

Examining dimensions of religiosity as protective factors against substance consumption in teenagers

Análisis de las dimensiones de la religiosidad como factores protectores contra el consumo de sustancias en adolescentes

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Abstract

(1) Background: Adolescence is a fundamental phase in the development of individuals, during which they are especially sensitive to substance use, both in terms of initiation and the consequences that habitual use can lead to. This explains why the study of the variables that influence substance use by teenagers is a key topic in the public health literature. In this regard, religiosity has been widely reported to be a protective factor against substance use. (2) Methods: In a sample from Tarragona (Spain) (N=1,935 adolescents), we tested whether religion is a protective factor against the use of the most common substances: alcohol, tobacco, and cannabis. We differentiate three dimensions of religiosity in the scale used in the studies of Planet Youth: faith, cult attendance, and religious environment. (3) Results: The religiosity scale of Planet Youth, which can be split into three subscales (faith, cult attendance and religious environment), was validated with exploratory factor and confirmatory factor analyses. We have also checked that religion is indeed a protective factor against substance abuse since the odds

ratio for at least one dimension linked to religiosity was often less than one for all examined consumption behaviours. However, the degree of statistical significance depended on the substance assessed. Protection is clearer for cannabis than it is for alcohol and tobacco. Similarly, cult attendance had a significant protective effect. On the other hand, the religious environment appears to be less of a protective factor, while simply being a believer seems to have no preventive effect at all. (4) Conclusions: Religion has a significant ability to prevent substance use. However, the power of that inhibitory capability depends on substance and use behaviour and on the religiosity dimension.

Keywords

Substance use by adolescents, family environment, faith, cult attendance, religious environment.

Resumen

(1) Antecedentes: La adolescencia es una fase fundamental en el desarrollo de los individuos, durante la cual son especialmente sensibles al uso de sustancias, tanto en términos de iniciación como de las consecuencias que el uso habitual puede conllevar. Esto explica por qué el estudio de las variables que influyen en el consumo de sustancias por parte de los adolescentes es un tema relevante en la literatura de salud pública. En este sentido, la literatura ha reportado ampliamente que la religiosidad es un factor protector contra el uso de sustancias. (2) Métodos: En una muestra de Tarragona (España) (N=1,935 adolescentes), evaluamos si la religión es un factor protector contra el uso de las sustancias más comunes: alcohol, tabaco y cannabis. Diferenciamos tres dimensiones de la religiosidad en la escala utilizada en los estudios de Planet Youth: fe, asistencia a cultos y entorno religioso. (3) Resultados: La escala de religiosidad de Planet Youth, que puede dividirse en tres subescalas (fe, asistencia a cultos y entorno religioso), fue validada con análisis factoriales exploratorios y confirmatorios. También hemos comprobado que la religión es efectivamente un factor protector contra el abuso de sustancias, ya que la razón de probabilidades para al menos una dimensión vinculada a la religiosidad fue a menudo menor que uno para todos los comportamientos de consumo examinados. Sin embargo, el grado de significancia estadística dependió de la sustancia evaluada. La protección es más clara para el cannabis que para el alcohol y el tabaco. Del mismo modo, la asistencia a cultos tuvo un efecto protector significativo. Por otro lado, el entorno religioso parece ser un factor protector menor, mientras que simplemente ser creyente no parece tener ningún efecto preventivo. (4) Conclusiones: La religión tiene una capacidad significativa para prevenir el consumo de sustancias. Sin embargo, el poder de esa capacidad inhibitoria depende de la sustancia y el comportamiento de uso y de la dimensión de la religiosidad.

Palabras clave

Consumo de sustancias por adolescentes, entorno familiar, fe, asistencia a cultos, entorno religioso.

1. Introduction

There are a multitude of variables that influence substance use by adolescents, and they interact in many ways. These differences may be genetic, related to personality (i.e., individual variables), or due to differences in social circumstances, social responses, or cultural background, which embeds systems to which the adolescent

belongs at the micro, meso, and macro levels (Trucco, 2020). Adolescence is a particularly sensitive period for the initiation of substance use, as this period involves engaging in risky behaviors and making impulsive choices, often exposing adolescents to psychoactive substances (Whyte *et al.*, 2018). The potential harm that substance use can cause to adolescent development ranges from health and developmental issues, including physical problems (Wellman *et al.*, 2023), to behavioural and personality problems such as bullying or sexual harassment (Francis *et al.*, 2019; Prignitz *et al.*, 2023). While not all substances have the same undesirable effects to the same degree, it must also be noted that the use of one substance is often clearly correlated with the consumption of another (Sutherland & Shepherd, 2001; Raposo *et al.*, 2017). In this context, the three most common substances among adolescents around the world are alcohol, tobacco, and cannabis (WHO, 2024), and this statement applies to Spain (Spanish Observatory of Drugs and Addictions, 2022).

The relevance of the microsystem of adolescents, which includes parents, school, peers, and social settings where they engage in sports, cultural and religious activities, is particularly significant in explaining substance use habits (Trucco, 2020). This can be justified by the social development model (Catalano *et al.*, 1996), which integrates social learning theory and social control theory. This model posits that youth create social links with social agents in the following contexts: family, school, community and religious institutions, and peers, which are sustained by rewards that reinforce the performance of actions perceived as prosocial and punishments for avoiding antisocial actions (Catalano *et al.*, 1996). Therefore, adolescents who anticipate rewards for prosocial actions are more likely to participate in prosocial activities (Trucco, 2020). Among the social agents identified, this paper focuses on the religious aspect.

The relationship between religion and adolescence has been analysed as an important component of adolescents' psychosocial development (Smith, 2003). In fact, in many communities, religion is a significant dimension of the lives of its members, and therefore, the influence of religious practices and beliefs (i.e., organic religion) in relevant areas of contemporary society is a subject of study in the social sciences (Johnson, 2008). That influence may encompass three domains: moral order, learned competencies, and social and organisational ties. Moreover, links between religious beliefs and cognitive functioning have been established in young people (King & Roeser, 2009). In fact, it is commonly accepted that religious faith and practices can generate normative and resource-based social capital, which often positively impacts healthy practices (Satariano, 2020; Shapiro, 2022). Certainly, there are exceptions to this last statement, as theological beliefs can also harm health, such as religious explanations for some illnesses, attributing them to sin or divine will (Shapiro, 2022).

