professional development.” (harm reduction)

The *fragmentation and inertia of the system* was further identified as an important challenge. In some countries, institutions responsible for prevention do not share a common vision of evidence-based interventions and the importance of QS. Key informants pointed out that different authorities are responsible and that there is a need to determine who is responsible for disseminating QS. In the treatment area, the main barrier is availability of the treatment (within a reasonable time frame). Systems are slow and inflexible in adapting to new discoveries and lack a good link to long-term planning. The dichotomy between abstinence and harm reduction-oriented services is one of the biggest challenges to treatment/harm reduction from a key informant perspective.

“The system is very slow to adapt to new developments.”
(treatment/social reintegration)

Area 3: Factors supporting the implementation of QS

Key informants indicated that the main factors that support the process of implementing QS are appropriate *materials and training*. Some of them emphasized the need for continuous education and training and the availability and dissemination of scientific knowledge. The availability of QS materials in the national language is also one of the important factors that can influence implementation of QS. QS should be accessible, visible and adopted by different sectors and disciplines. According to the respondents, practitioners should have advocacy skills, need to be focused on quality and the service user, and should continuously invest in education and knowledge.

“[It is very important] to embed professional development and education within existing career trajectories and pathways more effectively.” (prevention)

Sufficient support and networking are also seen as important supportive factors. QS implementation requires support from ministers, government and decision makers at all levels, but also from the academic community, and collaboration between all sectors is required. Experts who know a lot about QS should advocate among policy and decision makers to enhance the implementation of QS.

“Availability and visibility of QS is very important (a good web-site, making promotion and advertisements on these QS, communication).” (treatment/social reintegration/harm reduction)

In some cases, supporting factors vary according to DDR area. Some key informants recognised the existence of a prevention law and national prevention plan as factors supporting QS implementation, while others mentioned evidence-based treatment done by quality specialists and regulation of treatment through professional training. Harm reduction experts emphasised the importance of having a strategic document.

Discussion

The results of this study show that QS are only implemented in half or two third of the EU countries and implementation of QS varies considerably across DDR areas. Implementation needs regarding QS were described in terms of mandatory implementation of QS, resources and support needed and monitoring and evaluation needs. Lack of funding, the unrecognised importance of evaluation, the competences of practitioners and decision makers, and the fragmentation of the system were cited as major challenges and barriers to implementation. Finally, the availability of materials and training, as well as available support and networks, were cited by key informants as supportive factors for the implementation of QS.

In recent years, it has become accepted that drug demand reduction services should provide evidence-based interventions and increased attention has also been paid to

the quality of the services offered (EMCDDA, 2021a). The EU Drug Action Plan for 2021-2025 considers the adoption of QS as one of its core strategic lines to improve the value and effectiveness of drug programmes, practices, and policies. Most – though not all – European countries appear to have implemented the EQUUS and MQS standards, but no data were available for some countries. Prevention is one of the DDR areas that is implementing QS to a larger extent. Within this area, the EDPQS are the most widely used standards, while in the treatment/social rehabilitation area specific standards (e.g. the Standards by the World Federation of Therapeutic Communities and national/sector specific QS have been implemented. In the harm reduction area, key informants indicated that the MQS are adopted in some countries, but it is worth noting that QS are adopted to a lower extent compared to prevention and treatment. This finding is in accord with the lack of reliable monitoring data on quality of interventions and service implementation that has been noted before in the harm reduction area (Larney et al., 2017; Petersen et al., 2013; Schaub et al., 2013). In response to this, a proposal of several potential indicators (e.g., syringes/person who inject drugs/year) has already been released (Wiessing et al., 2017), but pilot studies on its feasibility and applicability for monitoring harm reduction services are still needed. Alongside the MQS, such indicators may be useful to discourage services from using their own standards and indicators.

The mechanisms through which QS implementation can be enhanced pose several challenges, particularly for health professionals. The fact that QS is not mandatory but voluntary in some countries was highlighted by most of the key informants as a barrier that may compromise the implementation of QS across DDR areas, which has also been confirmed by other authors (Ferri & Griffiths, 2021). Voluntarism may account for the lack of information about several countries (e.g., Sweden, Malta) and can be explained, at the same time, by the absence of an accreditation systems (a form of quality assurance) that is usually placed at the national level. Relatedly, for many countries key informants provided information at the national level in a greater extent, suggesting QS may be scarcely implemented, or at least monitored, at local/regional levels. There are some examples of QS being a prerequisite for participating in publicly funded programs (Ferri et al., 2018), an aspect that may also encourage institutions and substance use facility centres to adopt the QS.

Aside from accreditation systems (i.e., ISO norms), increasing efforts can be observed to develop toolkits to analyze the quality of the services offered and to ensure continuous improvement based on ongoing evaluation of existing practices. The UNODC has led an initiative in this area (Busse et al., 2021) and all agents, including those involved in planning, funding, and monitoring, are

expected to adopt appropriate mechanisms for ensuring compliance with QS implementation.

Other aspects that might compromise the adoption of QS pertain to the un(der)recognized importance of evaluation and the lack of a common, evidence-based vision. Support by decision and opinion policy makers (DOPs) will be essential to change this scenario. In this regard, academics have an important role, not only in advancing knowledge about evidence-based treatment and interventions, but also in promoting the practical utility of QS (Fernandez Lynch et al., 2020). Evaluation pertains to a systematic gathering of data within a particular service/program, so it can be used to improve existing services and make decisions on best practices. A major issue is the fact that evaluation requires some technical skills that practitioners usually lack. Evaluation and continuous monitoring are usually considered complicated and time consuming. In fact, evaluation is argued to cover the initial phases of program development, process evaluation, and outcome evaluation (Rush, 2003). The latter means evaluation should be implemented as a consistent basis and continuously to ensure the efficiency and cost-effectiveness of existing programs (EMCDDA, 2017b, 2021b). It is important that the budgets for conducting DDR practices include money for evaluation. It is conceivable that most health practitioners are subjected to high time pressure and workload. Consequently, if there is not a culture of evaluation, meaning that poor organization support is available, either process or outcome evaluation is not expected to occur.

Key informants indicated that mandatory application of QS and sufficient resources (materials, training and economic resources) could expedite the implementation of QS, which is supported in the literature (Autrique et al., 2016; Campello et al., 2014). Lack of training and education are commonly reported as challenges to advocate on the implementation of QS (Orte et al., 2020). Knowledge is also related to a 'culture of evaluation', meaning the recognition of ongoing monitoring and evaluation efforts in all substance use working areas. For example, The Science for Prevention Academic Network (SPAN) survey conducted in the prevention workforce indicated that low levels of advocacy for prevention are in fact due to training, and low funding may hamper effective implementation systems (Ostaszewski et al., 2018). Several initiatives (Agwogie & Bryant, 2021; Henriques et al., 2019) focused on increasing the knowledge and skills of the workforce in DDR areas have been launched in university and continuing education programs, but also targeted to law enforcement officers and health care professionals on a wide variety of topics (prevention, treatment, and early intervention). One example in Europe is the European Universal Prevention Curriculum (EUPC), a training course on evidence-based prevention developed for people working in the prevention

field, but also for those involved in prevention decisions, opinions, and policies in Europe. This training course is delivered in 5-half-days (if online) or 2 days (if face-to-face) and focuses on prevention science, theoretical models, epidemiology, different prevention areas (school, work, family, environmental) and the basics on the evaluation of prevention programs. The feasibility of implementing a training to practitioners in the substance use field has been previously evaluated. Agwogie and Bryant (2021) have provided evidence on the feasibility of implementing a six-day training course (based on the European Prevention Curriculum [EUPC]) to 202 practitioners in the substance use prevention area. Amongst others, authors noted knowledge gains in the science of evidence-based prevention, policy interventions, skills, and self-efficacy to communicate with stakeholders. Collectively, the results suggest that further enhancing the implementation of QS across DDR areas and countries can be successfully reached if all relevant decision, opinion and policy makers are involved. Conducting trainings of trainer's courses similar to the EUPC program in the treatment and harm-reduction areas is expected to contribute to increased QS implementation.

The results presented should be interpreted against the background of several limitations. First, the process for selecting key informants was not conducted randomly, in the absence of overviews of QS experts per country and drug demand reduction area. Also, the sample of study participants is rather small to allow generalization of the results on a national or EU level, and possibly, some important key informants were not reached, contributing to unequal representation across DDR areas and countries. Although the criterion for selecting participants was the ability to provide an overview of national implementation of QS, the sample of key informants was heterogeneous in terms of the institutions from which they came (national EMCDDA contact points, NGOs, other relevant national institutions in the field, academic community). Another limitation for drawing conclusions was the fact that some of the key informants reported on the implementation of QS only in cases where QS was formally adopted in their country, which in some cases led to conflicting information from key informants in the same country. Second, findings are based on experts' opinions and examining evidence of QS implementation by external evaluators (e.g., grades of evidence for actual implementation of specific QS) may have provided a more accurate assessment. Finally, the level of implementation of QS could not be measured and levels of implementation for each specific QS cannot be ascertained.

To conclude, The EU Drug Action Plan for 2021-2025 recognizes the relevance of offering services that consider QS in DDR. Within this context, FENIQS-EU project gathered important data on the implementation of QS across Europe. The findings reveal that QS are

not consistently adopted across DDR areas, nor are they applied widely. Key informants in the prevention area described better scenarios in terms of QS implementation as compared to the areas of harm reduction and treatment. This finding is concerning as it suggests that some services may deviate from evidence-based practices. Several barriers such as lack of training, insufficient economic resources, and non-mandatory QS implementation may compromise the adoption of QS. This study identifies several steps to accelerate the implementation of QS. More efforts should be made to advocate for the need to implement QS. National authorities, especially at the local and regional levels, should be aware of the need to require proof of implementation of QS as a mandatory requirement for project funding. To achieve this goal, it is important to invest in the training of local experts, i.e., to enhance education and training of DDR workforce and to create a culture of continuous evaluation. Another important step for the future is to increase funding so that long-term contracts can be signed to ensure the sustainability of QS implementation.

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Conflict of interests

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ORIGINAL

Influence of educational level on the prevalence of risk behaviors during the perinatal period

Influencia del nivel de estudios en la prevalencia de conductas de riesgo durante el periodo perinatal

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Abstract

The objective of this work was to assess changes during pregnancy and after childbirth in diet, consumption of tobacco, electronic cigarettes, cannabis, alcohol use and exposure to environmental tobacco smoke depending on the mother's educational level.

A cross-sectional study was carried out whose target population was 18,822 Galician women aged 18-49 who gave birth between September 2015 and August 2016, and their 19,204 live-born children. A descriptive analysis was performed, and the prevalence of different behaviors was estimated at three time points – pre-pregnancy, pregnancy and after childbirth – depending on the mother's educational level. Percentages of change were calculated. Information was obtained from 6,436 women. Regardless of the educational level, during pregnancy there was an improvement in the different lifestyles. In the first months after childbirth, lifestyles worsened, except for exposure to environmental tobacco smoke and the use of electronic cigarettes. Most of the risk behaviors showed a gradient depending on the educational level; thus, the lower the educational level, the higher the prevalence of risk behaviors.

In general, during pregnancy all women adopted healthier lifestyles that they abandoned in the months following childbirth. Women with a lower level of education showed a higher prevalence of risk behaviors, both in the period prior to pregnancy, as well as during pregnancy and after childbirth.

Keywords: lifestyle, behavior, pregnancy, mothers, education primary and secondary, education higher, tobacco, feeding

Resumen

El objetivo de este trabajo fue valorar cambios durante el embarazo y tras el parto en la dieta, consumo de tabaco, cigarrillos electrónicos, alcohol, cannabis y exposición al humo ambiental de tabaco en función del nivel de estudios de la madre. Para ello, se llevó a cabo un estudio transversal cuya población objetivo fueron 18.822 mujeres gallegas de 18-49 años que dieron a luz entre septiembre 2015 y agosto 2016, y sus 19.204 hijos/as nacidos vivos. Se realizó un análisis descriptivo y se estimó la prevalencia de diferentes conductas en tres momentos temporales —pre-embarazo, embarazo y tras el parto— en función del nivel de estudios de la madre. Se calcularon los porcentajes de cambio.

Se obtuvo información de 6.436 mujeres. Con independencia del nivel de estudios, durante el embarazo se produce una mejora en los diferentes estilos de vida. En los primeros meses tras el parto los estilos de vida empeoran, con excepción de la exposición al humo ambiental de tabaco y el consumo de cigarrillos electrónicos. La mayoría de las conductas de riesgo muestran un gradiente dependiente del nivel educativo; así, a menor nivel educativo, mayor es la prevalencia de conductas de riesgo.

En general, durante el embarazo todas las mujeres adoptan estilos de vida más saludables que abandonan en los meses siguientes al parto. Las mujeres con menor nivel de estudios muestran una mayor prevalencia de conductas de riesgo, tanto en el periodo previo al embarazo, como en el embarazo y tras el parto.

Palabras clave: estilo de vida, conducta, embarazo, madres, educación primaria y secundaria, educación superior, tabaco, alimentación

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From preconception until after childbirth, the maternal lifestyle, including substance use, can have a significant impact on foetal development and the future health of children. In Spain, there is a lack of information that would permit us to establish the prevalence of risk behaviours in pregnant women. A meta-analysis of ten primary studies carried out in 2018 estimates the prevalence of tobacco smoking at 26.0% (Lange et al., 2018). The prevalence of alcohol and cannabis use during pregnancy in Spain may be estimated at 25.0%-27.2% for alcohol and 2.4-5.0% for cannabis (Blasco-Alonso et al., 2015; Ortega-García et al., 2012).

Pregnancy represents a “teachable moment” for adopting a healthy lifestyle, including quitting substance use, since women at this life stage are more receptive to change (Olander et al., 2016). On the other hand, lifestyles are closely related to each other and to educational level, with objective health indicators improving as the level of education increases (Borrell et al., 2004). Assessing whether educational level influences changes in risk behaviours during pregnancy and after childbirth is important since if such influence exists, context-specific interventions based on educational level should be developed to avoid health inequalities. Among the potentially modifiable risk behaviours affecting foetal development are unhealthy diet, eating fish rich in methylmercury due to the harmful effects of methylmercury on the physical and neurological development of infants (Saavedra et al., 2022), using drugs such as tobacco, alcohol or cannabis, smoking e-cigarettes (Bar-Zeev, 2022; González Sala et al., 2020; Gould et al., 2020; Popova et al., 2021) and exposure to environmental carcinogens, such as second-hand tobacco smoke (Banderali et al., 2015).

To date, there are few studies estimating the prevalence and identifying the changes in risk behaviours associated with women's lifestyles in the three key periods (pre-pregnancy, pregnancy and postnatal) as linked to educational level, and none have been carried out in the Spanish population. The aim of this study was therefore to assess the existence of differences in the prevalence of various lifestyle factors based on educational level among Galician women who had children in 2016 in the preconception period, during pregnancy and in the months after giving birth.

Method

Data source and sample size

Within the framework of the Galician risk behaviour information system (Sistema de Información sobre Conductas de Riesgo de Galicia, SICRI), a cross-sectional study was carried out in 2016 with a target population of 18,822 women aged 18 years and over, resident in Galicia, who gave birth between September 1, 2015 and August 31, 2016, and their 19,204 live-born children in that period.

The registry of the detection of neonatal endocrine and metabolic diseases program (Programa de Detección Precoz de Enfermedades Endocrinas y Metabólicas durante el período Neonatal) was used to select a sample of these women, from now on referred to as mothers. Sampling was random, stratified by age groups (18-24, 25-29, 30-34, 35-39 and 40 years or older) and, in a second stage, one child was selected for each mother in case of multiple births. The sample size of women was calculated independently for each age stratum, with an expected prevalence of 50% and a sampling error of less than 2%. The theoretical sample size was 6,777 mothers and their live-born children.

Data collection

Computer-assisted telephone interviews (CATI) were carried out with the selected mothers, with questions regarding the preconception period (6 months prior to pregnancy), pregnancy and postpartum (referring to the time of the survey, which was 3 to 16 months after birth). The instrument used for data collection was a questionnaire developed specifically for the study and subsequently validated in a sample of the target population. Specific information about the design and the questionnaire can be found at: www.sergas.es/Saude-publica/SICRI-2016.

Variables

Sociodemographic variables included age, country of birth, degree of urbanization, level of education, living situation, employment situation and parity. The variables analyzed before, during and after birth were: non-compliance with dietary recommendations, eating fish rich in methylmercury (swordfish/bluefin tuna), use of tobacco, e-cigarettes, alcohol, cannabis and exposure to environmental tobacco smoke (ETS). The questions were the same at the three time points, the only difference being the period to which they referred.

Mothers who reported not eating fruit or vegetables daily or two or more servings of fish per week were considered as not following a healthy diet. They were considered to be eating fish rich in methylmercury if they reported the consumption of swordfish/bluefin tuna at least once a week. Women who reported using tobacco, electronic cigarettes, alcohol and cannabis and being exposed to ETS were considered as such, regardless of frequency and intensity.

To assess education, they were asked about the highest educational level achieved; this was then categorized into basic (no studies, incomplete or completed primary schooling), intermediate (incomplete or completed secondary education and vocational training) and higher (incomplete or completed university studies).

Women with a healthy lifestyle were defined as those who followed a healthy diet, did not consume methylmercury-rich fish, did not smoke tobacco, cigarettes, e-cigarettes or

cannabis, did not drink alcohol and were not exposed to ETS.

Statistical analysis

A descriptive analysis was performed and the prevalence of risk behaviours were estimated with 95% confidence intervals (CI). Percentages of change were calculated for each variable analyzed.

Statistical analysis was carried out using Stata v.16.

