



# INFLUENCE OF ATTITUDES AND ALCOHOL CONSUMPTION ON TOBACCO USE AMONG UNIVERSITY STUDENTS IN ECUADOR: AN EXPLANATORY MODEL WITH SEM

## *INFLUENCIA DE LAS ACTITUDES AL CONSUMO DE ALCOHOL EN EL CONSUMO DE ALCOHOL Y TABACO EN UNIVERSITARIOS DEL ECUADOR: UN MODELO EXPLICATIVO CON SEM*

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## Abstract

Objective: Establish an explanatory model through latent variables analysis of tobacco consumption based on alcohol consumption and alcohol consumption based on attitudes towards consumption in a sample of university students in Ecuador. Method: Descriptive correlational and explanatory design using SEM (Structural Equation Modeling) techniques. Participants: 546 students (69.2% women) aged between 17 and 41 years old (M= 21.3 years old; SD= 2.6), from four universities (45.1% public ones) in two cities of Ecuador. Results: The predominance of alcohol consumption is high; the prevalence of tobacco consumption is low, and attitudes towards alcohol consumption are ambivalent. Alcohol attitudes predict alcohol consumption ( $R^2 = .57$ ) and alcohol consumption predicts tobacco consumption ( $R^2 = .26$ ). Attitudes and consumption provide an explanatory model for tobacco consumption with  $\chi^2 = 662.59$ ;  $p < .001$ ;  $df = 480$ ;  $\chi^2/df = 1.4$ ; CFI= .95; TLI= .94; SRMR= .049; RMSEA= .026 [.021 - .031]. Conclusions: The study of attitudes and consumption behaviors are important for a better understanding about alcohol and tobacco consumption in university students.

## Resumen

Objetivo: Establecer un modelo explicativo a través del análisis de variables latentes del consumo de tabaco basado en el consumo de alcohol y el consumo de alcohol basado en las actitudes hacia el consumo en una muestra de estudiantes universitarios de Ecuador. Método: Diseño descriptivo correlacional y explicativo mediante técnicas SEM (Structural Equation Modeling). Participantes: 546 estudiantes (69,2% mujeres) con edades entre 17 y 41 años (M= 21,3 años; DE= 2,6), de cuatro universidades (45,1% públicas) en dos ciudades del Ecuador. Resultados: El predominio del consumo de alcohol es alto; la prevalencia del consumo de tabaco es baja y las actitudes hacia el consumo de alcohol son ambivalentes. Las actitudes hacia el alcohol predicen el consumo de alcohol ( $R^2 = .57$ ) y el consumo de alcohol predice el consumo de tabaco ( $R^2 = .26$ ). Las actitudes y el consumo brindan un modelo explicativo para el consumo de tabaco con  $\chi^2 = 662.59$ ;  $p < 0,001$ ;  $gl = 480$ ;  $\chi^2/df = 1,4$ ; CFI= .95; TLI= .94; SRMR= .049; RMSEA= .026 [.021 - .031]. Conclusiones: El estudio de las actitudes y comportamientos de consumo son importantes para una mejor comprensión sobre el consumo de alcohol y tabaco en estudiantes universitarios.

## Key words

Attitude, alcohol, consumption, tobacco, relation

## Palabras clave

Actitud, alcohol, consumo, tabaco, relación

## Introduction

Alcohol and tobacco are the most widely consumed psychoactive substances in society. (World Health Organization [WHO], 2014). According to research, the prevalence of substance use is increasing every year worldwide (WHO, 2020) as well as in the local area (Panamerican Health Organization [PHO], 2018). The consequences of physical and mental health of drug consumption cause effects on the health and social services in several countries (WHO, 2020). For example, there is evidence of psychological problems of anxiety linked to a higher level of consumption than other groups which have not been marked by psychopathology (Lechner et al., 2020).

In Ecuador, teenagers and young adults drink alcohol and use tobacco and the incidence is reported as low, although alcohol consumption is more predominant than tobacco consumption (Mayorga-Lascano et al., 2019; Moreta-Herrera et al., 2020; Moreta-Herrera et al., 2021a). Therefore, it is important to deepen the analysis and study about the topic, especially on the aspects that determine the practice of consumption of the mentioned substances.

## Attitudes towards alcohol use and consumption

The study of alcohol consumption is relevant to research on substance use since it is considered the first drug to be used (which usually begins in adolescence and strengthens in young adulthood) and of greater frequency than other drugs, it is considered to be the most widely used drug (Gea et al., 2014; Moreta-Herrera et al., 2020; PHO, 2018; Tsiligianni et al., 2012). Alcohol consumption is widespread among university students (Gajecki et al., 2014; Mayorga-Lascano et al., 2019). The risky consumption is shown by around 84% and 20% (Gómez et al., 2017; Roosen & Mills, 2015). Additionally, the reasons to justify the use of alcohol are: a) stimulant to improve concentration or attention; b) relaxation; and c) academic stress management (Mache et al., 2012). Other reasons are: to cope with problems such as social phobia, poor academic performance, parental pressure, etc. (Mekonen et al., 2017). There is diversity among the predictors that lead and support its use. One of the predictors of interest to psychology is related to the mental constructs that shape favorable attitudes toward consumption. These belong to the set of subjective evaluations of an object or behavior, and place it positively or negatively, which subsequently will affect the performance of a behavior (Ajzen & Cote, 2008; Ajzen, 2015). From this point of view, the behavior is preceded by a mental frame of reference (which usually operates explicitly or implicitly) that gives clues about how to act. Consequently, regular or pathological behaviors are preceded by different attitudes that strengthen or not the intentionality and directionality of the behavior.