Religious communities foster social networks that promote behaviours such as ethical guidelines, role models, peer and adult care, and safe recreational activities (Smith, 2003). Therefore, religious practices influence the actions and attitudes of adolescents (King & Roeser, 2009), facilitating the transmission of ethical references and generally promoting healthier lifestyles (Bartkowski & Xu, 2007) and resistance to risky behaviours (Quinn *et al.*, 2023). This suggests that religion may discourage the adoption of risky behaviours and promote healthy ones (Smith, 2003; King & Roeser, 2009). Even in the case of adolescents with substance dependency and behavioural problems, religious engagement and behaviours encouraged by religion, such as service to others, decrease the likelihood of repeating criminal actions that could result in prison sentences (Lee *et al.*, 2014; Lee *et al.*, 2017; Johnson *et al.*, 2018). Additionally, the relationship between religious organizations and community participation prepares young people for the obstacles they might face and provides a refuge from daily

stressors and adversity (Quinn *et al.*, 2023). It is also widely confirmed that the protective effect of religiosity on substance use is found across a wide variety of creeds and cultures (Andrés-Sánchez *et al.*, 2023).

The above reflections suggest that belonging to a religious community may reduce both the likelihood of substance acquisition and the opportunities to learn how to use it (Hill *et al.*, 2009). Nasim *et al.* (2006) reported that practicing religion since childhood has a deterrent effect on adolescent behaviours, intervening in their drug use by aiding in the internalization of messages that discourage consumption and resistance to social pressures that encourage socially inappropriate behaviours related to substance use. This inhibitory effect not only manifests during adolescence but can also extend into young adulthood (Jang & Johnson, 2011; Wu *et al.*, 2022). There is wide experience that religiosity reduces the likelihood of tobacco use, excessive alcohol consumption, prescription drug misuse, marijuana use, and the consumption of other illicit drugs.

The above considerations explain why the influence of religiosity on substance use among adolescents is a recurring topic in the literature. For instance, a search in the Web of Knowledge for the keywords “substance use” AND “adolescence” AND “religion” on June 25, 2024, yielded 969 documents. Similarly, the same search on the same date in Scopus resulted in 867 documents. Among these studies, we outline the following:

1. Studies reporting the protective role of religion exclusively against alcohol, as outlined in the meta-study by Russell *et al.* (2020). Some examples of this are Bjarnasson *et al.* (2005), Menagi *et al.* (2008), Dohn *et al.* (2014), Porche *et al.* (2015), Kathol and Sgoutas-Emch (2017), and Charro-Baena *et al.* (2019). In the case of tobacco and vaping, see Andrés-Sánchez *et al.* (2021) and Hassan *et al.* (2022).
2. For studies showing the preventive role of religiosity against the use of illegal drugs, see Bartkowski and Xu (2007), Longest and Vaisey (2008), Barbosa *et al.* (2015), Hernández-Serrano *et al.* (2016), and Gallucci *et al.* (2018).
3. Studies have shown that religion inhibits the use of more than one substance: Sutherland & Shepperd (2001), Hwang and Akers (2003), Nasim *et al.* (2006), Wallace *et al.* (2007), Hill *et al.* (2009), Kristjánsson (2010), Ford and Hill (2012), Kim-Spoon *et al.* (2014), Acheampong *et al.* (2016), Parenteau (2017), Raposo *et al.* (2017), Francis *et al.* (2019), Buchtova *et al.* (2020), Malinakova *et al.* (2019), Hodge *et al.* (2021), Livne *et al.* (2021), Kádár *et al.* (2023), and Saunders *et al.* (2023).

Important theoretical gaps and contradictory findings about whether religiosity has a deterrent effect on substance use have also been highlighted (Bartkowski & Xu, 2007). Thus, although such studies are not mainstream, many have reported a weak or null impact of religion on substance use. We can outline Nasim *et al.* (2006) and Nguyen *et al.* (2023) for alcohol and tobacco, Jeines (2006) for cocaine, and Parsai *et al.* (2010) for tobacco, alcohol, and illegal drugs. Likewise, the ability of religion to act as an inhibitor may depend on gender (Piko & Fitzpatrick, 2004; Parenteau, 2017; Hodge *et al.* 2021) and ethnic differences (Rote & Starks, 2010; Andrés-Sánchez *et al.*, 2023).

However, religiosity is a multidimensional construct that encompasses intellectual, ideological, ritualistic, experiential, and consequential factors (Huber & Huber, 2012). Therefore, it is organized into personal beliefs, practices, and ritual behaviors (Kádár *et al.*, 2023) that can be situated in an intimate sphere (feelings and behaviors related to a God) and an institutional sphere, that is, attitudes towards and participation in religious

organizations and/or traditions (Good & Willoughby, 2014). Of course, participation in religious activities can be limited to attending worship activities that we can label “mandatory” or, on the contrary, participating and engaging in other activities organized by the church (Buchtova *et al.*, 2020). Thus, attachment can be studied from three dimensions: faith, cult attendance, and the religious environment. In all three dimensions, cultural and collective religious identities play an important role (Ashmore *et al.*, 2004; Templeton & Eccles, 2008).

The impact of religion on teenagers’ substance consumption is a multiple-factor phenomenon, as outlined in the seminal paper by Lorch and Hughes (1985). In that study, it was demonstrated that not every dimension of religion may have an equal protective effect. Paradoxically, most studies related to substance use, such as alcohol consumption among adolescents, typically treat religiosity as a univariate construct despite observing that the multidimensionality of religion is necessary to obtain a deeper understanding of its inhibitory capacity (Russell *et al.*, 2020). Thus, several authors, including Lorch and Hughes (1985), have reported that being an active churchgoer is more relevant than spirituality (Bartkowski & Xu, 2007; Ameri *et al.*, 2017; Gallucci *et al.*, 2018; Bradley *et al.*, 2020; Lin *et al.*, 2020). In fact, in some works, such as Kathol & Sgoutas-Emch (2017) and Buchtova *et al.* (2020), religious attendance must be accompanied by active participation in the activities of the religious community for the effect of religiosity to be especially protective against substance use. Likewise, other reports emphasize the importance of consistent attendance at worship for its protective capacity to have a longer-lasting effect throughout life (Hodge *et al.*, 2021; Wu *et al.*, 2022).

In contrast, authors such as Hassan *et al.* (2022) observe that the inhibitory power of religion is greater when individuals perceive that the precepts of their religion are against the consumption of a particular substance rather than merely participating in church activities. Similarly, while several studies have outlined greater protective effects of faith and spirituality than of other dimensions (Grim & Grim, 2019; Livne *et al.*, 2021; Kádár *et al.*, 2023), Malinakova *et al.* (2019) reported a greater protective effect against certain forms of alcohol consumption by spirituality rather than by cult attendance. It should also be noted that the results regarding faith are contradictory, as authors such as Adamczyk and Palmer (2008), Lorencova (2011), Yetarian *et al.* (2017), and McClure and Wilkinson (2018) found that some forms of spirituality may not be inhibitors but rather facilitators of cannabis consumption.