Ethical aspects

As the study was telephone-based, voluntary, with guaranteed confidentiality, and as the agreement to participate implied the women's consent, authorization from an ethics committee was not required.

Results

Information was obtained from 6,436 mothers aged between 18 and 49 years. Median interview duration was 25 minutes. Those under 30 years old made up 21.3% of the sample (95% CI: 21.1%-21.5%), and 9.9% (9.8%-10.0%) were over 40. Regarding educational level, 18.8% (17.8%-19.7%) had basic schooling, 37.1% (35.9%-38.3%) had intermediate studies and 44.1% (42.9%-45.4%) had higher education (Table 1).

A healthy lifestyle was most prevalent among mothers with higher education and fell with decreasing education levels. These results are observed in all three periods, i.e., preconception, during pregnancy and after delivery (Figure 1).

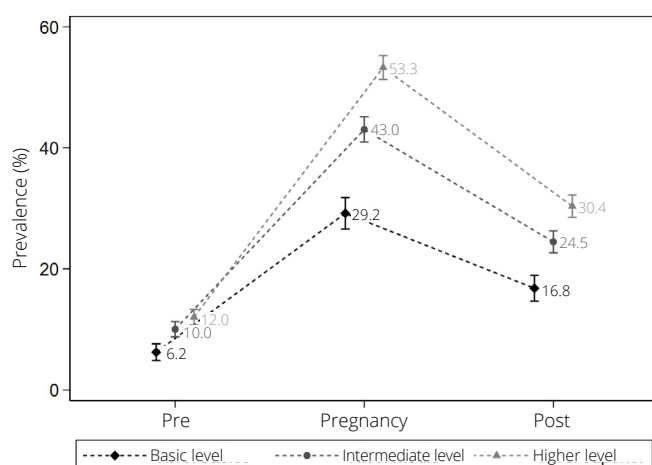
Table 1

Characteristics of Galician women aged 18 to 49 in the six months before pregnancy

Sociodemographic variables	%	CI95%
Age group		
18-29	21.3	21.1 - 21.5
30-34	34.1	33.9 - 34.3
35-39	34.7	34.5 - 34.9
40 +	9.9	9.8 - 10.0
Country of birth		
Spain	89.1	88.3 - 89.9
Other country	10.9	10.1 - 11.7
Degree of urbanization		
Urban	71.0	69.9 - 72.1
Semi-urban	19.5	18.6 - 20.4
Rural	9.6	8.8 - 10.3
Educational level		
Basic	18.8	17.8 - 19.7
Intermediate	37.1	35.9 - 38.3
Higher	44.1	42.9 - 45.4
Living situation		
With partner	94.7	94.2 - 95.3
Single	5.3	4.7 - 5.9
Work situation		
In work	71.7	70.6 - 72.9
Unemployed	18.6	17.6 - 19.6
Inactive	9.7	9.0 - 10.4
First-time mothers	57.0	55.8 - 58.3
Self-perceived health status		
Very good	25.1	24.0 - 26.2
Good	47.6	46.3 - 48.9
Normal	25.2	24.1 - 26.3
Bad - very bad	2.1	1.7 - 2.5

Figure 1

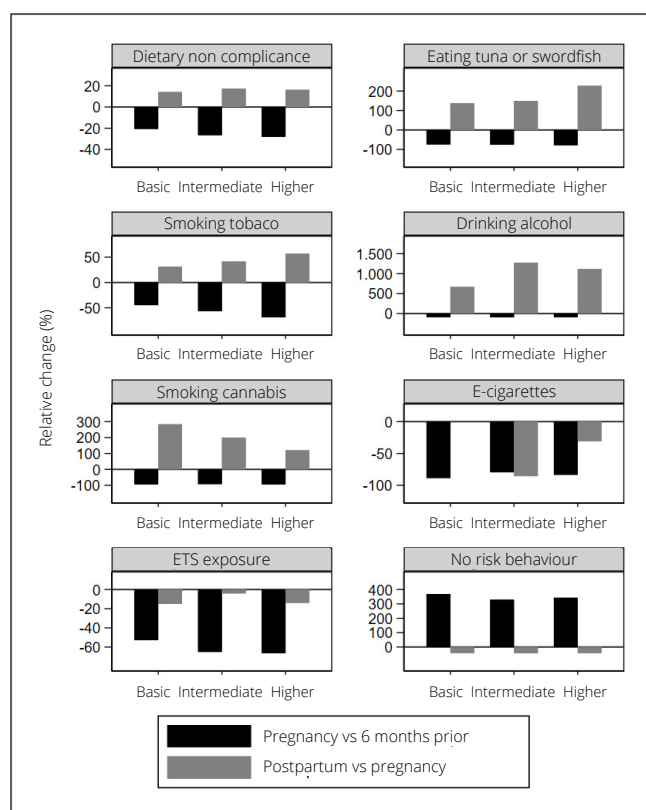
Prevalence of women with healthy lifestyles by educational level and at the three moments assessed: before pregnancy (pre), during pregnancy (pregnancy) and after childbirth (post)*



Note. *A healthy lifestyle is defined as complying with dietary recommendations, not consuming fish rich in methylmercury, not smoking tobacco, cannabis or e-cigarettes, not drinking alcohol and not being exposed to environmental tobacco smoke.

Figure 2

Relative change in maternal behaviours by educational level. Pregnancy versus pre-pregnancy (6 months before pregnancy) and postpartum (3-16 months after birth) versus pregnancy



Before pregnancy, the most common risk behaviour was the lack of a healthy diet, with 55.0% (53.7%-56.3%) of women in this category. As can be seen in Figure 2, which shows the relative change in behaviours by educational level in the three periods analyzed, all behaviours improved during pregnancy and worsened or stabilized after childbirth. Compared to before pregnancy, tobacco smoking decreased by 57%, but the decrease was stronger among mothers with higher education (Figure 2 and Annex 1).

Before pregnancy, during pregnancy and postpartum, risk behaviours were more prevalent among mothers with a lower educational level, with the exception of alcohol, cannabis and e-cigarette use. Tobacco use and ETS exposure decreased with higher educational. Mothers with a basic educational level compared to secondary and higher levels had a higher prevalence of tobacco smoking before pregnancy (30% and 60% more respectively), during pregnancy (46% and 79% more) and after childbirth (41% and 73% more). Likewise, with respect to secondary and higher levels, women with basic schooling were more exposed to ETS before pregnancy (20% and 44% more), during pregnancy (41% and 60% more) and after childbirth (33% and 60% more). Women with a higher level of education had a higher prevalence of drinking alcohol in all three periods. The prevalence of cannabis and e-cigarette use, as well as ETS exposure, was not significantly different postpartum compared to during pregnancy at any of the three educational levels (Table 2 and Annex 1).

Table 2
Maternal behaviours before pregnancy, during pregnancy and postpartum by level of education

		Basic level (95% CI)	Intermediate level (95% CI)	Higher level (95% CI)
Failing to comply with dietary recommendations	Pre-pregnancy	69.2 (66.5-71.8)	58.6 (56.5-60.7)	45.9 (43.9-47.9)
	During pregnancy	54.8 (52.0-57.6)	43.0 (40.9-45.1)	33.0 (31.1-34.9)
	Postpartum	62.6 (59.8-65.4)	50.5 (48.3-52.6)	38.4 (36.4-40.3)
Eating fish containing methylmercury	Pre-pregnancy	25.7 (23.2-28.2)	27.8 (25.9-29.7)	32.5 (30.6-34.3)
	During pregnancy	6.6 (5.2-8.0)	6.7 (5.6-7.7)	7.0 (5.9-8.0)
	Postpartum	15.7 (13.5-17.7)	16.6 (15.0-18.2)	22.8 (21.1-24.5)
Smoking tobacco (daily or occasional smoker)	Pre-pregnancy	42.4 (39.6-45.2)	30.8 (28.8-32.7)	19.2 (17.7-20.8)
	During pregnancy	23.4 (21.0-25.8)	13.3 (11.8-14.7)	6.0 (5.0-7.0)
	Postpartum	30.7 (28.1-33.3)	18.8 (17.1-20.4)	9.4 (8.2-10.5)
Smoking e-cigarettes	Pre-pregnancy	1.6 (0.9-2.2)	1.0 (0.6-1.4)	0.8 (0.4-1.1)
	During pregnancy	0.2 (0.0-0.4)	0.2 (0.0-0.4)	0.1 (0.01-0.3)
	Postpartum	0.2 (0.0-0.4)*	0.0 (0.0-0.1)*	0.1 (0.0-0.2)*
Drinking alcohol	Pre-pregnancy	45.1 (42.3-47.8)	50.3 (48.2-52.4)	60.8 (58.8-62.7)
	During pregnancy	3.5 (2.4-4.6)	2.1 (1.5-2.7)	2.8 (2.1-3.5)
	Postpartum	27.1 (24.6-29.7)	28.6 (26.7-30.5)	34.0 (32.1-36.0)
Smoking cannabis	Pre-pregnancy	2.3 (1.5-3.1)	1.4 (0.9-1.9)	1.0 (0.6-1.4)
	During pregnancy	0.1 (0.0-0.3)	0.1 (0.0-0.2)	0.0 (0.0-0.2)
	Postpartum	0.5 (0.1-0.8)*	0.3 (0.1-0.5)*	0.1 (0.0-0.2) *
ETS exposure	Pre-pregnancy	36.6 (33.9-39.2)	29.3 (27.4-31.2)	20.5 (18.9-22.1)
	During pregnancy	17.2 (15.1-19.3)	10.2 (9.0-11.5)	6.9 (5.8-7.9)
	Postpartum	14.7 (12.7-16.6)	9.8 (8.6-11.0)*	5.9 (5.0-6.9)*
Healthy lifestyle**	Pre-pregnancy	6.2 (4.8-7.6)	10.2 (8.8-11.3)	12.0 (10.7-13.3)
	During pregnancy	29.2 (26.6-31.8)	43.0 (40.9-45.1)	53.3 (51.3-55.3)
	Postpartum	16.8 (14.6-18.9)	24.5 (22.6-26.3)	30.4 (28.5-32.2)

Note. * Changes in prevalence with respect to the previous time period are not statistically significant. **A healthy lifestyle is defined as complying with dietary recommendations, not consuming fish rich in methylmercury, not smoking tobacco, cannabis or e-cigarettes, not drinking alcohol and not being exposed to environmental tobacco smoke.

Discussion

The prevalence of health-risk behaviours in the period before pregnancy, during pregnancy and postpartum varied by educational level. Thus, the prevalence of most risk behaviours increased with decreasing level of education. Irrespective of education, all behaviours explored improved during pregnancy: compliance with dietary recommendations increased and the consumption of methylmercury-rich fish, tobacco, e-cigarettes, alcohol, cannabis, as well as ETS exposure all decreased. After childbirth, all behaviours worsened except ETS exposure and e-cigarette use, which was lower than during pregnancy.

Overall, dietary recommendations were not heeded, in line with what is observed in other countries both in relation to dietary recommendations (Jarman et al., 2017) and the consumption of fish rich in methylmercury (Branco et al.,

2021). In Spain, although it is recommended that large fish should not be eaten during pregnancy, only 50% of pregnant women declared that a health professional had informed them to avoid eating swordfish or tuna (Mourino et al., 2022).

Regarding tobacco, alcohol and cannabis use and ETS exposure during pregnancy, the obstetric and foetal complications have been perfectly well established. These include ectopic pregnancy, spontaneous abortion, placental abruption or preterm birth, intrauterine growth restriction, intrauterine death or sudden infant death (González Sala et al., 2020; Gould et al., 2020; Popova et al., 2021). Prolonged exposure of the foetus to alcohol can cause a combination of physical and behavioural problems with long-term repercussions known as foetal alcohol spectrum disorder (Lee & Mostafaie, 2020). Regarding e-cigarette smoking, although they are associated with lower risks compared to

standard cigarettes, the specific effects they might have during pregnancy have not yet been established (Bar-Zeev, 2022).

In our study, the decrease in alcohol use linked to pregnancy stands out, being much more pronounced than that of tobacco smoking. Although it would be ideal to obtain zero consumption, this is a positive finding since it denotes a certain social awareness about the harmfulness of drinking during pregnancy. There is also a significant drop in cannabis use during pregnancy, with figures falling close to zero. This behaviour has been associated with fear of harming the foetus, stigma, and guilt feelings (Vanstone et al., 2021).

The prevalence of e-cigarette smoking was anecdotal in all three time periods assessed, despite the fact that in some countries the use of these devices is spreading at the population level and becoming part of harm reduction strategies (Obisesan et al., 2020). Nevertheless, the assessment of e-cigarette smoking during pregnancy should be based on a fundamental principle, the precautionary principle, since its impact on foetal health is not yet established (Larcombe, 2019).

The change in ETS exposure was also paradoxical since, unlike tobacco smoking, which rose after childbirth, exposure continued to decrease postpartum. According to a qualitative study conducted in the postnatal period, the reason for this may be that most women are concerned about the link between smoking and increased risk of sudden infant death syndrome, and some are worried about the increased likelihood of their child becoming a smoker by seeing people smoking (Brown et al., 2019). On the other hand, although women perceive the status of “mother” as a motivating factor for not smoking, they also consider that smoking tobacco and/or cannabis is useful and safe for coping with stress and to aid rest postpartum (Brown et al., 2019; Vanstone et al., 2021), leading to the conclusion that when they do smoke tobacco or cannabis, they do so not in the presence of the baby or they hide it. Although this is positive, we cannot ignore the risk of exposure to second- (or third-hand) smoke for those women who smoke, even if they do not do so in the presence of their child. Of the mothers who declared that their child was not exposed to ETS, 8.2% always smoked at home, so it is likely that they were not identifying the child’s exposure. Although more studies are needed to characterize the medium and long-term consequences of exposure to environmental tobacco smoke, given the unique characteristics of babies and children when compared to adults (crawling, sucking from hand to mouth...) and because of their developmental process, it seems likely that this population is especially vulnerable to exposure to environmental tobacco smoke (Díez-Izquierdo et al., 2018).

The influence of educational level on health-related behaviours in the general population has been established (Haeberer et al., 2020). It could therefore be said that these

behaviours are educational-level dependent, given that people with a higher level of education adopt healthier lifestyles. The influence of educational level on behavioural changes during pregnancy has not previously been assessed. The results are encouraging given the observation that, regardless of educational level, the changes in behaviour made during pregnancy were generally in the direction of improvement. However, their worsening after childbirth is once again dependent on educational level, since these negative changes were stronger among women with a lower educational level.

Furthermore, preconception, pregnant women with a lower educational level faced the worst scenario, presenting higher prevalence of risk behaviours, which is in line with earlier studies (Hill et al., 2014). Conversely, we found that alcohol use increases with educational level. A study in the general population had already pointed out a higher prevalence of drinking alcohol at higher levels of study (Rey-Brandariz et al., 2021).

This study presents certain limitations related to its cross-sectional design and the retrospective collection of data through maternal self-report. It is possible that there is a memory bias, given that mothers answered questions postpartum (at the time of the survey) which referred to the preconception period and pregnancy. Furthermore, there may be a social desirability bias, resulting in concealment of behaviours that are harmful to health and, therefore, in an underestimation of prevalence. Moreover, the period taken into account postpartum (3 to 16 months) is very long and may have influenced results. Other limitations derive from not having included underage pregnant women or pregnant women who did not give birth to a live child, and from not having quantified the amount of tobacco (cigarettes), alcohol, e-cigarettes and cannabis consumed by the women. It should also be noted that the questions assessing quality of diet were limited, with important items such as the consumption of processed foods or sugary drinks not included, and the degree to which healthy diet recommendations were adopted was not quantified. It is important to highlight that the level of education is a proxy, probably imperfect, of socioeconomic level. Thus, it must be taken into account that pregnancy-related dietary changes could represent an extra financial burden or added cost, since they are associated with greater consumption of more expensive foods, such as meat, fruits, vegetables or fish (Grenier et al., 2021).

The main strength of this study is the high participation rate and the large sample size since it included one in three of the almost 19,000 mothers who gave birth in Galicia during the period considered. Furthermore, the sample design allows conclusions to be generalized, given that the women did not come from a specific health system and were a representative sample of pregnant women.

Conclusions

Regardless of educational level, behaviour change occurs during pregnancy, with mothers adopting healthier lifestyles. However, after childbirth there is a worsening of behaviours, with the exception of ETS exposure. Based on the results, we consider that the message regarding the influence of educational level on parental lifestyle is clear since women with a higher level of education have better lifestyles. Understanding why maternal behaviour worsens again after childbirth, having improved during pregnancy, could help generate effective health promotion recommendations that eliminate false beliefs and communicate the risks entailed by parental behaviours with regard to children's health. The design and implementation of interventions associated with the establishment of healthy habits before pregnancy, during pregnancy and after childbirth should be education-level dependent.

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Conflict of interests

The authors declare no conflicts of interest.