In a nutshell, from the paragraphs above, we can conclude that mainstream literature reports religion as a potential factor in inhibiting substance use in adolescence and that it is a multivariate construct. These findings motivate the present work, which addresses the protective capacity of religiosity by differentiating the dimensions of faith, cult attendance, and the religiosity of the environment in relation to the use of the three most common substances among adolescents. Consequently, we propose two research objectives (Ros):

RO1: Given that we understand religion as a multidimensional construct, an intermediate objective will be to validate the 12-item scale of religious attachment commonly used in Planet Youth studies (Planet Youth, 2018) and the sub-scales embedded in that scale with data from Spanish adolescents in a specific geographical location, Tarragona.

RO2: Since religion involves various dimensions, the primary objective will be to measure the relevance of these dimensions in explaining the use of alcohol,

tobacco, and cannabis, as well as two forms of alcohol misuse—drunkenness and binge drinking.

2. Materials and methods

2.1. Data collection and sample profile

This cross-sectional and correlational study is based on the Planet Youth questionnaire (Planet Youth, 2018), which was administered to secondary school students in Tarragona (Spain). The survey was administered between February and March 2021. The survey targeted a population of $N=2,407$, and the number of responses received, regardless of whether the questionnaire was fully completed, was 1,935. The sample error was 1.8% for a confidence level of 95%, and $p=q=0.50$.

The demographic characteristics are shown in Table 1. The adolescents who completed the study ranged in age from 15 to 18 years. The average age was 16.67 years, with a standard deviation of 0.47 years. Of these adolescents, 45.12% responded that they were male, and 52.37% responded that they were female.

The survey questions used in this paper can be found in Table 1. Table 2 provides a detailed description of the sample and the number of times (in percentages) each answer was used for all questions. This table also shows the percentage of times the adolescents failed to provide an answer or preferred not to.

With the help of social workers of the Tarragona city council, we asked school head teachers for their permission and help with the survey. The questionnaire, which included the questions in Table 1, was completed online in approximately 15-20 minutes. The complete survey was initially supervised by social workers of Tarragona and three teachers to ensure that it was understandable to adolescents.

After receiving permission from the adolescents and their legal guardians, teachers from the school checked that the adolescents understood the questions. Anonymity was fully ensured, as it is impossible for us to know which adolescent provided which response and his/her identity. Informed consent was requested in an email sent to the adolescents' parents or legal guardians asking that anyone who did not allow their child to take part should contact the school office to have them excluded from the study. The adolescents were strongly advised that they were free to participate in the study and, if they chose to participate, to answer only the questions they deemed appropriate.

Table 1. Description of demographic characteristics and survey items analysed

Participant demographic characteristics	
Place: Tarragona (Spain)	
Universe: 2,407 adolescents	
Adolescents interviewed: 1,935	
Age: Rank 16-18 years, mean 16.67 and SD 0.47 years	
Gender: boys 45.12% and girls 52.37%	
Date of the survey: February to March 2021	
Output questions	Scale
<i>Tobacco use</i> =How often have you smoked cigarettes, on average, in the last 30 days?	1=Never 2=One or two times
<i>Alcohol use</i> = How often have you had a drink of alcohol of any kind in the last 30 days?	3=From three and five times
<i>Drunkenness</i> =How often have you got drunk in your lifetime?	4=From six and nine times
<i>Binge drinking</i> =How often, if ever, have you had 4 (four) or more alcoholic drinks (e.g. beer, wine, spirits, shots) within a period of one hour or less?	5=From ten to nineteen times

<i>Cannabis</i> =How often (if ever) have you used any of the following drugs? Cannabis (hashish or marijuana).	6=From twenty to thirty-nine times 7=Forty times or more
Input questions	Scale:
<i>Gender</i>	0=Boy, 1=Girl
<i>Were both of your natural parents born abroad?</i>	0=No; 1=Yes
<i>Educational status</i> ES1= What is your mother's level of education? ES2= What is your father's level of education?	0= Basic, 1= Secondary, 3= Graduate or beyond
<i>Family configuration:</i> I live with (please, choose the answer that fits you best)	<ol style="list-style-type: none"> 1. Mother and father 2. Only mother 3. Only father 4. Mother and her partner 5. Father and his partner 6. Grandparents and mother or father 7. Only grandparents 8. I live with my friends 9. I live on my own 10. I have different arrangements
<i>Parental support:</i> How easy or difficult would it be for you to receive the following from your parents/legal guardians? Parental support 1= Care and warmth. Parental support 2= Discussions about personal affairs. Parental support 3= Advice about studies. Parental support 4= Advice about other issues (projects) of yours. Parental support 5= Assistance with other things.	1=Very difficult, 2=Rather difficult, 3=Rather easy, 4=Very easy
<i>Religiosity:</i> How well does the following statement apply to you? Religion 1=I believe in God. Religion 2= My faith is important to me. Religion 3= I pray to God on a regular basis. Religion 4= I regularly read the scriptures of my faith. Religion 5= I regularly attend religious services. Religion 6= I regularly take part in religious activities other than services. Religion 7= I would be able to get support from God if I needed it. Religion 8= I have sought support from God when I have needed it. Religion 9= My best friends are religious. Religion 10= Most of my acquaintances are religious.	Applies to me: 1=Very poorly 2=Rather poorly 3=Rather well 4=Very well

Religion 11= My mother (foster/stepmother) is religious.

Religion 12= My father (foster/stepfather) is religious.

Note: A priori, in religiosity items {religion 1, religion 2, religion 3, religion 7, religion 8} stand for faith, {religion 4, religion 5, religion 6} stand for cult attendance and {religion 9, religion 10, religion 11, religion 12} for the religiousness of the adolescents' environment.

2.2. Measurement instruments

The variables, questions and scales used in this paper are shown in Table 1. They embed the output and input variables.

2.2.1. Output variables

Five output variables were assessed and obtained directly from the questions displayed in Table 1. For tobacco and cannabis use, we evaluated only one outcome variable, whereas for alcohol use, we examined three consumption modalities. Therefore, the evaluated outcomes are as follows:

- TOBACCO=Value for the question about tobacco use in Table 1.
- ALCOHOL=Value for the question about alcohol use in Table 1.
- DRUNK=Value for the question about drunkenness use in Table 1.
- BINGE_D=Value for the question about binge drinking use in Table 1. This study considered binge drinking as the consumption of four or more alcoholic drinks within a period of one hour or less.
- CANNABIS=Value for cannabis consumption in Table 1.

In all cases, we inquired about consumption in the last 30 days and used a 7-point Likert scale in accordance with Bartkowski & Xu (2007). The questions and the quantities associated with each point of the scale are displayed in Table 1. These responses included {1="Never"; 2="One or two times"; 3="From three and five times"; 4="From six and nine times"; 5="From ten to nineteen times"; 6="From twenty to thirty-nine times"; and 7="Forty times or more"}. So, the five output variables are ordinal with seven categories. Table 2 displays the frequency about each option responded obtained in the sample.

2.2.2. Input variables

Explanatory factors were divided into control variables and those associated with religious behaviour. The main aim of this paper was to assess how adolescent religiosity influences substance consumption and alcohol misuse. Of the various scales related to religiosity, this study uses the scale commonly employed in Planet Youth studies (Planet Youth, 2018), which encompasses the twelve questions shown in the Table 1. This scale has been used, for example, in Kristjansson (2010), to study the determining factors of alcohol and tobacco consumption by young people in Iceland. These questions are related to adolescents' beliefs (FAITH), their cult attendance (CULT_ATT), and the religiosity of the environment in which the adolescent lives (ENVIRONMENT). The religiosity items are displayed in Table 1. The exact items of this latest variable are displayed in Table 1. Table 2 displays that the mainstream (between 60%-70%, depending on the item) tend to report a very poor or rather poor engagement to the religion.

The dimensions of religiosity are controlled by several classical variables:

a) The first control variable we considered was gender. This is common in assessments of substance use and misuse, e.g., Bartkowski & Xu (2007), Hwang & Akers (2003), Pagano *et al.* (2015), Johnson *et al.* (2018) and Francis *et al.* (2019). This control variable is symbolized by GENDER and is 0 for boys and 1 for girls.

b) The second control variable we considered was whether the parents of the adolescents were migrants. This variable is used to consider adolescents' ethnicity (Regnerus & Elder, 2003; Bartkowski & Xu, 2007; Francis *et al.*, 2019) and acculturation (Parsai *et al.*, 2010; Lee *et al.*, 2014; Johnson *et al.*, 2018). This variable is named COUNTRY and is 0 if both parents were born abroad and 1 otherwise.

c) The third control variable was parents' educational level, which is often considered a relevant variable in substance consumption (Bartkowski & Xu, 2007; Raposo, 2017; Lee *et al.*, 2014; Johnson *et al.*, 2018; Francis *et al.*, 2019). This third control variable is named EDUC_ST, which is calculated from the educational levels of both parents by normalizing the sum of the responses for ES1 and ES2 in this construct, i.e., $EDUC_ST = (ES1 + ES2 - 2) / 4$.

d) Our final set of control variables involves adolescents' family environment, which has been found to be a key variable in numerous studies (Sutherland & Sheplerd, 2001; Hwang & Akers, 2003; Bartkowski & Xu, 2007; Larrosa & Rodríguez-Arias, 2010; Rasic *et al.*, 2011; Badr, Taha & Dee, 2014; Dohn *et al.*, 2014; Lee *et al.*, 2014; Johnson *et al.*, 2018; Francis *et al.*, 2019). In this regard, we differentiate family configuration and parental support

d.1) A simple way to measure family configuration is to introduce a dichotomous variable to differentiate between adolescents who live with two parents and those who have other arrangements (e.g., Francis *et al.* 2019; Kisely & Langille, 2011). However, this did not enable us to perceive the substantial difference between living with one parent and living with no parents. We therefore chose to use two dichotomous variables, one of which included teens that lived with one parent (ONLY_ONE_P), while the other included those who did not live with any parent (NO_PAR).

d.2) Our final set of control variables relates to perceived parental support, which is measured with the scale designed by Hwang and Akers (2003) and also used in Planet Youth (2018). This variable is named PAR_SUP. It can be observed that the mainstream responses (more than 70%) reports that it is easy or very easy obtaining support from parents.

2.2.3. Missing values

The following steps were used to address missing data:

1. With the exception of items related to religiosity and parental control, any missing values of independent variables were replaced with stochastic modal value substitutions, provided that the number of missing values did not exceed two.

2. For religiosity (12 items) and parental control (5 items), we removed observations with more than 25% missing items—i.e., one missing item for

parental control (PAR_SUP) and three for the religiosity scale. Otherwise, we replaced the missing values with stochastic median substitutions of the values of the available items.

3. To conduct the correlation analyses and logistic regression estimations linking the five methods of substance use examined in this paper with explanatory variables, we excluded observations where the output item value was missing.

In this regard, although there are more sophisticated alternatives for data substitution, the method we used is very common in studies such as ours, such as Bjarnason *et al.* (2005), due to its simplicity and because of its good properties. Replacing missing data with a central value allows us to obtain consistent sets of results. Additionally, since this substitution is performed randomly, it helps to avoid, at least partially, the potential problem of artificially reducing the variability of the items.

Table 2. The number of times each response was used for every question in the survey (in percentages)

OUTPUT VARIABLES								
	Never	1-2 times	3-5 times	6-9 times	10-19 times	20-39 times	>=40 times	Other/NA
Tobacco use	73.75%	5.37%	3.00%	5.79%	2.53%	1.19%	0.98%	7.39%
Alcohol use	48.84%	23.00%	10.03%	5.43%	2.48%	0.52%	0.47%	9.25%
Drunkenness	72.97%	12.87%	2.95%	0.93%	0.47%	0.10%	0.21%	9.51%
Binge drinking	60.57%	16.33%	8.17%	3.20%	2.17%	0.88%	0.52%	8.17%
Cannabis	64.96%	7.39%	4.08%	2.79%	2.95%	2.07%	5.74%	10.03%

INPUT VARIABLES					
Gender	Girl	Boy	Other/NA		
	51.37%	45.12%	3.51%		
Year of birth	2003	2004	2005	Other/NA	
	12.30%	42.7%	44.81%	0.36%	
Family's country of origin	Spain	Abroad	Other/NA		
	70.59%	18.04%	11.37%		
Academic level (mother)	Primary	Secondary	Graduate	Other/NA	
	15.04%	34.32%	26.67%	23.98%	
Academic level (father)	Primary	Secondary	Graduate	Other/NA	
	15.19%	32.97%	22.95%	28.89%	
I live with...	Both parents	One parent	Other status	NA	
	75.09%	20.21%	2.95%	1.76%	
Parental support	Very difficult	Rather difficult	Rather easy	Very easy	Other/NA
Parental support 1	2.43%	8.22%	25.99%	60.52%	2.84%
Parental support 2	12.61%	26.72%	31.68%	26.25%	2.74%
Parental support 3	6.61%	12.14%	30.08%	48.17%	3.00%

Parental support 4	6.15%	16.23%	31.27%	43.41%	2.95%
Parental support 5	5.53%	11.83%	31.37%	48.22%	3.05%

Religiosity	Very poor	Rather poor	Rather well	Very well	Other/NA
Religion 1	49.66%	15.14%	11.99%	14.88%	8.32%
Religion 2	43.46%	16.80%	13.33%	17.62%	8.79%
Religion 3	63.26%	13.07%	6.61%	7.75%	9.30%
Religion 4	72.20%	8.73%	5.53%	4.65%	8.89%
Religion 5	70.03%	10.08%	5.17%	5.94%	8.79%
Religion 6	70.18%	10.75%	4.65%	5.32%	9.10%
Religion 7	57.93%	12.51%	10.65%	9.72%	9.20%
Religion 8	52.61%	14.42%	12.09%	11.78%	9.10%
Religion 9	49.10%	24.81%	11.06%	5.53%	9.51%
Religion 10	40.98%	25.27%	17.26%	7.08%	9.41%
Religion 11	43.36%	14.01%	13.90%	19.07%	9.66%
Religion 12	49.61%	12.92%	12.66%	14.83%	9.97%

2.3. Data analysis

We used the following sequential statistical process, which was developed mainly with SPSS 28.0.1.0.