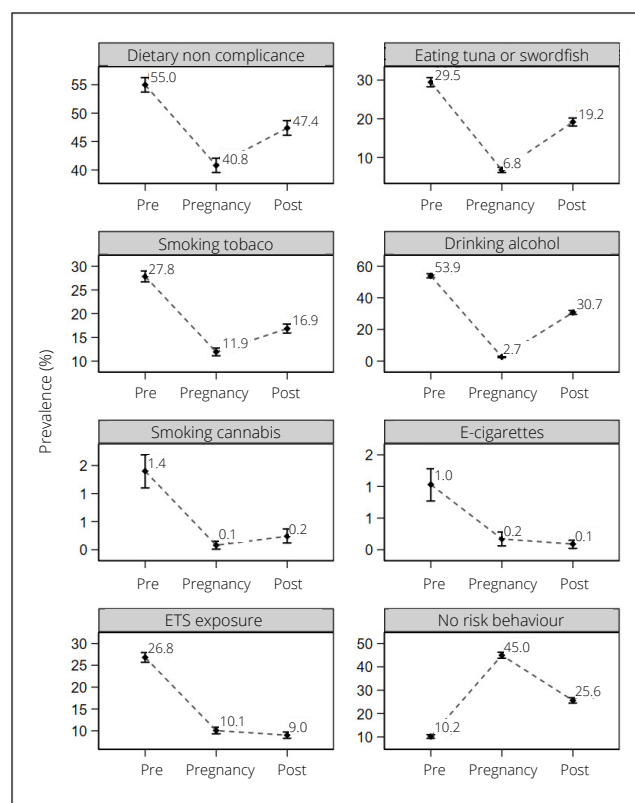
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Annex 1. Prevalence of health-risk behaviours before pregnancy (pre), during pregnancy (pregnancy) and after childbirth (post)

No risk behaviour refers to the fact that the women declared that they complied with dietary recommendations, did not eat tuna or swordfish, did not use tobacco, alcohol, cannabis or e-cigarettes and that they were not exposed to environmental tobacco smoke (ETS).



ORIGINAL

Relapse rates after treatment in Therapeutic Communities: A systematic review

Tasas de recaída tras un tratamiento en Comunidades Terapéuticas: Una revisión sistemática

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Abstract

Therapeutic Communities (TC) are residential settings that provide psychosocial rehabilitation for substance-using individuals. In general, TCs have been proven effective, although a large part of the evidence is from studies with methodological shortcomings. Therefore, the aim of this systematic review was to evaluate the effectiveness of TCs in terms of relapse rates. The search used EBSCO, PubMed, and Web of Science up to July 29, 2021 and was based on the international Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. Of the 94 studies, eight met selection criteria including a total of 2,064 participants from 40 TCs. Of the eight studies, seven were cohort studies and one was a randomized controlled trial (RCT). Findings reveal that TCs were effective in reducing substance use, although some uncertainty remains regarding the long-term persistence of the improvements. Thus, further research is necessary to compare relapse rates in TC programs for substance-related disorders.

Keywords: therapeutic communities, relapse rates, substance use treatment, substance-related disorders, TC programs

Resumen

Las Comunidades Terapéuticas (CT) son entornos residenciales que brindan rehabilitación psicosocial a las personas que consumen sustancias. En general, estas han demostrado su eficacia, aunque gran parte de la evidencia proviene de estudios con limitaciones metodológicas. Por tanto, el objetivo de la presente revisión sistemática fue evaluar los resultados de las CT en relación con las tasas de recaída. La búsqueda se realizó en EBSCO, PubMed y Web of Science con fecha límite del 29 de julio de 2021 y se basó en la declaración Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). De los 94 estudios encontrados, ocho cumplieron los criterios de selección, con un total de 2064 participantes de 40 CT. De los ocho estudios, siete eran estudios de cohortes y uno era un ensayo controlado aleatorizado. Los resultados revelan que las CT eran efectivas para reducir el consumo de sustancias, aunque persiste cierta incertidumbre con respecto a la persistencia a largo plazo. Se necesita más investigación que evalúe las tasas de recaída tras finalizar el tratamiento en las CT.

Palabras clave: comunidades terapéuticas, tasas de recaída, tratamiento por consumo de sustancias, trastornos relacionados con sustancias, programas en comunidades terapéuticas

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When treating substance use disorders (SUD), a severe and lasting problem that often emerges is relapse (Tims & Leukefeld, 1986), which is defined as the recurrence of SUD symptoms following a period of reduced or inexistent substance use (Dawson et al., 2007; Hendershot et al., 2011; Witkiewitz & Marlatt, 2007). In fact, resuming alcohol or drug use is a frequent outcome after individuals initiate the abstinence process (Bradizza et al., 2006; Suter et al., 2011). The rates of relapse may vary according to factors such as the definition of the concept, the populations used in the studies and the time since treatment. Some European studies have indicated relapse rates between 40 and 75% for heroin and other illicit drugs (Alterman et al., 2000; Pasareanu et al., 2016). Since the medical costs of detoxification and treatment for substance use disorders are significantly high, having to repeat treatment becomes a major problem for individuals (Gerwe, 2000).

Currently, outpatient therapy is the most common treatment modality in the field of addiction (Vanderplasschen et al., 2013). However, a lot of people are engaging in other types of treatment, as residential substance use treatment services, including therapeutic communities (TCs). TCs are 24-h residential locations that provide intensive support and treatment for individuals with an acute SUD (Reif et al., 2014). Depending on TCs, the treatment interventions vary. They can include psychological support in group or individual, mutual self-help and peer help, and supported reintegration into the community (de Andrade et al., 2019). The length of treatment and stay in a TC also vary, TCs are considered as long-term residential treatment models and ranging from 6 to 12-months (De Leon, 2000).

It is very important to highlight that not all residential locations to substance use treatment are TCs. According to De Leon & Unterrainer (2020), the TC theory is based on a specific approach: “community as method”. In fact, the use of “the community” as the key agent of change makes TCs different from other treatments (Malivert et al., 2012). TC’s paradigm is composed by four interconnected definitions of SUD, individual, process of recovery, and living healthy. According to this paradigm, the SUD could be seen as a symptom and considered a comprehensive disorder affecting the whole person (Griffiths, 2005). The individual is considered as a “whole person” and the main characteristic of a TC is working with the “whole person” within multi-intervention (De Leon & Unterrainer, 2020; Malivert et al., 2012). So, the aims of the TCs involve abstinence as well as the development of positive social values and appropriate behavior.

The literature about the effectiveness of TCs is scarce. De Andrade et al. (2019) conducted a systematic review about the evidence base for the residential treatment of

SUD including TCs. In this review, just three studies of the 23 included in the review reported abstinence rates in TCs, being these of 80% or more at 12-month follow-up (King et al., 2016; Šefránek & Miovský, 2017; Šefránek & Miovský, 2017b). Regarding relapse rates in TCs, Malivert et al. (2012) concluded that relapse was frequent after TC, being these more than 30% at 6-months follow-up.

Despite the great availability of TCs for SUD disorders, Smith et al. (2006) highlighted that literature about TCs has a few methodological limitations and the evidence from RCTs has not been reviewed systematically recently. Some studies inform about the evidence of TCs but they have not shown the relapse rates (De Leon, 2000; Reif et al., 2014). Therefore, this study intends to add and to update the existing literature information about relapse rates after substance abuse treatment in TC. Therefore, this systematic review aims to answer the following research question: what is the prevalence of relapse rates after substance abuse treatment in TC?

Method

Search strategy

This systematic review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement (Page et al., 2021) and the review protocol was registered with PROSPERO (CRD42021293676), an international database for the registration of systematic reviews in the field of health. Databases searched were EBSCO, PubMed, and Web of Science. We included studies published in English, Portuguese, and Spanish, and all the years available in the selected databases, with the limit of July 29, 2021. The search strategy, terms and PRISMA checklist are described and included as supplementary material.

Study characteristics

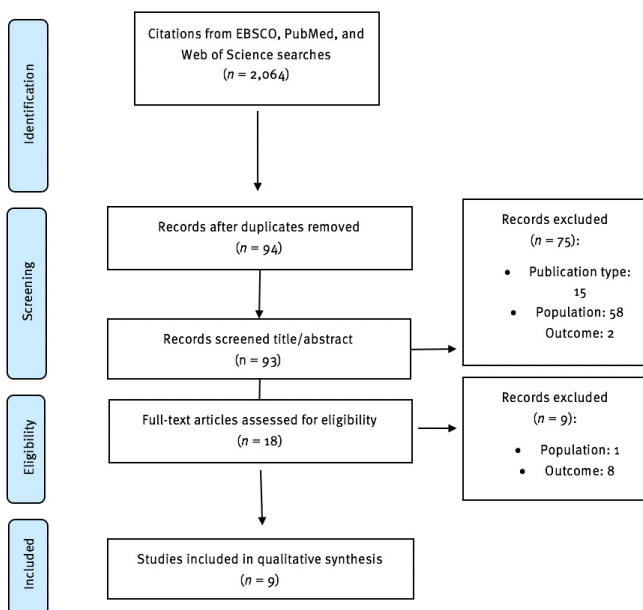
Inclusion and exclusion criteria are described in Table 1. We included the following study designs: (a) type of publication [experimental studies (randomized controlled trials, quasi-randomized trials, controlled clinical trials), quasi-experimental studies (interrupted time series, before-and-after studies), observational studies (cohort studies, case-control, and case series) and research protocols]; (b) population (18 and over); (c) intervention (SUD in TC). Included studies were those examining relapse after an intervention for TC are defined as residential locations that provide psychosocial rehabilitation for substance-using individuals (Malivert et al., 2012). The excluded studies were those in which there was no follow-up after a substance abuse treatment in a TC, studies not limited to adults, qualitative studies, and review studies.

Table 1
Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
a) Experimental studies, quasi-experimental studies, and observational studies	a) There was no follow-up after a substance abuse treatment in a TC
b) Population aged 18 or more	b) Studies not limited to adults
c) SUD intervention in TC	c) Review studies
d) Examining relapse after an intervention for TC	d) Qualitative studies

Study selection

Firstly, titles and abstracts retrieved by electronic searches were exported to a reference management software (Rayyan) to remove duplicates. These references were then exported to the online software tool Rayyan for screening. Reviewers DM and AA screened titles and abstracts independently. These reviewers discussed disagreements, and other reviewer (PCD) were involved if a decision was not reached. Full-text screening, and data extraction, were performed independently by both reviewers (DM and AA). Extracted information included: the study's general information, studies objectives, sample, type of treatment, main findings, operation definition of relapse, relapse cases, relapse rates, substance type, educational level, employment, marital status, and notes. Excluded studies, with the reasons, therefore, are recorded in the PRISMA flow diagram (Fig. 1).

Figure 1
PRISMA Flowchart

Quality and risk bias of quantitative studies

Two reviewers (DM and DSC) assessed the quality of the studies that met the eligibility criteria for this review. The quality assessment was performed using the Effective Public Health Practice Project Quality Assessment Tool (EPHPP). The EPHPP tool assesses six domains: (a) selection bias, (b) study design, (c) confounders, (d) blinding, (e) data collection method; and (f) withdrawals/dropouts (Armijo-Olivo et al., 2012). Once the specific domains are assessed (strong, moderate, or weak), each study receives a global quality score.

Results

A total of 94 studies were screened after duplicates were removed. Of these, 76 were excluded after the review of titles and abstracts. In the second phase, 18 papers were read in full text. After evaluation of the full report, 10 studies were excluded. No study required consensus decisions. Finally, 8 publications were included in this review.

Study characteristics

A summary of the studies' characteristics is presented in Table 2. Of the eight included studies, four were conducted in Spain (Barreno et al., 2019; Fernández-Hermida et al., 2002; Fernández-Montalvo et al., 2008), two in the United States (McCusker et al., 1995; Mooney et al., 2014), one in United Kingdom (Gossop et al., 2002) and one in Barbados (Griffith & Ross, 2019). Regarding the study type, seven were cohort studies (Barreno et al., 2019; Fernández-Hermida et al., 2002; Fernández-Montalvo et al., 2008; Gossop et al., 2002; Griffith & Ross, 2019; Mooney et al., 2014; Stevens et al., 2015) and one was randomized controlled trials (RCT) (McCusker et al., 1995). Studies included follow-up assessments ranging from 30 days to 13 years.

Table 2
Summary of studies' characteristics

Study ID	Objectives	Sample	% male	Therapeutic community	Type treatment	Follow-up	Main findings
		Age (M/SD)					
	Type of sample						
Barreno et al. (2019)	To examine the longitudinal relationship between baseline performance on several impulsivity measures and retention and relapse at the end of treatment.	N = 68 M = 37.4 SD = 11.33	92.6	Three public therapeutic communities (TCs) in Andalusia (Spain)	Unified treatment program based on multidisciplinary interventions, including cognitive behavioural therapy, psycho-education, occupational and pharmacological treatment.	289 days	The capacity for decision-making according to long-term outcomes helps achieve treatment aims. Conversely, a proneness for swift reactions whereas the under positive emotions is a risk factor for relapse.
Fernández-Hermida et al. (2002)	To assess whether the data obtained during follow-up in the group revealed improvements (<i>p</i> < .05) compared to data recorded on admission to the program.	N = 249 M = 26	80.32	Proyecto Hombre	The treatment program has three therapeutic stages: reception, residential therapeutic community, and reinsertion.	3 years and 4 months	Individuals who did not complete treatment had more severe and earlier relapses, after leaving the program, and remained abstinent for shorter periods of time compared to those who completed treatment.
Fernández-Montalvo et al. (2008)	To carry out a long-term follow-up evaluation of a therapeutic community treatment for addiction in Navarre (Spain) and to compare between those who completed the program and those who dropped out.	N = 155 M = 28 SD = 4.7	69	Proyecto Hombre	The treatment program has three therapeutic stages: reception, residential therapeutic community, and reinsertion.	30 months	Significant outcome differences were found between relapsing and non-relapsing patients.
Gossop et al. (2002)	To examine factors associated with abstinence, lapse or relapse among heroin users, after attending residential treatment.	N = 242 M = 29.4 SD = 6.2	78	23 residential (15 rehabilitation, and eight specialist in-patient drug dependence) programs.	Programs that comprised detoxification and relapse prevention interventions. The rehabilitation programs included two groups. One had a shorter planned treatment (6 to 12 weeks), with four agencies. All four shorter-term rehabilitation programs provided detoxification services. The second group included 11 programs with longer treatments (planned durations: over 3 months, with a range of 13-52 weeks.	12 months	Individuals who did not fully relapse to heroin use (abstinence and lapse groups) consistently used more cognitive, avoidance and distraction coping strategies at follow-up than at intake. The lapse and relapse groups, compared with the abstinent group, exhibited higher use rates of illicit drugs besides heroin. heroin after treatment than the abstinent group. Overall, treatment completion was associated with better outcomes.
Griffith & Ross (2019)	To examine the treatment outcomes patients who successfully finished a 90-day residential program at the Verdun House.	N = 114 M = 46.1 SD = 11.2	100	Verdun House	12-Step Programs	90-day	Half of the participants remained sober and abstinent for a long period of time, five years or more, and half reported participating in the 12-Step Programs, as well as events at the treatment facility.
Mooney et al. (2014)	To apply a 28-day program using evidence-based practices and principles of Alcoholics/Narcotics Anonymous.	N = 108 M = 30.7 SD = 8.3	79	Dwight D. Eisenhower Army Medical Center Inpatient Residential Treatment Facility (RTF).	28-day inpatient treatment program employing evidence-based practices and principles of Alcoholics/ Narcotics Anonymous	30, 90, 180 and 360 days	A large majority of service members (87%) successfully initiated the program, with continuous sobriety being observed in over 50% of service members 6 months later. At the 1-year mark, relapse rates were similar to those from other alcohol treatment programs.
Stevens et al. (2015)	To examine whether possessing disadvantageous decision-making patterns would place cocaine-dependent individuals (CDI) at greater risk for treatment drop-out.	N = 150 M = 36.3 SD = 8.2	93	Six different TCs located in the region of Andalusia (Spain): Cartaya, Almonte, Mijas, Los Palacios, La Línea, and Tarifa.	Multidisciplinary interventions, including Cognitive Behavioral Therapy (CBT), psychoeducation, and occupational therapy.	N.R.	CDI who dropped out of the TC prematurely did not establish a consistent and appropriate response pattern throughout the Gambling Task and exhibited a poorer ability to select the most probable outcome on the Cambridge Gamble Task. No group differences were found in betting behavior.

Note. CBT = Cognitive Behavioral Therapy; CDI = cocaine-dependent individuals; RTF = Residential Treatment Facility; TCs = Therapeutic Communities.

Table 3
Ratings of methodological quality by the EPHHP tool

	Selection bias	Study design	Confounders	Blinding	Data collection	Withdrawals	Global rating
Barreno et al. (2019)	Strong	Moderate	Weak	Moderate	Strong	Moderate	Moderate
Fernández-Hermida et al. (2002)	Moderate	Moderate	Strong	Moderate	Strong	Strong	Strong
Fernández-Montalvo et al. (2008)	Strong	Moderate	Strong	Moderate	Strong	Strong	Strong
Gossop et al. (2002)	Strong	Moderate	Strong	Moderate	Strong	Moderate	Strong
Griffith & Ross (2019)	Strong	Moderate	Strong	Moderate	Strong	Strong	Strong
McCusker et al. (1995)	Strong	Strong	Weak	Moderate	Strong	Moderate	Moderate
Mooney et al. (2014)	Strong	Moderate	Weak	Moderate	Strong	Weak	Weak
Stevens et al. (2015)	Strong	Moderate	Strong	Moderate	Strong	Strong	Strong

Table 4
Main relapse outcomes

Study ID	Operation definition of relapse	Retention	Treatment completion	Relapse cases	Relapse rate
Barreno et al. (2019)	Participants with positive drug results in at least two analyses were considered as 'relapses'.	-----	71%	N = 30	44% at 289 days follow-up. Heroin use: 13.3%; Cocaine use: 86.7%; Alcohol use: 56.7; Cannabis use: 50%.
Fernández-Hermida et al. (2002)	Three occasions of drug use in a maximum period of 2 months.	Abstainers: 89.7% Relapsers:10.3%	-----	N = 55	In 'treatment-completed' group was 10.3% at 8 years. In the non-completers group was 63.6% at 8 years. Most of the relapses involve heroin use (60%), followed by cannabis (32.7%), cocaine (18.1%), synthetic drugs (3.6%) and benzodiazepines (1.8%).
Fernández-Montalvo et al. (2008)	Three occasions of drug use in a maximum period of 2 months.	51.2%	72%	N = 42	46.5% at 6 years. Most relapses involved cannabis abuse (37.4%), followed by cocaine (31.6%), heroin (18.7%), and benzodiazepines (15.5%).
Gossop et al. (2002)	Using heroin after exiting treatment and continued to use regularly (on more than one-third of days from first use to follow-up).	-----	Abstainers: 44% Lapsers: 21% Relapsers:25%:	N = 75	31% used heroin at 12 months follow-up. Moreover, of relapses, 46.7% used methadone; 50.7% used benzodiazepines; 49.3% used crack cocaine; 14.7% cocaine powder; 20% amphetamines; 20% heavy drinking.
Griffith & Ross (2019)	Participants had used substances at all since leaving treatment.	-----	-----	N = 51	45% at 5 years. There is not information about specific substance in follow-up period.
McCusker et al. (1995)	Self-report of any drug use since exit from treatment	65% completed follow-up at 6 months.	66%	3 months N = 223 6 months N = 221	71% used heroin at 6 months.
Mooney et al. (2014)	Any documented evidence of substance use	Day 30: 28% drop-out Day 90: 31 drop-out Day 180: 51% drop-out Day 360: 72% drop-out	-----	30 months N = 68 90 months N = 66 180 months N = 47 360 months N = 27	30 months 14.7% 90 months 28.8 % 180 months 44.7% 360 months 77.8% There is not information about specific substance in follow-up period
Stevens et al. (2015)	Any use of an illicit substance during the follow-up period.	-----	Abstainers: 39.45% Relapsers:28.23%	N = 84	56% at 2 years. There is not information about specific substance.