Stage 1. Analysis of descriptive statistics:

We took special care with the items of parental support and religiosity. The analysis of skewness and kurtosis will determine whether the behaviour of these items deviates excessively from a normal distribution, which could compromise the reliability of subsequent statistical analyses.

Stage 2. Assessment of the measurement model:

Reliability and validity analyses of the scales linked to religiosity and parental support were performed. To detect the three dimensions theoretically encompassed by the religiosity scale and the single dimension contained in the parental support scale, we conducted an exploratory factor analysis (EFA). This was implemented first with principal component analysis (PCA) and varimax rotation and controlling outliers with Mahalanobis distance. After performing EFA, a confirmatory factor analysis (CFA) with SmartPLS 4.0 was implemented to establish the validity of the three-dimensional religiosity measurement model.

The use of CFA will reinforce the validity of splitting the religiosity scale into the three hypothesized dimensions in the introduction and subsection 2.2. (FAITH, CULT_ATT and ENVIRONMENT). The fit measures evaluated were the standardized root mean squared residual (SRMR), comparative fit index (CFI), Tucker–Lewis index (TLI), and normed fit index (NFI).

We also checked the scale reliability, including that of parental control. It involves evaluating internal consistency with Cronbach’s alpha and convergent validity with the average variance extracted (AVE). Notably, internal consistency (Cronbach’s alpha>0.7) does not automatically imply convergent reliability (AVE>0.5).

Stage 3. Testing the ability of variables to prevent substance use:

A bivariate exploratory analysis of the relationships between variables was conducted using Spearman correlations. Note that we explore links between variables that are mostly ordinal or binary rather than Gaussian and whose relationships are

probably not linear. In such cases, the Spearman correlation coefficient is better suited than the Pearson correlation coefficient (Schober *et al.*, 2018).

To determine the statistical significance of the explanatory factors on an outcome variable ordered logistic regression (OLR) was estimated. As Table 1 and Table 2 display, variables measuring substance use can take seven ordinal categories.

To make the analyses of this stage, the variables related to religion (FAITH, CULT_ATT, and ENVIRONMENT) and parental support (PAR_SUP) were quantified through the standardized factor loadings obtained with the PCA in step 1, whose mean was 0 and standard deviation was 1.

3. Results

3.1. Descriptive statistics, measurement test of scales and factor analysis

Table 3 presents the descriptive statistics for age, parental support items, and religious dimensions. Generally, the skewness and kurtosis measures do not show an unacceptable deviation from a normal distribution, as they fall within the range of [-2, 2] (George & Mallery, 2010). However, in three instances (questions religion 4, religion 5 and religion 6 of the religiosity scale), this condition is slightly violated. Nevertheless, in these cases, both skewness and kurtosis are far from extreme values and can be within ± 5 (George & Mallery, 2010).

Table 4 displays the results of the EFA for the questions on religion. The Kaiser–Meyer–Olkin coefficient was 0.909, and the Bartlett test indicated that dimensional reduction with PCA was suitable. However, we observed three factors with an eigenvalue greater than 1, i.e., we detected three different dimensions in the questions on religion. By considering these three components, we could explain more than 76% of the variance in the responses. All the questions were loaded above 0.6 by extracting those three factors.

Table 4 also shows the rotated component matrix for religion by the varimax method. The first component is associated with {religion 1, religion 2, religion 3, religion 7, religion 8}. These questions correspond to the individual and intimate dimension of religion that can be identified with spirituality, which we have named FAITH. The second set of questions {religion 4, religion 5, religion 6} is associated with the ritual sphere of religion, i.e., attending services. With the standardized values of this factor, we constructed the variable CULT_ATT. The third factor is associated with religiosity within the adolescent's environment (e.g., whether they are educated in the values and rules of a religion). It comprises a set of questions {religion 9, religion 10, religion 11, religion 12}. These items are contained within the third variable linked to religion, which we named ENVIRONMENT. Subsequent CFA showed an SRMR of 0.06, which is < 0.1 ; an NFI of 0.92; a TLI of 0.901; and a CFI of 0.922 (i.e., greater than 0.9). Therefore, the measurement model of religiosity, which is structured in one scale and three subscales, is reliable.

The EFA for parental support showed that the first component was sufficient to represent this set of items since we only observed an eigenvalue greater than 1, and the first factor explained more than 60% of the variance. Moreover, the Kaiser–Meyer–Olkin coefficient was 0.839, the Bartlett sphericity test rejected the identity of the correlation matrix, and all responses were loaded above 0.6. Using the standardized scores of the first factor, we constructed the variable PAR_SUP.

Table 5 shows that the scale consistency for the PAR_SUP and the religious dimensions were adequate: their Cronbach's alpha values were > 0.7 , and the AVE > 0.5 for those four latent variables.

Table 3. Descriptive statistics of age, parental support and religion items

Item	Mean	SD	Skewness	Kurtosis
AGE	16.673	0.466	0.165	0.479
Parental support 1	3.509	0.732	-1.415	1.365
Parental support 2	2.743	0.992	-0.246	-1.010
Parental support 3	3.243	0.910	-1.028	0.124
Parental support 4	3.158	0.909	-0.788	-0.348
Parental support 5	3.278	0.865	-1.054	0.323
Religion 1	1.902	1.135	0.826	-0.863
Religion 2	2.034	1.173	0.628	-1.166
Religion 3	1.527	0.942	1.668	1.467
Religion 4	1.346	0.790	2.324	2.347
Religion 5	1.393	0.841	2.141	2.423
Religion 6	1.374	0.814	2.232	2.925
Religion 7	1.678	1.031	1.232	0.062
Religion 8	1.802	1.085	0.990	-0.511
Religion 9	1.691	0.899	1.144	0.339
Religion 10	1.891	0.965	0.729	-0.603
Religion 11	2.092	1.212	0.532	-1.341
Religion 12	1.916	1.159	0.797	-0.961

Note: A priori, in religiosity items {religion 1, religion 2, religion 3, religion 7, religion 8} stand for faith, {religion 4, religion 5, religion 6} stand for cult attendance and {religion 9, religion 10, religion 11, religion 12} for the religiosity of the adolescents' environment.

Table 4 Rotated component matrix for questions on parental support and religiosity (eigenvalues greater than one)

Parental support		Religiosity			
Question	Factor1 (PAR_SUP)	Question	Factor1 (FAITH)	Factor2 (CULT_ATT)	Factor3 (ENVIRON-MENT)
Parental support 1	0.731	Religion 1	0.827	0.261	0.271
Parental support 2	0.756	Religion 2	0.775	0.181	0.124
Parental support 3	0.777	Religion 3	0.664	0.558	0.220
Parental support 4	0.834	Religion 4	0.307	0.820	0.218
Parental support 5	0.828	Religion 5	0.280	0.864	0.220
		Religion 6	0.270	0.862	0.219
		Religion 7	0.769	0.393	0.275
		Religion 8	0.764	0.323	0.302
		Religion 9	0.080	0.378	0.714
		Religion 10	0.149	0.251	0.814
		Religion 11	0.479	0.063	0.687
		Religion 12	0.467	0.108	0.680

Note: (a) Rotation method: varimax rotation with Kaiser normalization. (b) For parental support, the Kaiser–Meyer–Olkin test was 0.839, and the Bartlett sphericity test rejects the identity of the correlation matrix (Chi-square test 3060.77, $p < 0.001$). (c) For religiosity, the Kaiser–Meyer–Olkin test result was 0.909, and the Bartlett sphericity test rejects the identity of the correlation matrix (Chi-Squared 14566.57 $p < 0.001$).

Table 5. Measures of the internal consistency of the constructs

Construct	Cronbach Alpha	AVE
Parental support	0.843	0.618
Faith (religion 1-religion 3, religion 7, religion 8)	0.919	0.580
Cult attendance (religion 4-religion 6)	0.924	0.721
Environment (religion 9-religion 12)	0.843	0.536

3.2. Testing religiosity to prevent substance abuse

Table 6 shows the Spearman correlations between the variables defined above. In this bivariate exploratory analysis, we identified the following patterns:

- There was a strong correlation between the consumption of one substance and that of another.
- It seems clear that PAR_SUP is a protective factor. Its correlation with the consumption of any substance is often negative and significant at standard statistical levels.
- As we expected, living with one parent or without any parent correlated positively with substance use.
- The significant negative correlation of the variable COUNTRY with alcohol and cannabis consumption suggested that the children of migrants are less predisposed to consuming these substances than are those of Spaniards.
- The variable GENDER does not have any clear relation to “substance abuse”. It seems that girls are more exposed to tobacco, while boys are more exposed to cannabis. There was no relationship between sex and alcohol consumption habits.
- Parents’ educational status was not correlated with the use of any substance or with alcohol abuse practices.
- The religiosity dimensions are negatively correlated with the use and abuse of substances. However, these dimensions are not of equal importance. FAITH, for example, has a significant negative correlation only with ALCOHOL, whereas ENVIRONMENT has such a correlation with binge drinking and cannabis consumption. Similarly, except for binge drinking, CULT_ATT is negatively correlated with all consumption items.

Table 6. Spearman correlations between the embedded variables

	TOBACCO	ALCOHOL	DRUNK	BINGE_D
TOBACCO	1			
ALCOHOL	0.599**	1		
DRUNKED	0.629**	0.723**	1	
BINGE_D	0.414**	0.505**	0.529**	1
CANNABIS	0.689**	0.533**	0.588**	0.423**
GENDER	0.063**	-0.022	0.015	-0.032
COUNTRY	-0.036	-0.087**	-0.026	-0.072**
EDUC_ST	0.009	0.032	-0.014	0.005
ONLY_ONE_P	0.111**	0.084**	0.113**	0.113**
NO_PAR	0.066**	0.049*	0.083**	0.083**
PAR_SUP	-0.107**	-0.055*	-0.094**	-0.090**

FAITH	-0.001	-0.076**	-0.026	-0.011
CULT_ATT	-0.089**	-0.137**	-0.091**	-0.028
ENVIRONMENT	-0.043	-0.046	-0.046	-0.074**

Note: “**” and “***” indicate that Spearman’s rho is significant at 90% and 95%, respectively.

Table 7 shows the basic statistics in relation to our results after fitting five ordered logistic regressions where the output and input variables are defined in subsection 2.2. Although these five logistic regressions present a low coefficient of determination, in all cases, their χ^2 statistic, which plays the same role as the F statistic in linear regression for the significance of the overall model, rejects that all coefficients are null (in all cases $p < 0.0001$). Despite their low predictive power, logistic regression models have statistical significance. The odds ratios show similar patterns to those of the correlation matrix.

The most important factor for explaining adolescents’ substance use is their family configuration. The variable ONLY_ONE_P has an OR that fluctuates between 1.464 and 1.705 and is significantly different from 1 for all OLRs. Similarly, in general, the ORs of NO_PAR are greater than those of ONLY_ONE_P and are always significantly different from 0. Our results are therefore in line with the mainstream results in the literature. We also found that not living with both parents seems to be a facilitator of substance use. In all cases, PAR_SUP had an OR that was consistently below 1, and except for ALCOHOL, we obtained $p < 0.01$. GENDER may play an explanatory role in the case of tobacco since being a girl appears to be more conducive to being a tobacco consumer (OR=1.29, $p < 0.05$). On the other hand, being a boy was more conducive to being a cannabis user (OR=0.591, $p < 0.0001$). Similarly, having migrant parents may help to prevent both binge drinking (OR=0.657, $p < 0.05$) and cannabis consumption (OR=0.711, $p < 0.05$). In any case, all estimates of ORs are < 1 . Educational status has no influence on substance use.

Being a churchgoer had a protective effect on tobacco use (OR=0.866, $p < 0.05$), alcohol consumption (OR=0.792, $p < 0.01$), drunkenness (OR=0.871, $p < 0.05$) and cannabis smoking (OR=0.801, $p < 0.01$). However, we also found that CULT_ATT has an OR slightly greater than 1 in relation to BINGE_D, although this difference is not significant at standard statistical levels. We also found that having a religious environment may be protective against cannabis consumption (OR=0.796, $p < 0.01$). Finally, the FAITH dimension of religion seems not to have any significant relationship with substance use at significant levels under 5%.