Methodological quality assessment

According to the EPHPP Tool, five studies received a quality rating of strong (Fernández-Hermida et al., 2002; Fernández-Montalvo et al., 2008; Gossop et al., 2002; Griffith & Ross, 2019; Stevens et al., 2015), two of moderate (Barreno et al., 2019; McCusker et al., 1995) and one of weak (Mooney et al., 2014). Selection bias and data collection were the main strengths of the included studies, whereas the withdrawals were the main weakness. Concerning the analysis component, the unit of analysis and allocation were individuals. All studies used appropriate statistical methods. In addition, there was consensus when evaluating all the studies through EPPHPP Tool. The specific and global methodological quality ratings of each study are described in Table 3.

Main relapse outcomes

A summary of the main relapse outcomes is described in Table 4. Regarding the RCT study (McCusker et al., 1995) no significant differences were found on the relapse rates between different programs with different duration. Regarding studies focused on Proyecto Hombre Therapeutic Community (Fernández-Hermida et al., 2002; Fernández-Montalvo et al., 2008), significant differences were observed between those who finished treatment and those who dropped out. Specifically, individuals who did not finish treatment relapsed more often and earlier when compared to individuals who completed treatment. Relapse rate in 'treatment-completed' group was 10.3% and in the non-completers was 63.6% at follow-up (range from 73 days to 8 years) (Fernández-Hermida et al., 2002). Fernández-Montalvo et al. (2008) informed that 83.3% of the dropouts relapsed versus 32.7% of the completers in the follow-up (range from 6 months to 13 years).

The remained cohort studies, two studies reported similar relapse rates (Barreno et al., 2019; Griffith & Ross, 2019) about 45%, while Gossop et al. (2002) reported a relapse rate of 31% and Stevens et al. (2015) reported a 56% relapse rates. Finally, Mooney et al. (2014) reported that 77.8% of the participants had relapse at one year follow-up.

Discussion

A total of eight studies about relapse rates after substance abuse treatment in Therapeutic Communities (TC) were reviewed. Overall, relapse rates in TCs were similar in all studies showing high relapse rates. When examining the retrospective cohort studies, relapse rates ranged between 10.7 and 77.8% (Barreno et al., 2019; Fernández-Hermida et al., 2002; Fernández-Montalvo et al., 2008; Gossop et al., 2002; Griffith & Ross, 2019; Mooney et al., 2014; Stevens et al., 2015). When examining the randomized control trial (McCusker et al., 1995), the relapse rates was

71% at 6-months follow-up. These outcomes are in line with previous studies which showed high relapse rates in TC (King et al., 2016; Malivert et al., 2012). Most of the studies indicate that the most frequent consumed substance after relapse was heroin. However, this is difficult to confirm since some studies do not show the substances that are consumed once the relapse has occurred.

When considering the methodology quality of studies, five studies received a quality rating of strong (Fernández-Hermida et al., 2002; Fernández-Montalvo et al., 2008; Gossop et al., 2002; Griffith & Ross, 2019; Stevens et al., 2015), two of moderate (Barreno et al., 2019; McCusker et al., 1995) and one of weak (Mooney et al., 2014).

Regarding treatment completion and retention rates, two studies showed that relapse rates in people who completed treatment was lower than in the non-completers group (Fernández-Hermida et al., 2002; Fernández-Montalvo et al., 2008). These improvements are comparable to results found in therapeutic communities across Europe (Broekaert et al., 1999; Fernández-Hermida et al., 2002; Gossop et al., 1999) and the United States (Hubbard et al., 1989; Simpson & Sells, 1982). In this vein, McCusker et al. (1995) concluded that planned duration of treatment revealed little effect on retention rates over time and, consequently, longer programs will have lower completion rates.

The following factors could influence the findings of this systematic review. First, the definition of relapse was different in each included study. For instance, Barreno et al. (2019) considered relapses two positive drug results in at least two analyses while McCusker et al. (1995) considered relapse the self-report of any drug use since exit from treatment. Second, the follow-up time varied greatly on different studies. Thus, the follow-up period was from 90 days (Griffith & Ross, 2019) to three years (Fernández-Hermida et al., 2002). Finally, the kind and the duration of the treatments varies greatly in each TC. Since 28 days programs (Mooney et al., 2014) from large programmes developed in established TCs (Fernández-Hermida et al., 2002; Fernández-Montalvo et al., 2008).

Some of the studies included in this review showed factors associated with withdrawal and relapse. Gossop et al. (2002) showed that patients who did not relapse exhibited a more consistent use of cognitive, avoidance and distraction coping strategies at the follow-up, compared to relapse. Two research has focused on neurocognitive deficits in Substance Use Disorders (SUD) (Barreno et al., 2019; Stevens et al., 2015). Stevens et al. (2015) indicate that subjects who dropped out of treatment did not maintain consistent and appropriate response patterns throughout the Iowa Gambling Task and revealed a worse ability to select the most probable outcome on the Cambridge Gamble Task. Barreno et al. (2019) suggested that individuals who dropped out of treatment tended to exhibit poorer decision-making on the Iowa Gambling Task, while

individuals with higher rates of relapse presented increased commission errors in the Affective Go/No Go task. This link between decision-making and treatment retention provides support for the idea that having the capacity to perceive the long-term benefits of treatment is an essential factor for the successful completion of TC programs. Decision-making differs from other types of impulsivities, since it entails a subjective valuation of distinct response options (as opposed to allocating resources to only one response, e.g., selective attention and response inhibition) and it requires weighing both rewards and punishments (conversely to choosing between two rewards, e.g., delay discounting) (Verdejo-García et al., 2018). On the other hand, there was an association of response inhibition and delay discounting with treatment retention in shorter-term settings (Barreno et al., 2019; Stevens et al., 2015). As such, the capacity for making choices based on long-term outcomes helps patients to engage in treatment activities, overcome setbacks and, thus, better achieve the treatment goals (Volkow et al., 2016). Alternatively, a proneness for swift and impulsive reactions may hinder patients' ability to remain in treatment, especially when problems emerge, in addition to being a risk factor for relapse.

This review has some limitations. Firstly, studies that assess relapse in TC's are limited. Secondly, the follow-ups were carried out at different times and, moreover, there were a lot of dropouts in the different studies, which should be considered in generalization of results. Thirdly, of the eight studies that are included in this review, just one is a randomized control trial. Fourthly, it is impossible to access the therapeutic community data that were not published. Despite the limitations, this study describes and follows the internationally PRISMA statement and overviews the available research about relapse rates after TC.

Regarding avenues for future research, it should be a focus on trying to identify risk factors for relapse, as well as intervention programs that can effectively reduce relapse rates. Furthermore, it would also be important to identify critical periods in the recovery process and the features of aftercare intervention that would help maintain abstinence. Attention should also be given to examining the presence of mental health disorders among individuals who sought substance use treatment, as well as developing and strengthening relapse prevention and relapse coping skills in these individuals. For instance, the study proposed by Kelly et al. (2020) will answer the calls, in academic literature, for the examination of continuing care interventions for substance users (Blodgett et al., 2014; Lenaerts et al., 2014; McKay, 2009) and will provide relevant data on the effectiveness, both clinical and cost-wise, of continuing care interventions via telephone. This study is expected to demonstrate that continuing care interventions via telephone are low-cost and effective in supporting individuals who leave residential care (Kelly et al., 2020).

Summing-up, relapse rates after a treatment in TCs are high and they should develop further and strengthen relapse prevention and relapse coping skills among drug misusers. In fact, being able to vastly reduce relapse rates is a major priority of substance abuse treatment.

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Annex

EBSCO

AB relapse rates AND TX (“substance abuse treatment” OR “addiction treatment” OR “addictions” OR “addiction” OR drug addiction OR drug dependence) AND TX (“therapeutic community” OR “therapeutic communities” OR tc)

PubMed

((relapse rates[Title/Abstract]) AND (“substance abuse treatment” OR “addiction treatment” OR “addictions” OR “addiction” OR drug addiction OR drug dependence)) AND (“therapeutic community” OR “therapeutic communities” OR tc)

Web of Science

AB=relapse rates AND TX=(“substance abuse treatment” OR “addiction treatment” OR “addictions” OR “addiction” OR drug addiction OR drug dependence) AND TX=(“therapeutic community” OR “therapeutic communities” OR tc)

ORIGINAL

Impact of alcohol consumption and diet on quality of life in higher education. A structural equation model

Impacto del alcohol y la dieta en la calidad de vida en la educación superior. Un modelo de ecuaciones estructurales

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Abstract

Alcohol consumption among Spanish undergraduates during their university time has increased exponentially in recent years. In addition, this lifestyle change is associated with abandoning the Mediterranean diet, increasing the risk of suffering some kind of injury and affecting their quality of life. The study was carried out with a sample of 1,057 Spanish university students, 12.1% (n = 127) of them women and 87.9% (n = 930) men. The SF-36 questionnaire was used to measure health-related quality of life, the MEDAS test to check adherence to the Mediterranean diet, and the AUDIT test to measure alcohol consumption. The results show an inverse relationship between injury and quality of life ($\beta = -0.020$) and adherence to the Mediterranean diet ($\beta = -0.042$) among students who have suffered some kind of injury. On the other hand, there was a positive relationship with alcohol consumption ($\beta = -0.046$). The main conclusion is that lower alcohol consumption and higher adherence to the Mediterranean diet was associated with a better quality of life and a reduced risk of injury in undergraduates in southern Spain.

Keywords: quality of life, university students, alcohol, Mediterranean diet, injuries

Resumen

El consumo de alcohol de la juventud durante el periodo universitario ha aumentado exponencialmente en los últimos años. Además, el cambio de estilo de vida se asocia al abandono de la dieta mediterránea, aumentando el riesgo de sufrir algún tipo de lesión y afectando a su calidad de vida. El estudio se realizó con una muestra de 1057 estudiantes universitarios españoles, el 12,1% (n = 127) de mujeres y el 87,9% (n = 930) de hombres. Se utilizó el cuestionario SF-36 para medir la calidad de vida relacionada con la salud; el test MEDAS para comprobar la adherencia a la dieta mediterránea; y el test AUDIT para medir el consumo de alcohol. Los resultados muestran una relación inversa entre la lesión y la calidad de vida ($\beta = -0,020$) y la adherencia a la dieta mediterránea ($\beta = -0,042$) entre los estudiantes que han sufrido algún tipo de lesión. Por otro lado, se observa una relación positiva con el consumo de alcohol ($\beta = -0,046$). La principal conclusión es que un menor consumo de alcohol y una mayor adherencia a la dieta mediterránea se asociaron con una mejor calidad de vida y un menor riesgo de lesiones en los estudiantes universitarios del sur de España.

Palabras clave: calidad de vida, estudiantes universitarios, alcohol, dieta mediterránea, lesiones

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Late adolescence and youth are stages of life characterized by a series of physical, psychological and social changes (Brooks et al., 2021; Dewi et al., 2021). This process is decisively shaped by many external agents affecting personal habits and customs.

More specifically, starting university can involve a drastic transformation in terms of the excessive use of harmful substances such as alcohol and tobacco (Maric et al., 2021). Authors such as Noh-Moo et al. (2021) and Rial et al. (2020) have highlighted how alcohol use is greater during adolescence (Chen et al., 2018). Drinking increases during weekends, when most students build their social lives around the consumption of strong alcoholic beverages (Buvik et al., 2021). Furthermore, this premature and excessive drinking is linked to problems such as depression (Paulus et al., 2021) or stress (Greenwood et al., 2021), both pathologies closely related to quality of life (QoL).

However, diet is another aspect influenced by starting university, since young people leave the family home, become autonomous and prepare their own meals (Hudak et al., 2021; Winpenny et al., 2018). The eating patterns of Spanish families are based on adherence to the Mediterranean diet (MDA) (Aguilar-Martínez et al., 2021; Jiménez-Boraita et al., 2020), a diet typical of countries around the Mediterranean basin. It is characterized by the consumption of fresh products, vegetables, fruit and pulses and, at the same time, by the low consumption of processed products (Real et al., 2020). However, on leaving home, young people drastically modify their diet, consuming mainly pre-cooked products (Rodrigues et al., 2017). Increasingly, the combination of sedentary habits and easy access to fast foods lead young people to adopt an unbalanced diet and abandon familiar eating habits (Atencio-Osorio et al., 2020; Serra-Majem et al., 2020).

According to Blanco et al. (2020), sedentary habits have increased considerably in adolescents, and more significantly during weekends (Mielgo-Ayuso et al., 2017). Lack of physical activity leads to a worsening of the individual's physical condition (Diehl et al., 2021), potentially leading to injury when performing any movement requiring greater intensity (Fort-Vanmeerhaeghe et al., 2017). Injuries represent a reduction in the person's QoL as they can limit the degree to which an activity is practised or a daily task is performed (Chmelik et al., 2021).

QoL is understood as the absence of disease or the absence of limitations in daily task performance (Villafaina et al., 2021). Furthermore, according to recent studies (Kuczynski et al., 2020), QoL is associated with feelings of loneliness or social disengagement among university students. Other research, such as that of Aymerich et al. (2021), show how QoL is closely linked to life satisfaction or subjective well-being. Likewise, Losada-Puente et al. (2020) highlight the importance of physical, psychological and

emotional elements in the development of the perception of QoL.

This research therefore aims to: a) analyze the relationships between QoL and associated variables such as alcohol use, MDA and injury risk; b) test a structural model that provides explanations for the risk of injury based on QoL in university students; c) analyze the differences between the variables studied with respect to having or not having suffered an injury through a multigroup analysis in a trajectory model.

Material and method

Design and sample

The study used a descriptive, cross-sectional and non-experimental design. The sample comprised 1,057 university students of Physical Activity and Sports Sciences in Almería, Cádiz, Granada, Huelva and Seville (Spain), selected through convenience sampling. The sample was made up of 12.1% (n = 127) women and 87.9% (n = 930) of men, aged between 18 and 23 years (M = 20.78, SD = 2.85).

Instruments

In this study, a total of four instruments were used to collect data. The first is an ad-hoc questionnaire for collecting sociodemographic data such as sex, age and injuries.

To measure alcohol use, the Spanish version (Rubio, 1998) of the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993) was used. The scale comprises ten items, with the first eight answered on a Likert-type scale from 0 (*never*) to 5 (*daily*). The other two items are answered on a Likert-type scale with values of 0, 2 and 4 points. Reliability for the scale in this study was a Cronbach's alpha of $\alpha = 0.856$.

For MDA, the MEDAS test was used (Schröder et al., 2011). This has 14 items answered with *yes* or *no*. Three categories are established: around 14 points shows "high level adherence"; 8 to 11 points indicate "medium level adherence"; from 5 to 7 points "low level adherence"; and less than 5 reflect "very low adherence." Cronbach's alpha in the present study was 0.882.

Health-related QoL (Ware & Sherbourne, 1992) was measured using the Spanish version of the SF-36 questionnaire (Alonso et al., 1995). It comprises 36 items divided into eight dimensions. Twenty-six items are answered on a Likert-type scale from 1 (*always*) to 5 (*never*), and the other ten are answered on a Likert-type scale with three options from 1 (*yes, it limits me a lot*) to 3 (*no, it does not limit me at all*). These dimensions are: Physical Functioning (PF), Physical Role (PR), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Emotional Role (ER) and Mental Health (MH). In the present research, Cronbach's α was 0.794.

Procedure

The research process covered different phases. In the first, authorization was requested from the Department of Body Expression and the Ethics Committee of the Faculty of Educational Sciences at Granada University (Spain), code number 1478/CEIH/2020. In the following phase, a document was prepared explaining the aims of the research and the study, and requesting informed consent from the participants. After 1,234 undergraduate students agreed to participate, a questionnaire was sent to the students by email using Google Forms. During the final phase, the responses of the 1,234 undergraduates were checked, and 177 questionnaires had to be discarded for not being properly completed, that is, having one or more items unanswered. Data analysis was carried out between July and September 2022, with participant confidentiality guaranteed at all times. The processing and analysis of the data was carried out following the human research guidelines of Granada University Ethics Committee, and the ethical principles established by the Declaration of Helsinki in 1975 and its update in Brazil in 2013.