Table 7. Ordered logistic estimates of ordered logistic regressions

Outcome: TOBACCO					
Variable	β	$SD(\beta)$	z	p value	OR
GENDER	0.255	0.106	2.408	0.016	1.29
COUNTRY	-0.204	0.146	-1.397	0.1624	0.816
EDUC_ST	0.172	0.234	0.735	0.4623	1.187
ONLY_ONE_P	0.429	0.133	3.218	0.0013	1.536
NO_PAR	1.105	0.304	3.638	0.0003	3.021
PAR_SUP	-0.182	0.055	-3.314	0.0009	0.834
FAITH	-0.021	0.056	-0.367	0.7134	0.979
CULT_ATT	-0.144	0.058	-2.457	0.014	0.866
ENVIRONMENT	-0.032	0.055	-0.578	0.5632	0.969

Results of the adjustment: $R^2=0.0131$, $\chi^2=198.94$ ($p < 0.0001$)

Outcome: ALCOHOL					
Variable	β	$SD(\beta)$	z	p value	OR
GENDER	0.04	0.095	0.422	0.6734	1.041
COUNTRY	-0.201	0.129	-1.553	0.1203	0.818
EDUC_ST	0.39	0.207	1.882	0.0598	1.477
ONLY_ONE_P	0.381	0.125	3.044	0.0023	1.464
NO_PAR	0.948	0.297	3.191	0.0014	2.581
PAR_SUP	-0.066	0.051	-1.295	0.1952	0.936
FAITH	-0.093	0.051	-1.837	0.0662	0.911
CULT_ATT	-0.233	0.052	-4.447	<0.0001	0.792
ENVIRONMENT	-0.042	0.049	-0.849	0.396	0.959

Results of the adjustment: $R^2=0.0093$, $\chi^2=311.56$ ($p<0.0001$)

Outcome: DRUNK					
Variable	β	$SD(\beta)$	z	p value	OR
GENDER	0.169	0.105	1.614	0.1065	1.184
COUNTRY	-0.05	0.142	-0.354	0.7232	0.951
EDUC_ST	0.11	0.231	0.475	0.6349	1.116
ONLY_ONE_P	0.483	0.131	3.689	0.0002	1.621
NO_PAR	1.05	0.294	3.571	0.0004	2.859
PAR_SUP	-0.14	0.054	-2.605	0.0092	0.869
FAITH	-0.006	0.055	-0.102	0.9187	0.994
CULT_ATT	-0.138	0.058	-2.37	0.0178	0.871
ENVIRONMENT	-0.041	0.054	-0.753	0.4515	0.96

Results of the adjustment: $R^2=0.0110$; $\chi^2=278.09$ ($p<0.0001$)

Outcome: BINGE_D					
Variable	β	$SD(\beta)$	z	p value	OR
GENDER	-0.078	0.129	-0.6	0.5483	0.925
COUNTRY	-0.42	0.186	-2.264	0.0236	0.657
EDUC_ST	0.307	0.288	1.068	0.2856	1.36
ONLY_ONE_P	0.52	0.155	3.355	0.0008	1.682
NO_PAR	0.861	0.318	2.705	0.0068	2.365
PAR_SUP	-0.184	0.065	-2.843	0.0045	0.832
FAITH	0.014	0.069	0.2	0.8415	1.014
CULT_ATT	0.017	0.069	0.241	0.8096	1.017
ENVIRONMENT	-0.106	0.068	-1.551	0.121	0.9

Results of the adjustment: $R^2= 0.0156$, $\chi^2=256.61$ ($p<0.0001$)

Outcome: CANNABIS					
Variable	β	$SD(\beta)$	z	p value	OR
GENDER	-0.526	0.123	-4.276	<0.0001	0.591
COUNTRY	-0.341	0.171	-1.998	0.0457	0.711
EDUC_ST	0.206	0.268	0.768	0.4424	1.229
ONLY_ONE_P	0.534	0.147	3.628	0.0003	1.705
NO_PAR	1.044	0.307	3.405	0.0007	2.84
PAR_SUP	-0.187	0.062	-3.027	0.0025	0.83
FAITH	0.006	0.065	0.09	0.9286	1.006
CULT_ATT	-0.222	0.076	-2.932	0.0034	0.801
ENVIRONMENT	-0.228	0.065	-3.495	0.0005	0.796

Results of the adjustment: $R^2=0.0286$, $\chi^2=252.31$ ($p<0.0001$)

Note: β is the fitted coefficient; $SD(\beta)$ is the standard deviation; z is the Wald statistic; OR is the odds ratio; OR (95% CI) is the 95% coefficient of the OR; and R^2 is McFadden's pseudo determination coefficient. responded obtained in the sample.

4. Discussion

The main aim of this study was to explore the relationship between religiosity and substance use in adolescents in Tarragona (Spain). This study considered the three main substances consumed by adolescents, alcohol, tobacco and cannabis, and two abuses linked to alcohol use, binge drinking and drunkenness. Our results are consistent with those of other studies that have reported the protective effect of religiosity against substance use among adolescents (Barbosa *et al.*, 2015; Acheampong *et al.*, 2016; Kathol, & Sgoutas-Emch, 2017; Parenteau, 2017; Raposo *et al.*, 2017; Charro-Baena *et al.*, 2019; Francis *et al.*, 2019; Malinakova *et al.*, 2019; Buchtova *et al.*, 2020; Andrés-Sánchez *et al.*, 2021; Hodge *et al.*, 2021; Livne *et al.*, 2021; Hassan *et al.*, 2022; Kádár *et al.*, 2023; Saunders *et al.*, 2023).

According to Russell *et al.* (2020), obtaining profound conclusions regarding the impact of religiosity on issues such as substance use requires differentiating between the various dimensions that religion encompasses. In this study, we differentiated one related to the individual realm (faith) and two related to the collective realm (rituality or cult attendance and environment) by validating the 12-item scale related to religiosity from Planet Youth (2018).

We have observed that the primary inhibitor of alcohol consumption is cult attendance, which is in accordance with seminal studies by Lorch and Hughes (1985) and subsequent findings (Bartkowski & Xu, 2007; Ameri *et al.*, 2017; Gallucci *et al.*, 2018; Bradley *et al.*, 2020; Lin *et al.*, 2020). However, its impact is highly dependent on the type of substance. We found that it is greater in the case of cannabis. This finding is consistent with Malinakova *et al.* (2019), who reported that the protective capacity of cult attendance depends on the type of substance evaluated and does not seem to have statistical relevance in alcohol misuse practices. We also observed that belonging to a religious environment has a protective effect, especially for cannabis use.

In contrast, the spiritual or faith-related aspects did not have a statistically significant impact on any of the measures of substance consumption evaluated. Thus, our findings contradict previous reports highlighting that spirituality may have a protective effect against substance use (Grim & Grim, 2019; Livne *et al.*, 2021; Kádár *et al.*, 2023; Malinakova *et al.*, 2019). In fact, even odds ratios slightly above one of faith for cannabis consumption do not contradict the positive relationship between spirituality and cannabis consumption reported in some studies (Lorencova, 2011; Yetarian *et al.*, 2017; McClure & Wilkinson, 2018).

From our results, we cannot confirm a difference in substance consumption rates between religious boys and girls. Patterns are very similar, i.e., regardless of gender, those who consume the least are also those who practise religiosity the most, as is also shown in the studies by Parenteau (2017) and Charro-Baena *et al.* (2019). However, some studies have suggested that religiosity is more beneficial to women than to men in relation to the simultaneous consumption of different drugs (Acheampong *et al.*, 2016).

With regard to cultural differences, our finding that young people from foreign families consume less alcohol in binge drinking mode contradicts some of the literature on the role of ethnicity and acculturation in substance consumption (Parsai *et al.*, 2010). This discrepancy may be because the principal migrant population in Spain comes from Morocco (Spanish Institute of Statistics, 2022), which is predominantly Muslim. Several studies have shown that Islam provides greater protection against substance use,

especially alcohol use. These findings have been reported in Spain (Charro-Baena *et al.*, 2019; Andrés-Sánchez *et al.*, 2021) and in other countries (Kim-Spoon *et al.*, 2014; Badr *et al.*, 2014; Chagas *et al.*, 2023).

We have observed that familiar structure is relevant for explaining substance use in such a way that living with two parents is clearly a protective factor. This finding is in accordance with the mainstream findings in the literature (Sutherland & Sheplerd, 2001; Hwang & Akers, 2003; Bartkowski & Xu, 2007; Larrosa & Rodríguez-Arias, 2010; Rasic *et al.* 2011; Badr *et al.* 2014; Dohn *et al.*, 2014; Francis *et al.*, 2019). Likewise, we have also checked that it is convenient to differentiate between living with only one parent and living without any parent. This familiar arrangement significantly increases the risk of substance consumption.

It is also remarkable that the correlational analysis showed that the consumption of one substance is strongly correlated with the consumption of another, which is in connection with mainstream findings on this question outlined in the introduction.

Religiosity is a dimension that rarely appears in the literature on risk or protective factors against substance use and misuse, and it is often overlooked in prevention programs. The results outlined in this paper reinforce mainstream findings about the usefulness of religion as a protective factor. We therefore agree with Porche *et al.* (2015) that activities linked with the practice of religion should be taken into account by health and educational policymakers when designing prevention interventions in schools. In this regard, Grim and Grim (2019) emphasize the contribution of religion to improving public health not only from the more abstract perspective of the social construction model but also from the added value provided by religious activities in reducing the use and abuse of substances. In their work, they estimate that religious activities provide up to \$316.6 billion in savings to the USA economy every year at no cost to taxpayers regarding the treatment and prevention of addictions and misuse of substances. Thus, they conclude that the decline in religious affiliation is not only a concern for religious communities but also a public health problem.

5. Conclusions

The main aim of this paper was to determine the protective power of religiosity against smoking tobacco, consuming cannabis and drinking alcohol. The survey questions about religiosity identified three dimensions of religiosity, i.e., faith, cult attendance and the religious environment.

Regression analysis suggests that religiosity is associated with lower substance use. We should point out that of the three dimensions of religiosity, cult attendance, which involves the practice of religion, appears to be the strongest protective factor. Again, this is in line with the literature. However, this relationship should be further investigated in additional studies conducted in various contexts. Our results agree with the existence of similar behaviour patterns between boys and girls in relation to the negative association between high levels of religiosity and consumption.

We found that family variables are key factors for explaining substance use by teenagers. This is a common finding in the literature. For example, not feeling the support of one's family and the absence of parents in a teenager's daily life explain substance misuse (this result is statistically significant). We have also shown that differences must be made between living with both parents and not doing so and between living with one parent and living with no parents (e.g., uncles). Of course, living in a "traditional" family structure, i.e., with two parents, is a protective factor. However, we also found that adolescents who live with one parent are less exposed to substances than are those whose family configuration contains no parents.

Parents' educational status was not significant for explaining substance use, while gender was significant for explaining tobacco and cannabis use but not alcohol use. The slight differences in alcohol consumption between adolescents born in Spain and those of foreign origin may be explained by the overrepresentation of Muslim adolescents in the latter group.

6. Study limitations

Although likelihood ratios show that ordered logistic regression models are significant, we are aware that the coefficient of determination (R^2) for all regressions suggests poor prediction capability. However, a low R^2 does not invalidate the regression analysis if, as in our case, there are significant coefficients (Colton & Bower, 2002). Like the mainstream literature on the topic, the interest of our paper lies more in testing the significance of the assessed variables than in building a model with great predictive power.

Likewise, pseudo R^2 in logistic regressions tends to be much lower than R^2 in ordinary least squares, so a pseudo R^2 between 20% and 40% is equivalent to an R^2 of a linear regression between 70% and 90% (Ugba & Gertheiss, 2023). This explains why a multitude of papers report ORs and their significance, or their 95% confidence intervals, but not the determination coefficient of the regressions (Kristjansson, 2010; Ford & Hill, 2012; Kathol & Sgoutas-Emch, 2017; Raposo *et al.*, 2017; Francis *et al.*, 2019). Authors who do show R^2 , such as McArdle *et al.* (2002), Bartkowski and Xu (2007), Parsai *et al.* (2010), and Parenteau (2017), report a similar determination coefficient.

It is important to note that in studies based on self-reported variables, in some cases, the answers may be biased by the perception of what is socially desirable. Therefore, some adolescents may have underreported their substance consumption because of this perception. Even, in some instances, there may have been overreporting if the perception is that using substance is “cool”. This bias may have occurred with the religious variables.

The results presented in this paper are from a cross-sectional survey conducted in 2021, a year when certain restrictions affected the daily lives of adolescents due to the COVID-19 pandemic. Therefore, although our conclusions about religion as a protective factor against substance abuse align with findings from other countries, further research will require longitudinal data to assess the directionality of these influences.

Regarding the generalizability of the results to the current context in Tarragona, it is important to note that Tarragona is a city of approximately 150,000 inhabitants whose main economic activities are industry and services. There is a significant proportion of the migrant population from South America and North Africa. This demographic has not changed in recent years, so we believe that the results obtained from the survey can be extrapolated to the same region at the present time.

Likewise, the results could be representative of similar social environments in Spain, such as cities within the area of influence of Barcelona or Madrid. On the other hand, we believe that the results cannot be generalized to adolescents in rural Spanish regions whose main economic activities are in the primary sector or tourism and who have a low proportion of immigrant citizens.

7. Financing

The study underlying this work is the National Plan R&D+I 2019 of the Ministry of Science and Innovation. The title of the study is “Prevención del consumo de drogas

y del juego en adolescentes: la paradoja de la información. El caso de Tarragona” (Prevention of drug consumption and gambling in adolescents: the information paradox. The Tarragon case) Code: PID2019-104310RB-C21.

8. Ethical declaration

1) participants and their legal guardians were informed about the study and procedures; 2) the anonymity of the data collected was guaranteed; 3) the study was conducted with the support of the City Hall of Tarragona through its Addiction Prevention Committee, and the Department of Education of the regional government of Catalonia; 4) participation in the questionnaire was voluntary for the adolescents after obtaining the permit from the school administration and their legal guardians.

The study has been carried out in accordance with the provisions of the Declaration of Helsinki and was approved by the Research Ethics Committee of the Universitat Rovira i Virgili (CEIPSA-2021-PDR-39).

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