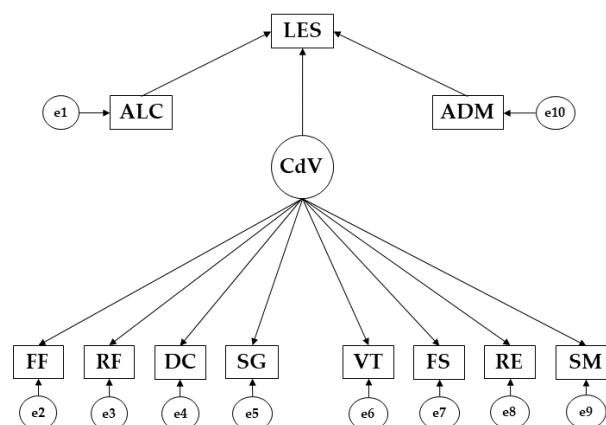
Statistical analysis

The statistical program IBM SPSS Statistics 25.0 (IBM Corp, Armonk, NY, USA) was used for the descriptive analysis of the results. An analysis of frequencies and means was performed. Additionally, Cronbach's alpha was used to determine the internal consistency of the instruments, with a 95% confidence interval.

For the structural equation model, we used the IBM SPSS Amos 26.0 program (IBM Corp., Armonk, NY, USA) to establish the relationships between the variables included in the theoretical model (Figure 1). A general model was developed for the study sample and two models to study the relationships between the variables according to injuries and non-injuries. In this case, the proposed model was made up of a total of eleven endogenous variables (INJ, ALC, MDA, PF, PR, BP, GH, VT, SF, ER and MH) and one exogenous variable (QoL). For endogenous variables, causal explanations were analyzed in view of the associations obtained between the measurement reliability indicators. Therefore, endogenous variable errors of measurement were included in this model and could be controlled and interpreted as multivariate regression coefficients. One-way arrows represent lines of influence between the latent variables and are interpreted from the regression weights. To determine the statistically significant differences in the models, Pearson's chi-square test was used, and the level of significance established at $p < 0.05$ and $p < 0.001$.

After estimating the parameters, model fit was assessed. In accordance with the recommendations of McDonald and Marsh (1990) and Bentler (1990), goodness of fit should be assessed on the chi-square, whose non-significant p values indicated good model fit. Nevertheless, these data cannot be interpreted in isolation due to the influence of sample susceptibility and size (Tenenbaum & Eklund, 2007), so other standardized fit indices were used. Thus, the comparative fit index (CFI) must obtain values above 0.95 for good model fit, the goodness-of-fit index (GFI) needs values above 0.90 for acceptable fit, values greater than 0.90 in the incremental reliability index (IFI) reflect acceptable fit, and, finally, values below 1 in the root mean square approximation (RMSEA) also indicate acceptable model fit.

Figure 1
Theoretical model



Note. Alcohol (ALC); Adherence to the Mediterranean diet (MDA); Injury (INJ); Quality of life (QoL); Physical functioning (PF); Physical role (PR); Bodily pain (BP); General Health (GH); Vitality (VT); Social functioning (SF); Emotional role (ER); Mental health (MH).

Results

Table 1 shows the basic descriptives for QoL, alcohol use and MDA depending on having suffered an injury or not. In relation to the variables assessed for the general sample, a good fit was found for all the indices in the model developed. The CFI analysis yielded a value of 0.978, representing an excellent fit. A value of 0.965 was obtained in the NFI analysis; the IFI was 0.945 and the Tucker-Lewis Index (TLI) yielded a value of 0.934, which was excellent. Furthermore, the RMSEA was 0.054.

The regression weights of the general model can be seen in Figure 2 and Table 2. Note the negative relationship between the INJ variable and QoL ($\beta = -0.013$), as well as with ALC ($\beta = -0.03$). However, for the link between MDA and INJ, positive relationships were found ($\beta = 0.01$). Positive relationships were likewise observed for the QoL variable with MH ($\beta = 0.193$; $p < 0.001$), ER ($\beta = 0.366$; $p < 0.001$), PR ($\beta = 0.894$; $p < 0.001$) and PF ($\beta = 0.527$; $p < 0.001$). Negative relationships were found with respect to SF ($\beta = -0.054$; $p < 0.001$), VT ($\beta = -0.096$; $p < 0.001$), GH ($\beta = -0.089$; $p < 0.001$) and BP ($\beta = -0.730$; $p < 0.001$).

The model developed for participants with injuries also showed good fit values. The CFI yielded a value of 0.965, the NFI a value of 0.954 and the IFI was 0.962. Additionally, the TLI was 0.953, and the RMSEA 0.055.

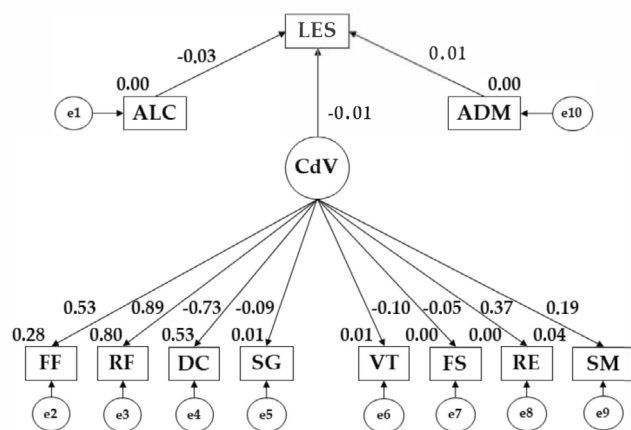
The regression weights are shown in Figure 3 and Table 2, with statistically significant values ($p < 0.001$). A negative relationship was found between INJ and QoL ($\beta = -0.020$), as well as with MDA ($\beta = -0.042$). Positive relationships were observed with ALC ($\beta = .046$). In terms of QoL, positive relationships were found with PF ($\beta = -0.612$; $p < 0.001$), SF ($\beta = 0.097$; $p < 0.001$), PR ($\beta = 0.889$; $p < 0.001$), ER ($\beta = 0.407$; $p < 0.001$) and MH ($\beta = 0.208$; $p < 0.001$). However, the relationships with BP ($\beta = -0.695$; $p < 0.001$), GH ($\beta = -0.083$; $p < 0.001$) and VT ($\beta = -0.061$; $p < 0.001$) were negative.

Table 1
Descriptive data based on injury

	Injury	N	M	SD
GH	NO	485	14.88	1.702
	YES	572	13.87	1.863
SF	NO	485	6.95	0.922
	YES	572	6.90	0.889
VT	NO	485	13.81	2.054
	YES	572	13.02	2.018
MH	NO	485	19.94	1.830
	YES	572	19.15	1.948
BP	NO	485	3.61	2.013
	YES	572	3.84	1.948
ER	NO	485	5.66	0.830
	YES	572	5.15	0.950
PR	NO	485	7.63	1.035
	YES	572	6.98	1.036
PF	NO	485	29.67	0.835
	YES	572	29.38	1.161
ALC	NO	485	27.48	4.167
	YES	572	27.98	4.347
MDA	NO	485	1.13	0.312
	YES	572	1.09	0.334

Note. Mean (M); Standard deviation (SD); General Health (GH); Social functioning (SF); Vitality (VT); Mental health (MH); Bodily pain (BP); Emotional role (ER); Physical role (PR); Physical functioning (PF); Alcohol (ALC); Adherence to the Mediterranean Diet (MDA).

Figure 2
Structural equation model for the sample



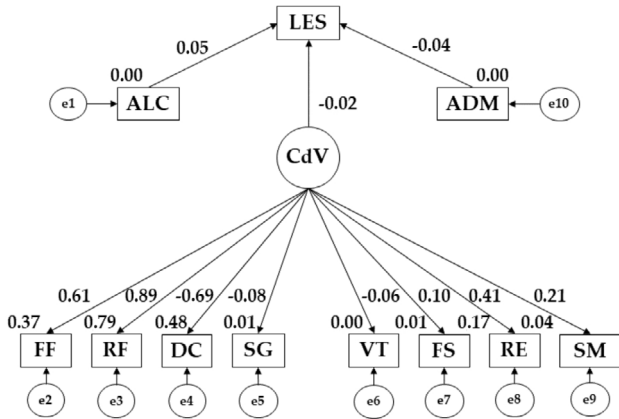
Note. Alcohol (ALC); Adherence to the Mediterranean diet (MDA); Injury (INJ); Quality of life (QoL); Physical functioning (PF); Physical role (PR); Bodily pain (BP); General Health (GH); Vitality (VT); Social functioning (SF); Emotional role (ER); Mental health (MH).

Table 2
Structural equation model for the sample

Association of variables	R.W.				S.R.W.	
	Estimation	S.E.	C.R.	p	Estimation	
MH $\leftarrow$ QoL	1.000				.193	
ER $\leftarrow$ QoL	1.495	.283	5.278	***	.366	
SF $\leftarrow$ QoL	-.333	.213	-1.561	.118	-.054	
VT $\leftarrow$ QoL	-.664	.257	-2.590	*	-.096	
GH $\leftarrow$ QoL	-.432	.178	-2.429	*	-.089	
BP $\leftarrow$ QoL	-9.848	1.699	-5.797	***	-.730	
PR $\leftarrow$ QoL	3.157	.546	5.783	***	.894	
PF $\leftarrow$ QoL	.737	.131	5.625	***	.527	
INJ $\leftarrow$ ALC	-.028	.026	-1.094	.274	-.034	
INJ $\leftarrow$ MDA	.068	.187	.362	.717	.011	
INJ $\leftarrow$ QoL	-.085	.227	-.375	.708	-.013	

Note. Regression weight (R.W.); standardized regression weight (S.R.W.); Standard error (S.E.); Critical relationship (C.R.); Alcohol (ALC); Adherence to the Mediterranean diet (MDA); Injury (INJ); Quality of life (QoL); Physical functioning (PF); Physical Role (PR); Bodily pain (BP); General Health (GH); Vitality (VT); Social functioning (SF); Emotional role (ER); Mental health (MH); * Statistically significant relationship at $p < .05$ level; *** Statistically significant relationship at $p < .001$ level.

Figure 3
Structural equation modeling for injured individuals



Note. Alcohol (ALC); Adherence to the Mediterranean diet (MDA); Injury (INJ); Quality of life (QoL); Physical functioning (PF); Physical role (PR); Bodily pain (BP); General Health (GH); Vitality (VT); Social functioning (SF); Emotional role (ER); Mental health (MH).

Table 3
Structural equation model for injured individuals

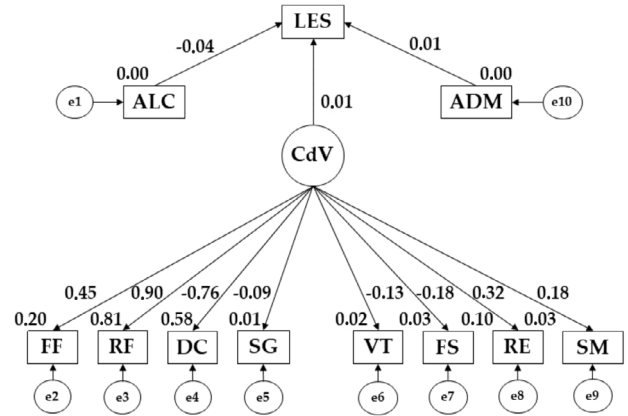
Association of variables	R.W.				S.R.W.	
	Estimation	S.E.	C.R.	p	Estimation	
MH $\leftarrow$ QoL	1.000				.208	
ER $\leftarrow$ QoL	1.600	.416	3.849	***	.407	
SF $\leftarrow$ QoL	.525	.294	1.784	.074	.097	
VT $\leftarrow$ QoL	-.369	.314	-1.174	.240	-.061	
GH $\leftarrow$ QoL	-.377	.242	-1.556	.120	-.083	
BP $\leftarrow$ QoL	-8.269	1.988	-4.159	***	-.695	
PR $\leftarrow$ QoL	2.849	.681	4.177	***	.889	
PF $\leftarrow$ QoL	.852	.207	4.109	***	.612	
INJ $\leftarrow$ ALC	.005	.005	.998	.318	.046	
INJ $\leftarrow$ MDA	-.034	.036	-.927	.354	-.042	
INJ $\leftarrow$ QoL	-.016	.040	-.405	.686	-.020	

Note. Regression weight (R.W.); standardized regression weight (S.R.W.); Standard error (S.E.); Critical relationship (C.R.); Alcohol (ALC); Adherence to the Mediterranean diet (MDA); Injury (INJ); Quality of life (QoL); Physical functioning (PF); Physical Role (PR); Bodily pain (BP); General Health (GH); Vitality (VT); Social functioning (SF); Emotional role (ER); Mental health (MH); * Statistically significant relationship at $p < .05$ level; *** Statistically significant relationship at $p < .001$ level.

Furthermore, the values found for each index in the model with non-injured participants were acceptable. The CFI analysis had a value of 0.958, the NFI a value of 0.953 and the IFI was 0.958. The TLI obtained a score of 0.947, while the RMSEA yielded a result of 0.058.

Figure 4 and Table 3 show the model's regression weights, with statistically significant differences at the levels $p < 0.05$ and $p < 0.001$. The relationship between LES

Figure 4
Structural equation modeling for uninjured individuals



Note. Alcohol (ALC); Adherence to the Mediterranean diet (MDA); Injury (INJ); Quality of life (QoL); Physical functioning (PF); Physical role (PR); Bodily pain (BP); General Health (GH); Vitality (VT); Social functioning (SF); Emotional role (ER); Mental health (MH).

Table 4
Structural equation model for uninjured individuals

Association of variables	R.W.				S.R.W.	
	Estimation	S.E.	C.R.	p	Estimation	
MH $\leftarrow$ QoL	1.000				0.179	
ER $\leftarrow$ QoL	1.371	0.384	3.574	***	0.321	
SF $\leftarrow$ QoL	-1.241	0.435	-2.854	*	-0.177	
VT $\leftarrow$ QoL	-0.998	0.428	-2.332	*	-0.127	
GH $\leftarrow$ QoL	-0.500	0.266	-1.881	0.060	-0.095	
BP $\leftarrow$ QoL	-11.558	2.889	-4.001	***	-0.758	
PR $\leftarrow$ QoL	3.519	0.884	3.979	***	0.902	
PF $\leftarrow$ QoL	0.629	0.165	3.811	***	0.447	
INJ $\leftarrow$ ALC	0.044	0.252	0.174	0.862	0.008	
INJ $\leftarrow$ MDA	0.028	0.027	-1.042	0.297	-0.043	
INJ $\leftarrow$ QoL	-0.015	0.186	-0.082	0.935	-0.003	

Note. Regression weight (R.W.); standardized regression weight (S.R.W.); Standard error (S.E.); Critical relationship (C.R.); Alcohol (ALC); Adherence to the Mediterranean diet (MDA); Injury (INJ); Quality of life (QoL); Physical functioning (PF); Physical Role (PR); Bodily pain (BP); General Health (GH); Vitality (VT); Social functioning (SF); Emotional role (ER); Mental health (MH); * Statistically significant relationship at $p < .05$ level; *** Statistically significant relationship at $p < .001$ level.

and QoL ($\beta = -0.003$) and MDA ($\beta = -0.043$) was negative, although there was a positive relationship with ALC ($\beta = 0.008$). For QoL, positive relationships were found with PF ($\beta = 0.447$; $p < 0.001$), PR ($\beta = 0.902$; $p < 0.001$), ER ($\beta = 0.321$; $p < 0.001$) and MH ($\beta = 0.179$; $p < 0.001$). Conversely, negative relationships were observed with BP ($\beta = -0.758$; $p < 0.001$), GH ($\beta = -0.095$; $p < 0.001$), VT ($\beta = -0.127$; $p < 0.001$) and SF ($\beta = -0.177$; $p < 0.001$).

Discussion

In the present study, a multigroup analysis was carried out with the aim of identifying the relationships between QoL, alcohol use and the Mediterranean diet in university students, depending on whether or not they had suffered an injury. The model yielded a good fit, offering a good explanation of the associations between QoL and the aspects influencing injuries among university students, in line with several other national and international studies (Baden et al., 2020; Dalwood et al., 2020; Knox & Muros, 2017; Moral-García et al., 2020).

When analyzing alcohol use, this is shown in the proposed structural model to be positively associated with having suffered some type of injury, while in those university students reporting no injury, this association is of lower strength. Many studies show how alcohol intake and injuries are related, since it has been widely demonstrated that alcohol acts as a determining factor in increasing the likelihood of suffering injuries (Htet et al., 2020; Lechner et al., 2020; Schnettler et al., 2015).

Likewise, there was a negative association in college students between MDA and having suffered some type of injury. Based on these results, it can be seen how having high MDA adherence is associated with a lower risk of suffering any type of injury (Buckland & González, 2015; Lemma et al., 2021; Martini, 2019). This is a reflection of university students renouncing traditional diets in favour of Western diets (Andrade et al., 2020). The intake of processed foods is linked to a higher incidence of injury risk and a greater likelihood of suffering from cardiovascular diseases, cancer, diabetes and obesity (Romagnolo & Selmin, 2017).

Regarding the influence of QoL on the risk of suffering some type of injury, a negative relationship is observed. Results show how those with some type of injury have seen their QoL reduced, whether for a short or a prolonged period of time. These results are also similar to those obtained by Tonapa et al. (2021), who revealed that individuals who had suffered an extreme injury had experienced a reduction in their QoL. On the other hand, Busse et al. (2019) pointed out how people with well-developed coping strategies improved their QoL.

Some of the main limitations of this study should be noted. Firstly, its methodological design is descriptive, transversal and assessed on a single group of individuals. Such a methodology does not allow causal relationships to be established between the ideas investigated. It does, however, allow the status of an issue in a given population to be easily diagnosed. Similarly, the data do not allow extrapolation beyond the students of the Physical Activity and Sports Sciences degree. Some extraneous variables, such as the sex of the participants or their place of residence, had a moderating effect and were not taken into account in the study. It would therefore be important to design and

carry out a longitudinal study to be able to follow how the relationships between the variables develop over time.

Conclusions

In conclusion, lower alcohol use and higher MDA adherence were associated with better QoL and lower risk of injury in university students in southern Spain. The results of this study support further research examining the relationship between dietary factors and QoL with better methodological design (i.e., prospective studies). More evidence is needed to better understand the relationship between QoL factors, MDA adherence, alcohol use, and injury risk.

Conflicts of interest

The authors declare no conflict of interest.

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ORIGINAL

Integrated vs. parallel treatment in adolescents with substance use and comorbid disorders: A randomized trial

Tratamiento integrado vs. tratamiento paralelo en adolescentes con consumo de sustancias y trastornos comórbidos: Un ensayo aleatorizado

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Abstract

Integrated treatments are often recommended for adolescents with substance use disorders (SUD) and comorbid pathologies. This study aims to compare the effectiveness of two different intervention programs (integrated and parallel) and to investigate treatment outcome predictors. Seventy-five adolescents (13-17 years old) with substance use and comorbid disorders referred to our outpatient program were randomized to integrated ($n = 33$) or parallel ($n = 32$) treatment groups. Their sociodemographic variables, psychopathology, substance use problems, and global functioning were assessed at baseline and 12 months after treatment initiation. Both treatments were associated with positive pre-post changes in several outcome variables (severity of school, family, and psychiatric problems; global functioning; and stage of change). Integrated treatment showed better outcome on adherence ($\chi^2 = 14.328$; $p > .001$) and a composite global measure based on the severity of drug-related problems ($\chi^2 = 8.833$, $p = .003$). Following an adaptive treatment strategy, we offered patients who dropped out of parallel treatment ($n = 12$) the possibility of entering integrated treatment. Eleven of them accepted and constituted a third comparison group (parallel-to-integrated). Multivariate logistic regression analysis showed that the likelihood of a positive global treatment outcome increased with integrated or parallel-to-integrated treatment, internalizing or mixed comorbid disorders, older age, and fewer legal issues. Integrated treatment showed better adherence and global treatment outcomes than parallel treatment in adolescent patients with dual disorders. Older age and fewer legal issues were also related to a positive global treatment outcome.

Keywords: substance use disorders, adolescents, dual disorders, integrated treatment, outpatient program, comorbidity

Resumen

Los tratamientos integrados suelen recomendarse para adolescentes con trastornos por uso de sustancias (TUS) y patologías comórbidas. Este estudio compara la eficacia de dos programas de intervención (integrado y paralelo) e investiga factores predictores de resultados del tratamiento. Setenta y cinco adolescentes (13-17 años) con TUS y trastorno comórbido, remitidos a un programa ambulatorio, fueron asignados aleatoriamente a un tratamiento integrado ($n = 33$) o paralelo ($n = 32$). Se evaluaron variables sociodemográficas, psicopatología, consumo de sustancias y funcionamiento global al inicio del tratamiento y 12 meses después. Ambos tratamientos se asociaron con cambios positivos pre-post en diferentes variables (problemas escolares, familiares, psiquiátricos, funcionamiento global y estadio de cambio). El tratamiento integrado mostró mejores resultados en adherencia ($\chi^2 = 14.328$; $p > .001$) y en una medida global compuesta basada en la gravedad de problemas relacionados con drogas ($\chi^2 = 8.833$; $p = .003$). Siguiendo una estrategia de tratamiento adaptativa, ofrecimos a los pacientes que abandonaron el tratamiento paralelo ($n = 12$) la posibilidad de entrar en el integrado. Once aceptaron, constituyendo un tercer grupo de comparación («paralelo a integrado»). El análisis de regresión logística multivariante mostró que la probabilidad de resultado global positivo aumentaba en los pacientes de los grupos integrado y «paralelo a integrado», con trastornos comórbidos internalizantes o mixtos, mayor edad y menores problemas legales. El tratamiento integrado mostró mejor adherencia y resultados globales que el paralelo en adolescentes con patología dual. Una mayor edad y menos problemas legales también se relacionaron con un resultado global positivo.

Palabras clave: trastornos por consumo de sustancias, adolescentes, trastornos duales, tratamiento integrado, programa ambulatorio, comorbilidad

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Clinical studies with adolescents have revealed that substance use disorders (SUD) frequently coexist with other psychiatric disorders, such as depression, attention deficit-hyperactivity disorder, oppositional defiant disorder, and conduct disorder. Comorbidity rates are inconsistent, ranging between 40% and 50% in community SUD cohorts, between 62% and 88% in SUD treatment cohorts, and between 50% and 90% in psychiatric cohorts (Hawkins, 2009; Hulvershorn et al., 2015; Köck et al., 2022; Norberg et al., 2012). Moreover, adolescents with SUD and comorbid disorders usually have an earlier onset of substance use, greater frequency of use, and more chronic use than those without psychiatric comorbidity. They also present poorer family relationships and more parental psychopathology, as well as more severe school, social and legal problems that complicate therapeutic interventions and contribute to negative treatment outcomes (Cornelius et al., 2017; Díaz et al., 2011; Morisano et al., 2014).

A dual diagnosis results in patients having complex treatment needs that are often difficult to address in traditional outpatient mental health centers or SUD departments. These patients usually need more intensive and costly interventions than people with a single disorder, and it is not always possible to avoid chronicity and the accompanying physical, psychological, and social deterioration (Drake et al., 2008; Erskine et al., 2015; Norberg et al., 2012). Considering the handicap and high socioeconomic and human cost of treating dual disorders once they become established, much more attention needs to be devoted to designing effective means to better treat adolescents at high risk of developing chronic dual disorders (Köck et al., 2022).

Historically, SUD and comorbid mental health disorders were treated independently in patients with dual diagnosis, often sequentially, trying to stop substance use before addressing comorbid mental health problems. More recently, experts and clinical practice guidelines recommended addressing SUD and comorbid psychiatric disorders simultaneously, adopting either a parallel or integrated approach. In parallel interventions, different clinical teams address SUD and the other psychiatric conditions separately, whereas in integrated interventions, the same team simultaneously addresses both the SUD and comorbid mental health disorder, making ongoing adjustments to both treatments and considering their interaction (Drake et al., 2008; Morisano et al., 2014; van Wamel et al., 2021).

Several authors have argued that integrated interventions are the most effective way to treat adolescents with dual disorders due to both the neurodevelopmental characteristics and the socio-cultural aspects of substance use during adolescence (Hawkins, 2009; Hogue et al., 2014, 2018; Hulvershorn et al.,

2015; Kaminer et al., 2017, 2018; Silvers et al., 2019). Integrated interventions address both substance use and psychiatric symptoms combining psychotherapeutic, psychosocial, and psychopharmacological techniques in an individualized and flexible way (Drake et al., 2008). Psychotherapeutic approaches usually include motivational and cognitive behavioral elements (Hogue et al., 2018, 2020), contingency management, or home incentives (del Palacio-Gonzalez et al., 2022; Hesse et al., 2021), continuous care (Dahlberg et al., 2022; Stanojlović & Davidson, 2020) parental psychoeducation, and family intervention (Hogue et al., 2021). Moreover, it is even more necessary to incorporate different interventions in an integrated and flexible way during adolescence than in adults, including components such as crisis interventions and continuous care (Passeti et al., 2016), booster sessions, phone contacts or reminders of appointments (del Palacio-Gonzalez et al., 2022; Pedersen et al., 2021), and new technologies (Martínez-Miranda & Espinosa-Curiel, 2022). Additionally, coordination with educational and social services can increase adherence and produce better and more stable outcomes in reducing use and increasing functionality (van Wamel et al., 2021).

However, integrated programs are costly, both economically and organizationally, and are not accessible to all adolescent patients with dual diagnoses (Glowacki et al., 2022; Libby & Riggs, 2005; Sterling et al., 2010). Additionally, a few studies have reported that some patients with SUD achieve positive outcomes with simpler interventions, like the use of urinalysis to monitor abstinence (Schuler et al., 2014) or other cost-effective brief interventions (Dennis et al., 2004; Ramchand et al., 2011; Winters et al., 2023). It could be the case that some adolescent patients with dual diagnoses could achieve good outcomes without an integrated approach (Goti et al., 2009; Winters et al., 2023) and studying the patient characteristics that predict good treatment outcomes, regardless of the modality of treatment used, could therefore inform the most appropriate therapy. Some authors have suggested that patients who are more emotionally distressed, less involved in illegal activities, or more motivated to abstinence at baseline could have better outcomes than those with more externalized problems or who lack commitment to abstinence (Garner et al., 2008; Hersh et al., 2013; Kaminer et al., 2018; Mason et al., 2008; Winters et al., 2008).

In this study, the first aim was to compare the effectiveness of integrated and parallel intervention programs in a naturalistic clinical setting among adolescents with dual diagnoses referred to a specialist service for adolescent SUD. We hypothesized that patients receiving integrated treatment would evidence better adherence and more positive results in different relevant outcome measures relative to the parallel treatment. The second aim was to

investigate the patients baseline characteristics that might be associated with a global positive treatment response in either the integrated or the parallel treatment condition. We hypothesized that adolescents with dual diagnoses, who have more severe emotional symptoms and more motivation to change, would respond more positively to treatment, irrespective of the treatment condition.

Material and methods

Participants

Participants were recruited prospectively using a screening procedure applied to all adolescents referred to the outpatient program of the Addictive Behaviors Unit of the Child and Adolescent Psychiatry and Psychology Department of a public general hospital in an urban setting in Spain. Patients were included if they were 12 to 17 years old, and met the criteria for dual disorder; that is, a SUD diagnosis (with active substance use) plus at least one other axis I mental health disorder, according to DSM-IV-TR. Patients were excluded if they met the following criteria: ongoing non-stabilized/active psychotic symptoms or severe suicidal thoughts interfering with assessment or requiring hospitalization, need for residential treatment, severe cognitive impairment (estimated IQ < 70), or not living in the area served by our hospital and being unable to attend the program regularly (See flowchart in Figure 1).

Procedure

We invited adolescents who met the described eligibility criteria to take part in a two-group parallel randomized trial. After obtaining written parental consent and adolescent assent, adolescent patients and their parents were assessed comprehensively. Baseline assessment was conducted in two sessions by a trained master's degree psychologist, blinded to the treatment condition, who had expertise with all the instruments used in this trial. Patients underwent a complete follow-up assessment 1 year after treatment initiation. Intermediate measures at 3 and 6 months were incomplete because many patients were reluctant to repetitive assessments and therefore, complete 1-year assessment were prioritized and included in the final analysis. We aimed to obtain data in face-to-face interviews, but when this was not possible, we relied on telephone interviews and some mailed questionnaires. The study procedure has been carried out following the Declaration of Helsinki and was approved by our institutional ethics committee at the Hospital Clínic of Barcelona (R: 2007/3650).

Treatment groups

In both treatment groups, 15 to 18 therapeutical sessions of about 45 minutes were delivered over a year approximately.

Parallel treatment

In the parallel treatment group, patients received separate interventions for substance abuse (about 5–6 sessions over approximately 3–4 months) and for the comorbid disorder (about 10–12 sessions during a year), delivered by different therapists and without a centralized case management component to oversee and coordinate all elements of patient treatment. In this condition, a clinician specializing in the treatment of adolescent SUD provided treatment outside the context of a stage-wise client level of engagement paradigm. This treatment comprised the following components, delivered sequentially: feedback of substance use assessment, motivational enhancement, coping with craving, family interventions (i.e., contingency management, managing SUD in adolescents and communication skills), refusal skills and other cognitive behavioral techniques for the adolescent, and relapse prevention. Whenever possible, SUD therapist provided feedback about alcohol and/or tetrahydrocannabinol (THC) urine quantification to motivate the reduction or cessation of substance use. Materials were adapted ad hoc from Cannabis Youth Treatment-5/7 project (CYT) (Dennis et al., 2004; Sampl & Kadden, 2001). Treatment for comorbid symptoms was based in psychoeducation, cognitive-behavioral and pharmacological techniques according to the clinical guidelines and the clinical protocols of the Department.

Integrated treatment

The integrated treatment approach included the same specific substance use motivational and cognitive-behavioral components as the parallel treatment approach; however, they were tailored flexibly and individually to the patient's current stage of change and its clinical and psychosocial characteristics. Two mental health professionals (a psychiatrist and a psychologist) specializing in the treatment of dual disorders in adolescents delivered the interventions. One of these specialists acted as a case manager and coordinated all therapeutic and psychosocial interventions. Patients received SUD therapy jointly with mental health interventions for their comorbid conditions, according to the principles of the Drake Model (Drake et al., 2008) and key elements of effective adolescent substance use and dual disorders treatment (Brannigan et al., 2004; Hogue et al., 2020; Meisel et al., 2022). Therapeutic sessions specifically addressed the interaction between mental health symptoms and substance use (i.e., substance use as self-medication or how substance use trigger psychiatric symptoms and vice-versa).

The sessions in the integrated intervention were distributed 4 weekly, 8 biweekly, and 6 monthly sessions over a year approximately. Another important component of the integrated treatment was the construction of the

therapeutic alliance, to enhance the adherence to treatment. If patients and/or parents missed an appointment, the therapist phoned them to remind the next citation, to intervene in family crisis, to motivate them to continue treatment, or to accept harm reduction purposes from the patient (Winer et al., 2022).

Assessments and outcome measures

Psychopathology, sociodemographic and clinical data

To obtain substance use and other mental health diagnoses according to the DSM-IV-TR (APA, 2002), we evaluated adolescent psychopathology by administering the Kiddie-SADS (Kaufman et al., 1996) to parents and adolescents at baseline, consulting the clinical records of the hospital or reference therapist in doubtful cases. For several analyses, clinical diagnoses comorbid with SUD were grouped as externalizing (attention deficit-hyperactivity disorder, oppositional defiant disorder, and conduct disorder), internalizing (anxiety, depressive, obsessive disorders), and mixed (bipolar disorder, mixed behavioral and emotional disorders).

Semi-structured interviews from the Collaborative Studies on Genetics of Alcoholism (adapted to Spanish) were administered to parents and patients to obtain measures of sociodemographic variables (age, gender, and socioeconomic status [SES]). The utility of these interviews for clinical and research purposes are established (Díaz et al., 2008, 2011).

Substance use pattern and age at first use

Initial age and quantity/frequency measures of substance use were obtained at baseline by semi-structured interviews. The pattern of use of each substance (e.g., tobacco, alcohol, cannabis, and other drugs) was coded into five categories (Díaz et al., 2008, 2011): 1) non-use; 2) occasional use, defined as from time to time, usually at parties or celebrations; 3) regular use, defined as several times a week for tobacco, almost weekly for alcohol and cannabis, or almost monthly for stimulants or other drugs, with no evidence of substance use-related problems; 4) substance use problems, defined as a quantity-frequency and/or situational pattern of drug use with a high probability to generate health or psychosocial problems in a short or middle-term, but still sub-diagnostic; and 5) SUD, which meets the diagnostic criteria for substance abuse or dependence according to the DSM-IV-TR (APA, 2002). Self-report data about current drug use was corroborated whenever possible by urinalysis. A Spanish version of the Cannabis Problem Questionnaire-CPQ (Fernández-Artamendi et al., 2012) was administered at baseline to determine the extent of problems related specifically to cannabis use.

Severity of addiction

The Spanish version of the Teen-Addiction Severity Index (Teen-ASI) (Díaz et al., 2008) was administered at baseline and at 3, 6 and 12 months of follow-up to assess the severity of problems arising from substance use in six domains: drug use, school status, family function, peer-social relationships, legal status, and psychiatric status. The version used in this study included 142 items, with each domain scored using a five-point scale (0 = none, 1 = a little, 2 = medium, 3 = much, 4 = extreme).

Family environment

Parents completed the Spanish version of the Family Environment Scale (Moos & Moos, 1981) at baseline to assess the quality of family relationships. This has proven reliability and both content and construct validity (Moos, 1990). We analyzed only the cohesion and conflict scales to control for possible confounding variables in the multivariate analyses.

Emotional and behavioral symptoms

To obtain dimensional data on adolescent behavioral and emotional problems in the 6 months before both starting treatment and the 12-month follow-up, patients and their parents completed the Youth Self-Report (YSR) scale and the Child Behavior Checklist (CBCL) at baseline and 12 months, respectively. These tools have both shown adequate reliability and validity (Achenbach & Rescorla, 2001). Direct scores for internalizing (i.e., withdrawn, somatic complaints, and anxious/depressed subscales) and externalizing (i.e., delinquent and aggressive behavior subscales) scales were used in the analysis.

Psychosocial functioning

The Children's Global Assessment Scale (CGAS) (Shaffer et al., 1983) was used to assess the level of psychosocial adaptive behavior, both before the start of treatment and at 12 months.

Stage of change

Each patient's therapist determined the stage of change at baseline and 12 months by asking a series of questions according to the guidance of Krebs y cols. (Krebs et al., 2018). This resulted in ordinal categorization into five stages: 1) precontemplation (no intention to change); 2) contemplation (intention to change within the next 6 months); 3) preparation (plans to act with the next month); 4) action (significant modifications in behavior and way of life); and 5) maintenance (working to prevent relapse).

Global treatment outcome

To account for the interaction between different treatment outcomes, both in substance use and in other affected areas, we created a composite measure similar to those

used in other studies of SUD (Anton et al., 2006; Weiss et al., 2009). This involved evaluating the overall effects of treatment based on the measures obtained in different Teen-ASI scales: the 12-month global treatment outcome was coded as positive if there was a reduction of ≥ 1 point in the drug scale and ≥ 1 point in at least two of the other scales and was coded as negative for all other outcomes.

Statistical analysis

After performing a descriptive analysis, we examined the normality of the data using histograms and the Shapiro–Wilk test. To check for equivalence between the integrated and parallel treatment groups, we performed comparative analyses for age, gender, and other sociodemographic variables. We used Student t-tests for quantitative variables and Pearson chi-squared tests for categorical variables with normally distributed data, and we used non-parametric tests for ordinal variables or those not fulfilling normative conditions or homoscedasticity. Measures of treatment abandonment or non-compliance were used to compare attrition rates between the two groups.

We performed two different repeated-measures analysis of variance (ANOVA) for the post-treatment measures (Teen-ASI scales scores, CGAS total score, and the CBCL and YSR internalizing and externalizing scale scores), with time set as the intra-subject variable (baseline vs 12 months follow-up). In the first, we examined differences between the two treatment groups (integrated vs parallel), while in the second, we compared three treatment groups (integrated, parallel, and change from parallel to integrated). The effect size was reported as eta squared (η^2).

Finally, multivariate binary logistic regression was performed to verify the predictive value of the treatment group and other variables related to a positive global outcome, controlling for possible confounding variables (e.g., age, gender, SES, and comorbid diagnoses). The variables were entered in successive forward steps (the Wald method).

Data were analyzed using IBM SPSS version 25.0 for Windows and JASP version 14.1.

Results

Sample description

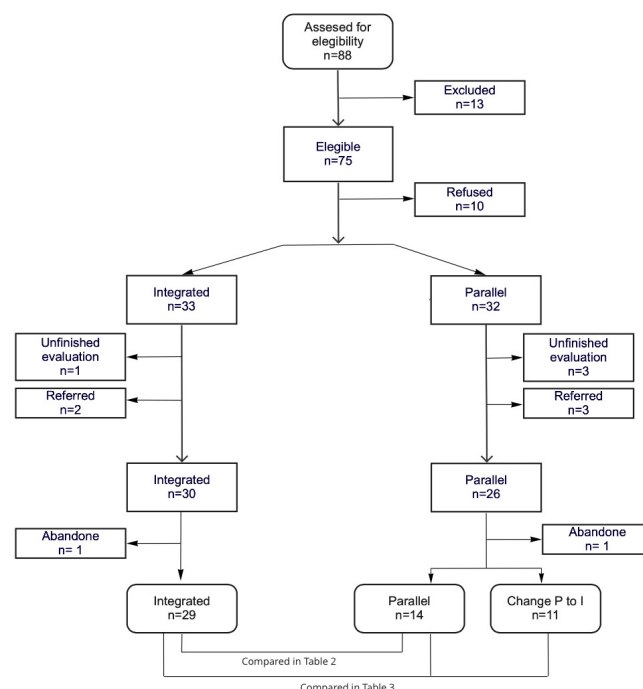
Over an initial 14-month period, we assessed 88 adolescents with dual disorders and identified 75 eligible participants; however, 10 refused, leaving a final sample of 65 patients. Of these, we randomly assigned 33 and 32, respectively, to the integrated and parallel outpatient treatment groups. Another 4 patients failed to complete the initial evaluation (integrated group = 1, parallel group = 3) and 5 needed referral for inpatient or residential treatment (integrated group = 2, parallel group = 3). The Flowchart in Figure 1 provides full details.

The age of participants ranged from 13 to 17 years ($M = 16.29$, $SD = 1.24$), with males accounting for 60.71% of the cohort. Almost half of the patients came from two-parent biological or foster families and had lived at home since the child's birth. Patients came predominantly from families of middle SES. All analyzed patients were regular users of cannabis, and many of them also used other substances at least occasionally (alcohol, 96.43%; tobacco, 94.64%; other drugs, 48.21%). All participants had a diagnosis of SUD and at least one other DSM-IV-TR disorder (see Table 1).

Comparison of baseline measures between the integrated and parallel treatment groups

Table 1 shows the comparative analysis of baseline measures between the groups initially randomized to the integrated ($n = 30$) and parallel ($n = 26$) treatment groups. Groups were not significantly different by gender, age, family cohesion or conflict, and CGAS score. Both groups mainly comprised externalizing and mixed clinical diagnoses and showed no significant differences in the percentages of each diagnostic category. The groups also did not differ by substance use variables, except for age at first use of “other drugs,” which was slightly lower in the parallel group ($p = .032$).

Figure 1
Diagram of study enrollment flow



Attrition data

After treatment initiation, 12 patients in the parallel group and 1 patient in the integrated group dropped out due to non-compliance or complaints of worsening symptoms, with the attrition analysis showing significant differences between the groups ($\chi^2 = 14.328$; $p > .001$). Allowing for an adaptive treatment strategy (Santisteban et al., 2015), we offered these patients the opportunity to continue their treatment with the integrated methodology. Those who accepted the offer became the third treatment group of the study (parallel-to-integrated) and we used their baseline and follow-up data in a post-hoc comparative analysis with

the parallel and integrated groups. After inclusion in the parallel-to-integrated group, patients received the same therapeutic procedures than the integrate group.

Comparative analyses between two treatment groups: integrated and parallel

Repeated-measures ANOVA and chi-square tests comparing patients who remained in the initial treatment groups revealed that both treatment modalities (integrated and parallel) were associated with positive pre-post changes in the Teen-ASI school, family, and psychiatric scores, CGAS, and stage of change. No statistically significant

Table 1

Baseline sociodemographic characteristics, psychiatric diagnoses, and substance use by treatment group

	Integrated treatment n = 30	Parallel treatment n = 26	Statistic test t/U/ χ^2	p value
Age (years)	16.40 (1.163)	16.12 (1.177)	$t = 0.908$	0.368
Gender (% male)	20 (66.7%)	14 (56.3%)	$\chi^2 = 0.960$	0.327
Socioeconomic status				
Low	7 (23.3%)	11 (47.8%)	$\chi^2 = 3.012$	0.222
Middle	17 (56.7%)	9 (30.4%)		
High	6 (20%)	5 (21.7%)		
Main comorbid DSM-IV-TR diagnosis:				
Attention deficit-hyperactivity disorder	7 (23.3%)	6 (23.1%)	$\chi^2 = 6.501$	0.483
Oppositional defiant disorder	3 (10%)	3 (11.5%)		
Conduct disorder	2 (6.7%)	3 (11.5%)		
Affective disorder (mood/anxiety)	3 (10%)	4 (15.4%)		
Behavior/emotion mixed disorder [#]	8 (26.7%)	8 (30.8%)		
Eating disorder	1 (3.3%)	2 (7.7%)		
Psychotic disorder	3 (10%)	-		
Other disorders [‡]	3 (10%)	-		
Comorbid diagnosis (added to SUD):				
Externalizing	14 (46.7%)	12 (46.1%)	$\chi^2 = 0.050$	0.975
Internalizing	4 (13.3%)	4 (15.4%)		
Mixed	12 (40%)	10 (38.5%)		
CGAS	49.23 (13.554)	48.42 (11.583)	$t = 0.238$	0.812
Pattern of use				
Alcohol (at least regular use)	22 (73.3%)	23 (88.5%)	$\chi^2 = 5.032$	0.284
Tobacco (at least regular use)	24 (80%)	26 (100%)	$\chi^2 = 6.407$	0.171
Cannabis (at least regular use)	30 (100%)	25 (96.1%)	$\chi^2 = 2.145$	0.543
Other drugs (at least occasional use)	10 (30.40%)	13 (40.7%)	$\chi^2 = 3.327$	0.505
Age at first use:				
Alcohol	13.70 (1.137) (n = 27)	13.62 (1.203) (n = 26)	$t = 0.275$	0.785
Tobacco	13.17 (1.704) (n = 30)	12.88 (1.366) (n = 26)	$t = 0.676$	0.502
Cannabis	13.67 (1.539) (n = 30)	13.62 (1.472) (n = 26)	$t = 0.127$	0.899
Other drugs ¹	16.20 (0.919) (n = 10)	15.08 (1.320) (n = 13)	$t = 2.291$	0.032
CPQ ²	7.960 (4.668)	8.250 (5.024)	$t = -0.123$	0.903
Teen-ASI Drugs (continuous measures)				
School	3.10 (0.803)	2.96 (1.038)	$t = 0.562$	0.576
Family	2.90 (0.845)	3.00 (1.020)	$t = -0.401$	0.690
Social	3.00 (1.017)	3.00 (0.849)	$t = 0.000$	1.000
Legal	1.97 (1.129)	2.19 (0.939)	$t = -0.806$	0.424
Psychiatric	1.00 (1.390)	1.08 (1.440)	$t = -0.203$	0.840
Psychiatric	2.73 (1.143)	2.92 (0.891)	$t = -0.685$	0.496
Stage of change (continuous)				
Pre-contemplative	1.93 (0.753) (n = 30)	2.08 (0.935) (n = 26)	$t = -0.641$	0.524
Contemplative	9 (30.00%)	8 (28%)	$\chi^2 = 2.530$	0.470
Preparation	14 (46.66%)	10 (40%)		
Action	7 (23.33%)	6 (24%)		
Action	-	2 (8%)		

¹ Age at first use: Other drugs, n = 23 (integrated: 10; parallel: 13).

² CPQ, n = 47 (integrated: 25; parallel: 22).

[#] Behavior/emotion mixed disorder, including disruptive behavior due to impulsivity/emotionality and Cluster B personality traits.

[‡] Other disorders, including adaptive disorders, learning disorders, and autism spectrum characteristics, with clinically relevant consequences in personal, family, social, or academic dimensions.

* $p \leq 0.05$, ** $p \leq 0.01$.

differences existed between treatment groups, except for the global outcome measure based on Teen-ASI scores. Group by time interactions were also non-significant (Table 2).

Comparative analyses among the integrated, parallel, and parallel-to-integrated groups

Repeated-measures ANOVA and chi-square tests showed associations for the three treatment modalities (integrated, parallel and change parallel-to-integrated) with positive pre-post changes (time effects: baseline - 12 months follow-up) in several individual outcome variables (Teen-ASI drugs, school, family, social and psychiatric scores, CGAS, YSR internalizing and externalizing score, and stage of change). However, no statistical differences existed among treatment groups, except for the global treatment outcome measure. At 12 months, 75.9% (22/29) patients in the integrated group and 63.6% (7/11) in the parallel-to-integrated group attained a positive global outcome, compared to only 28.6% (4/14) of those receiving a parallel treatment

($\chi^2=8.922$; $p = .012$). Group by time interactions were also non-significant (Table 3).

Post-hoc Tukey analyses showed that significant pre-post differences in specific outcome measures corresponded with either the integrated group (Teen-ASI school, family, and psychiatric scores, CGAS, stage of change) or the parallel-to-integrated group (Teen-ASI drugs, family, and social scores, and CGAS), but never with the parallel group. Group by time interactions were also non-significant. The supplementary material provides more detail.

Variables associated to a positive outcome.

Analyzing the baseline characteristics that could predict a positive outcome 1 year after starting treatment, we identified significant effects for comorbid diagnoses and some Teen-ASI scales, as detailed in Table 4. The analysis showed that externalizing disorders were more common in the negative global outcome group and that internalizing and mixed disorders were more common in the positive global outcome group ($\chi^2 = 6.885$, $p = .032$). Regarding the

Table 2

Treatment outcomes from baseline to 12 months follow-up in the integrated and parallel treatment groups

Indicator	Treatment programs				F (1, 41)	η²	Groups		Time * Group	
	Integrated		Parallel							
	Baseline (n = 29)	Follow-up (n = 29)	Baseline (n = 14)	Follow-up (n = 14)						
Teen-ASI (0–4 cont)										
Drugs	3.07 (0.80)	2.38 (1.40)	2.64 (1.15)	2.00 (1.47)	8.240	0.065	1.648	0.024	0.010	0.000
School	2.86 (0.85)	1.89 (1.26)	2.75 (1.06)	2.42 (1.38)	8.721*	0.068	0.430	0.007	2.062	0.016
Family	2.97 (1.02)	1.93 (1.31)	3.00 (0.78)	2.57 (1.51)	12.868***	0.079	1.074	0.017	2.207	0.014
Social	1.97 (1.15)	1.52 (1.12)	2.21 (0.80)	1.79 (1.31)	8.132	0.034	0.612	0.012	0.004	0.000
Legal	0.90 (1.29)	0.66 (1.23)	0.93 (1.27)	0.86 (1.23)	0.674	0.004	0.104	0.002	0.199	0.001
Psychiatric	2.72 (1.16)	2.00 (1.36)	2.79 (0.98)	2.43 (1.09)	8.873*	0.044	0.505	0.009	1.022	0.005
CGAS (1–100)	48.86 (13.64)	61.38 (18.94)	48.07 (10.48)	54.50 (14.33)	13.268***	0.079	0.807	0.013	1.370	0.008
CBCL										
Internalizing	15.62 (8.18)	16.33 (10.95)	16.11 (9.29)	13.00 (5.75)	0.526	0.004	0.191	0.005	1.339	0.010
Externalizing	22.52 (7.87)	21.86 (10.12)	24.78 (7.86)	24.33 (11.75)	0.095	7.790e-4	0.523	0.014	0.009	0.000
YSR										
Internalizing	14.58 (9.52)	12.33 (9.84)	16.89 (9.01)	15.00 (11.28)	2.814	0.009	0.468	0.013	0.021	0.000
Externalizing	21.37 (7.77)	18.25 (9.65)	26.67 (7.26)	24.56 (9.34)	2.699	0.017	3.772	0.085	0.101	0.000
Stage of change (1-5)	1.93 (0.75)	3.17 (1.31)	1.86 (0.86)	2.57 (1.45)	18.941***	0.147	1.421	0.018	1.376	0.011
Pre-contemplative	9 (31.0%)	2 (6.9%)	6 (42.9%)	5 (35.7%)			χ² = 7.335			
Contemplative	13 (44.8%)	10 (34.5%)	4 (28.6%)	2 (14.3%)						
Preparation	7 (24.1%)	4 (13.8%)	4 (28.6%)	2 (14.3%)						
Action	-	7 (24.1%)	-	4 (28.6%)						
Maintenance	-	6 (20.7%)	-	1 (7.1%)						
Global outcome (positive)	-	22 (75.9%)	-	4 (28.6%)			χ² = 8.833**			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3
Treatment outcomes from baseline to 12 months in the integrated, parallel, and parallel-to-integrated groups

Indicator	Treatment group						Time		Groups		Time*Group	
	Integrated		Parallel		Parallel-to-integrated		F (1, 51)	η^2	F (2, 51)	η^2	F (2, 51)	η^2
Teen-ASI (0–4 cont.)	Baseline (n = 29)	Follow-up (n = 29)	Baseline (n = 14)	Follow-up (n = 14)	Baseline (n = 11)	Follow-up (n = 11)						
Drugs	3.07 (0.80)	2.38 (1.40)	2.64 (1.15)	2.00 (1.47)	3.27 (0.78)	2.00 (1.48)	18.789***	0.103	0.795	0.018	0.860	0.009
School	2.86 (0.85)	1.89 (1.26)	2.75 (1.06)	2.42 (1.38)	3.10 (1.10)	1.90 (1.20)	17.331***	0.104	0.231	0.006	1.457	0.018
Family	2.97 (1.02)	1.93 (1.31)	3.00 (0.78)	2.57 (1.51)	3.00 (1.00)	1.82 (1.17)	23.841***	0.111	0.648	0.016	1.511	0.014
Social	1.97 (1.15)	1.52 (1.12)	2.21 (0.80)	1.79 (1.31)	2.27 (1.104)	1.36 (0.92)	17.396***	0.060	0.323	0.009	1.028	0.007
Legal	0.90 (1.29)	0.66 (1.23)	0.93 (1.27)	0.86 (1.23)	1.09 (1.64)	0.91 (1.30)	1.025	0.004	0.154	0.005	0.112	0.001
Psychiatric	2.72 (1.16)	2.00 (1.36)	2.79 (0.98)	2.43 (1.09)	3.18 (0.75)	2.27 (0.91)	16.060***	0.069	0.657	0.018	0.831	0.007
CGAS (1–100)	48.86 (13.64)	61.38 (18.94)	48.07 (10.48)	54.50 (14.33)	47.36 (12.80)	61.73 (12.35)	26.210***	0.109	0.428	0.011	1.112	0.009
CBCL												
Internalizing	15.62 (8.18)	16.33 (10.95)	16.11 (9.29)	13.00 (5.75)	17.88 (10.59)	18.38 (8.73)	0.173	0.001	0.404	0.018	0.668	0.008
Externalizing	22.52 (7.87)	21.86 (10.20)	24.78 (7.86)	24.33 (11.75)	22.25 (6.63)	20.50 (8.98)	0.410	0.002	0.383	0.017	0.062	0.001
YSR												
Internalizing	14.58 (9.52)	12.33 (9.84)	16.89 (9.01)	15.00 (11.28)	13.25 (4.17)	9.88 (3.68)	5.776*	0.016	0.572	0.026	0.149	0.001
Externalizing	21.37 (7.77)	18.25 (9.65)	26.67 (7.26)	24.56 (9.34)	20.00 (8.44)	16.13 (5.28)	5.194*	0.025	2.608	0.096	0.117	0.001
Stage of change (1–5)	1.93 (0.75)	3.17 (1.31)	1.86 (0.86)	2.57 (1.45)	2.45 (0.93)	3.36 (1.33)	22.769***	0.135	1.413	0.039	0.781	0.009
Pre-contemplative	9 (31.04%)	2 (6.90%)	6 (42.86%)	5 (35.71%)	1 (9.09%)	-						
Contemplative	13 (44.82%)	10 (34.48%)	4 (28.57%)	2 (14.29%)	6 (54.55%)	4 (36.36%)	$\chi^2 = 11.556$		$\chi^2 = 11.242$			
Preparation	7 (24.14%)	4 (13.79%)	4 (28.57%)	2 (14.29%)	2 (18.18%)	2 (18.18%)						
Action	-	7 (24.14%)	-	4 (28.57%)	2 (18.18%)	2 (18.18%)						
Maintenance	-	6 (20.69%)	-	1 (7.14%)	-	3 (27.27%)						
Global outcome (positive)	-	22 (75.9%)	-	4 (28.6%)	-	7 (63.6%)			$\chi^2 = 8.922**$			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Teen-ASI scores, there was a better baseline functioning on the social ($p = .015$) and legal ($p = .010$) scales in the positive global outcome group. Finally, SES almost reached significance (tendency) for predicting the global outcome ($\chi^2 = 5.612$, $p = .060$), potentially indicating that low SES is slightly more represented in the negative outcome group and that high and middle SES are slightly more represented in the positive outcome group.

Multivariate analysis

We performed a binary logistic regression analysis to verify the predictive value of the treatment group, jointly considering other variables associated with a positive global outcome, using two different models. For model one, we selected the treatment groups and sociodemographic variables usually related to treatment outcome (i.e., age, gender, SES, and comorbid diagnoses) to control their possible effect over global outcome. For model two, we selected the treatment groups and those variables previously correlated with global outcome in our study

(comorbid diagnostics, $Rho = 0.340^*$; Teen-ASI social, $Rho = -0.322^*$; and Teen-ASI legal, $Rho = -0.290^*$).

Model one

In model one, the third step of the analysis obtained the best fit and significantly predicted global outcome ($\chi^2 = 25.1511$; $df = 5$, $p < .000$, Nagelkerke $R^2 = 0.50$). It correctly classified 79.6% of cases with a sensitivity of 84.4%. The Hosmer and Lemeshow test returned a non-significant result ($p = .720$), implying adequate model fit. The coefficients revealed that patients who received the integrated treatment ($OR = 26.811$; $p = .002$; 95% $CI = 3.329 - 215.944$) or the parallel-to-integrated treatment ($OR = 26.361$; $p = .011$; 95% $CI = 2.14 - 324.635$) had a higher likelihood of achieving a positive global treatment outcome. Additionally, age increased the probability of achieving a positive global treatment outcome ($OR = 2.584$; $p = .022$; 95% $CI = 1.148 - 5.818$), whereas externalizing comorbid diagnoses reduced the probability ($OR = 0.054$; $p = .006$; 95% $CI = 0.007 - 0.425$). Gender and SES were not significant.

Table 4
Possible predictive variables of treatment outcome (positive vs. negative)

	Global outcome		Statistic test t/U/ χ^2	p value
	Positive n = 33	Negative n = 21		
Group of treatment				
Integrated	22 (66.7%)	7 (33.3%)	$\chi^2 = 8.922$	0.012
Parallel	4 (12.1%)	10 (47.7%)		
Change parallel to integrate	7 (21.2%)	4 (19.0%)		
Age (years)	16.45 (1.148)	15.95 (1.203)	t = -1.538	0.130
Gender (% male)	18 (54.5%)	14 (66.7%)	$\chi^2 = 0.781$	0.377
Socioeconomic status				
Low	7 (21.3%)	11 (52.4%)	$\chi^2 = 5.612$	0.060
Middle	18 (54.5%)	7 (33.3%)		
High	8 (24.2%)	3 (14.3%)		
Family Environment Scale:	(n = 24)	(n = 13)		
Cohesion	37.08 (14.969)	38.92 (18.136)	t = 0.331	0.742
Conflict	53.33 (15.895)	57.92 (16.235)	t = 0.832	0.411
Main comorbid DSM-IV-TR diagnosis:				
Attention deficit-hyperactivity disorder	7 (21.2%)	4 (21.7%)	$\chi^2 = 13.434$	0.062
Oppositional defiant disorder	2 (6.1%)	4 (17.4%)		
Conduct disorder	-	5 (21.7%)		
Affective disorder (mood/anxiety)	5 (15.1%)	2 (8.7%)		
Behavior/emotion mixed disorder	12 (36.4%)	4 (17.4%)		
Eating disorder	2 (6.1%)	1 (4.3%)		
Psychotic disorder	2 (6.1%)	1 (8.7%)		
Other disorders [‡]	3 (9.1%)	-		
Comorbid diagnosis (added to SUD):				
Externalizing	10 (30.3%)	14 (66.7%)	$\chi^2 = 6.885$	0.032
Internalizing	6 (18.2%)	2 (9.5%)		
Mixed	17 (51.5%)	5 (23.8%)		
CGAS	49.91 (13.749) (n = 33)	45.90 (10.094) (n = 21)	t = -1.150	0.255
CBCL	(n = 33)	(n = 18)		
Internalizing	16.70 (8.673)	16.72 (9.963)	t = 0.009	0.993
Externalizing	23.39 (8.728)	25.39 (8.965)	t = 0.773	0.443
YSR	(n = 32)	(n = 20)		
Internalizing	16.25 (9.109)	14.65 (7.110)	t = -0.668	0.507
Externalizing	21.53 (8.478)	25.65 (7.686)	t = 1.765	0.084
Teen-ASI (continuous)	(n = 33)	(n = 21)		
Drugs	3.03 (0.770)	2.95 (1.117)	t = -0.304	0.763
Family	2.82 (1.044)	3.24 (0.700)	t = 1.622	0.111
School	2.91 (0.914)	2.95 (0.973)	t = 0.165	0.869
Social	1.82 (1.131)	2.52 (0.750)	t = 2.524	0.015
Legal	0.58 (0.969)	1.52 (1.632)	t = 2.683	0.010
Psychiatric	2.85 (1.121)	2.81 (0.928)	t = -0.133	0.895
Stage of change (continuous)	2.12 (0.857) (n = 33)	1.86 (0.793) (n = 21)	t = -1.136	0.261
Pre-contemplative	8 (24.24%)	8 (34.78%)	$\chi^2 = 2.268$	0.519
Contemplative	15 (45.45%)	8 (39.13%)		
Prep. Action	8 (24.24%)	5 (26.08%)		
Action	2 (6.06%)	-		

[‡] Other disorders, including adaptive disorders, learning disorders, and autism spectrum characteristics, with clinically relevant consequences in personal, family, social, or academic dimensions.

*Significant $p \leq 0.05$.

**Significant $p \leq 0.01$.

Model two

In model two, the second step obtained the best fit, significantly predicting global outcome ($\chi^2 = 20.723$; $df=3$, $p < .000$, Nagelkerke $R^2 = 0.45$) and correctly classifying 80.4% of cases with a sensitivity of 81.3%. The Hosmer and Lemeshow test returned a non-significant result ($p = .681$), implying adequate model fit. Patients who received the integrated treatment (OR = 26.811; $p = .002$; 95% CI = 3.329 – 215.944) or the parallel-to-integrated treatment

(OR = 26.361; $p = .011$; 95% CI = 2.141 – 324.635) had a higher likelihood of achieving a positive global treatment outcome. A lower Teen-ASI legal score (OR = 0.426; $p = .002$; 95% CI = 0.250 – 0.727) also increased the probability of achieving a positive global treatment outcome. The variables Teen-ASI social and comorbid diagnostics were excluded from the model.

Discussion

Concerning our first hypothesis, adolescents with dual disorders referred to a specialist addiction unit in a mental health center seem to benefit significantly more from an integrated than from a parallel treatment approach. Only two outcome measures—treatment adherence and the global outcome measure (accounting for improvements in drug use, family, school, social, legal, psychiatric according to Teen-ASI scores)—showed significant differences. The favorable treatment outcomes of patients reassigned from the parallel intervention to the integrated intervention during the study (parallel-to-integrated group) provided additional confirmation of the superiority of the integrated approach.

The univariable comparative analyses support the results of other studies favoring integrated interventions in adolescents with dual disorders (Esposito-Smythers et al., 2011; Hides et al., 2010; Latimer et al., 2003). Nevertheless, other authors have obtained mixed or confounding results when comparing parallel and integrated approaches (Adams et al., 2016; Rohde et al., 2014), possibly due to methodological differences in sample composition or outcome measures. For example, some studies have selected only patients with depression as a comorbid disorder with SUD (Hides et al., 2010), while other studies have considered substance use abstinence as the main outcome measure. However, it is well known that adolescents with dual diagnoses have difficulty achieving total abstinence, with risk reduction objectives acceptable early in their treatment (Kaminer et al., 2018). Another reason for the discordance between studies may be that adolescents with dual disorders constitute a very heterogeneous group with unstable post-treatment evolution (Santisteban et al., 2015).

Concerning the second hypothesis about predictors of treatment outcome, considering the whole sample in the univariate comparative analysis and independently of the treatment group, different variables showed predictive ability. First, comorbid internalizing and mixed disorders were significantly associated with positive outcomes, whereas externalizing disorders predicted a negative global outcome. These results partially agree with some studies (Hersh et al., 2013; Mason et al., 2008) regarding internalizing disorders, and certainly agree with other studies (Tamm et al., 2013; Winters et al., 2008) for externalizing disorders. Following Santisteban et al. (2015), the interpretation of these results could be related to the theory that patients with internalizing disorders have more insight than those with externalizing disorders about their problems, and they are more motivated to resolve them. Additionally, self-perception of emotional distress associated to internalizing symptoms could act as motivator to enhance the willingness to change. A third possible explanation is that people with emotional suffering could develop better therapeutic alliance, an important factor

to treatment adherence and success in psychotherapy (Santisteban et al., 2015).

Other possible explanation for the association of internalizing (and mixed) symptoms with positive results in both treatments (parallel and integrate) is that our treatments include family interventions (favoring communication and mutual understanding), and there is evidence that family-based treatment may be particularly useful for adolescents suffering emotional distress (i.e., depression, bipolar, borderline disorders) because they are more open to receive help from therapists and their family (Silvers et al., 2019; Wang et al., 2016). These results point to the need to screen SUD patients for internalizing and externalizing symptoms using short screening instruments, as proposed by Hesse et al. (2023), to identify those adolescents at high risk for dropout or negative treatment outcomes. Those patients with externalizing or disruptive disorders could need a modification of the components of the treatment (i.e., more parental psychoeducation to understand externalizing problems and their management, ethical thinking, anger management, empathy, or social skills training).

The Teen-ASI social and legal scores also showed some predictive value for the overall treatment outcome (positive results in adolescents with fewer social and legal problems). These findings partially align with those of other authors who found more legal problems in those achieving a negative outcome (Grella et al., 2001; Tamm et al., 2013). It is also important to note the quasi-significant effect for SES, in line with results obtained in other studies (Hersh et al., 2013), reflecting the advantages of a high SES for some patients, likely due to the greater opportunities to receive additional educational and therapeutic support.

Lastly, and contrary to our expectations, the stage of change did not predict a positive outcome 12 months after starting treatment. Several factors may have contributed to the discrepancy between our results and prior research documenting that patients who are more committed to abstinence have better treatment outcomes (Kaminer et al., 2018). First, in adolescents, contingencies and parental directions could help bring them to a period of abstinence, even if they lack the intrinsic motivation for change. Second, the stage of change and outcomes regarding substance use and related problems in adolescents often fluctuate, reflecting an underlying instability (Dahlberg et al., 2022). Third, we may have used an inappropriate method to measure or analyze this variable; for instance, not assessing commitment to abstinence, but rather their willingness to reduce or control use.

Clinical implications

The study results support the need to make integrated programs available for at least some adolescent patients with complex/severe dual disorders or those at high risk

(i.e., externalizing disorders, patients with difficulties engaging in treatment), consistent with the conclusions of several authors (Garner et al., 2008; Kaminer et al., 2017; Libby & Riggs, 2005; Wolff et al., 2020). For patients with lower risk (i.e., internalizing disorders, collaborative families, older adolescents or committed to abstinence), it may be appropriate to treat SUD and comorbid mental health conditions in parallel. Indeed, four patients in our study obtained a positive global outcome with a parallel treatment approach, although the small sample prevented statistical analysis of possible associated characteristics. Additionally, we found significant pre-post changes in several specific outcome measures among the 14 subjects treated in the parallel condition.

An adaptive strategy may be the most appropriate way to implement integrated and/or parallel treatments for adolescents with dual disorders, flexibly adapting interventions to the specific characteristics, needs, and changing situations of patients during treatment (Black & Chung, 2014; Grant et al., 2017; Kaminer et al., 2017; Kavanagh & Connolly, 2009; Marchand et al., 2019; Waldron & Turner, 2008). Mental health centers could adopt this strategy for adolescents by employing gradual or stepped programs (Kavanagh & Connolly, 2009), patient-treatment matching (Cornelius et al., 2017; Edalati & Conrod, 2019; Goti et al., 2009; Magallón-Neri et al., 2012), or modular treatments. This could pave the way to using a transdiagnostic approaches (Kim & Hodgins, 2018).

Limitations and strengths

The study results should be interpreted with caution due to several limitations. For example, the small sample size may have reduced the power needed to obtain significant results, the lack of a non-intervention control group (i.e., a waiting list) was not ideal, and the cohort studied prevents generalization to patients with dual diagnoses in inpatient or residential settings or who are affected by significant psychotic symptoms or cognitive deficits. Despite these limitations, the study has two main strengths. First, it has a high external validity in reflecting the difficulties of applied research in clinical practice in a naturalistic way, while simultaneously trying to maintain scientific rigor using an “as treated analysis” in a randomized design. Second, by offering the integrated treatment to poor responders in the parallel treatment group, we could test the adaptive treatment methodology proposed by other authors (Kaminer et al., 2017; Morisano et al., 2014; Santisteban et al., 2015).

Implications for future research

Firstly, this study could help with future analyses of the key research features for the treatment of adolescents with dual diagnoses. For example, we confirmed the usefulness

of treatment adherence and a specific global outcome measure for identifying positive treatment outcomes. The ability to retain adolescents in treatment is key to treatment success in a group that is traditionally challenging to engage. Therapists must be highly accessible, make the time to call patients (“gentle chase”), coordinate with other professionals, and give extra attention to the family. These aspects are more strongly adhered to in integrated treatments, as is the case in our practice. Secondly, this study also has potential value in capturing pre-post treatment differences as a global outcome measure that considers improvements in different domains of adolescent life (e.g., our use of the Teen-ASI scales). Adolescents with SUD often have different treatment goals and outcomes compared to adults, experiencing less certainty about the need for absolute abstinence, and preferring reduced use instead. They also show frequent fluctuations along treatment in substance use, psychiatric symptoms, school performance or social adaptation. Lastly, although a more in-depth analysis of treatment outcome predictors is necessary, our findings on the effect of comorbid disorders, age, and social relationships could also inform the designs of not only screening and assessment instruments aiming to improve patient allocation to the most appropriate level of treatment but also more effective adaptive treatment strategies.

Conclusions

Adolescent patients with dual disorders gained benefit from both the parallel and the integrated treatment programs. However, they gained the greatest benefit from the integrated approach, which led to better adherence and a positive global treatment outcome. Features associated with the positive treatment outcome, independent of the treatment modality, included the presence of an internalizing comorbid disorder, older age, and having few legal problems.

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Conflict of interests

The authors report no conflict of interest.

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AUTHOR GUIDELINES

Adicciones is published by **Socidrogalcohol** (*Sociedad Científica Española de Estudios sobre el Alcohol, el Alcoholismo y otras Toxicomanías*; Spanish Society for Studies on Alcohol, Alcoholism and other Drug Addictions).

Adicciones publishes original articles on treatment, prevention, policy, basic studies and descriptive studies in the field of addictions, including those to illegal drugs, alcohol and tobacco and any other addiction, and originating from various disciplines (medicine, psychology, basic research, social research, etc.). All articles are selected after undergoing an anonymous review process by experts on each topic.

Adicciones publishes four issues per year in March, June, September and December. The journal has the following sections: Editorial, original articles, brief reports, review articles and letters to the Editor.

1. GENERAL DESCRIPTION

Languages

The journal accepts articles in Spanish and in English. The final edition of the articles will be published in both languages.

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The journal's policy is that all articles and editorials expressly state whether or not there are conflicts of interest in the corresponding section. All conflicts of interest are important, but particular care should be taken in cases of having received funding for the study from the pharmaceuticals, drinks or tobacco industries, or comparable sources. The existence of a conflict of interests does not mean the article cannot be published. In cases of doubt over this issue, please contact the Editorial Board.

In this regard *Adicciones* follows the recommendations and the Ethical Guidelines of the ISAJE (*International Society of Addiction Journals Editors*): <https://www.isaje.net/ethical-guidelines.html>

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The articles must be original. It is very important to consider as authors only those who have made substantial contributions: 1) to the conception and design, data collection, or analysis and interpretation of data; 2) to the writing of the article or its critical review; and who have given their approval to the version submitted for publication.

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Any further doubts about these aspects can be clarified by consulting the *Farmington Consensus*, to which *Adicciones* subscribes: <https://www.isaje.net/farmington-consensus.html> or the publication rules of the American Psychological Association, 7th edition (2020).

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Types of articles

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These will preferably be works on clinical or experimental research in the field of drug dependence or addictions. Empirical manuscripts with large samples and solid methodologies will be especially valued.

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This section refers to research work which due to its special characteristics (small numbers of observations, clinical cases, research with highly specific aims and results, descriptive epidemiological studies, first results of a wide-ranging study, etc.) can be published in brief form. Where possible, these articles will have the same types of sections as full articles; they should be a maximum of 12 pages (double-spaced) in length.

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References

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