On this topic of interest, there are positive or negative attitudes associated with substance use (Dempsey et al., 2016), included in the alcohol consumption (García del Castillo et al., 2012; DiBello et al., 2018). This framework of evaluations or mode of action in relation to the situation of consumption (own or third parties), the object (alcohol) or the behavior helps to guide the consumption behavior and to place oneself in the path of understanding the situation and how to act in the future (Ajzen & Cote, 2008), which will have an impact not only on consumption, but also on its probable adaptation through conditioning (Moreta-Herrera et al., 2021a). Several reports show a positive relationship between attitudes in favor of alcohol consumption and drinking behaviors, both in adolescents and in young adults (Guzmán Facundo et al., 2014; Mayorga-Lascano et al., 2019; Wells et al., 2018) as well as in young university students (DiBello et al., 2018; Moreta-Herrera et al., 2021a; Telumbre-Terrero et al., 2017), for this reason, its study is relevant to the current issue.

## Alcohol and tobacco consumption

Alcohol consumption is not the only substance used frequently by university students, but also tobacco consumption (often in combination) or other drugs such as marijuana and cocaine (Gómez et al., 2017; Halperin et al., 2010; Nelson et al., 2015). Tobacco is the second most widely consumed substance (including among the university population) (Castro-Sánchez et al., 2017) in the world. The prevalence of tobacco use tends to be moderate and high, although it is less than alcohol. To illustrate, the rate of consumption last year alone was between 12% and 17% (Bautista-Pérez, 2014). In the case of excessive consumption (smoking), it is also associated with other pathologies such as alcoholism and depression and with other problems such as sedentary lifestyles, relationship problems and others (Halperin et al., 2010).

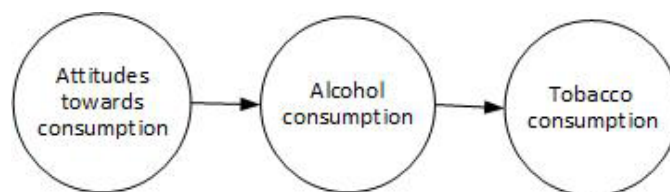
Given that alcohol has a high-risk potential (WHO, 2018) especially in vulnerable groups such as young university students, it contributes to the use of other substances. Consequently, it is considered that it is the connection for the development of polyconsumption (Gómez et al., 2017; Moreta-Herrera et al., 2018; WHO, 2020). In this regard,

there is considerable evidence of the relationship between drinking and smoking behaviors (Gómez et al., 2017; Moreta-Herrera et al., 2018; Tsiglianni et al., 2012; Wetzels et al., 2003). This is, apparently, because the use of both substances begins in early stages of individuals. However, university population consume alcohol first and then tobacco (Bautista-Pérez, 2014). Thus, the dynamics of these practices have an impact on the potential for future damage that is reflected on health and in the regular social development.

## The predictability of alcohol and tobacco use

Given to the statistical relationship between drinking attitudes and alcohol consumption, it can also be evidenced that the first is a factor in the practice of the second, so it would be considered as a relevant indicator (Cooke et al., 2016; Moreta-Herrera et al., 2021a). The same situation happens in the connection between alcohol and tobacco consumption. (Halperin et al., 2010; Powers et al., 2013). The displayed results suggest a possible connection between the two explanatory processes, which are usually studied separately. Without considering that a psychic attitude (attitudes towards consumption) is a trigger for a type of behavior (alcohol consumption) and this behavior influences in the development of a new one (tobacco consumption) as shown in Figure 1.

**Figure 1.** Theoretical model of explanation on alcohol and tobacco consumption



Source: Own elaboration

To support this possible connection of two similar processes, it would be necessary the development of a comprehensive explanatory model (which to date does not exist), by focusing on the practice of consumption and the development of poly-consumption of substances from a continuum of interactions between attitudes and behaviors that have not been measured in the research about substance consumption or the Ecuadorian university context.

The development of a structural explanatory model can help to evaluate the dynamics of consumption and mainly understand the role of the attitude process, given that the change in attitude has an impact on intentionality and the development of behavior (Patrick & Schulenberg, 2014). In addition, the research relevance given to the implicit or explicit cognitive processes associated with consumption is low, so it is necessary to deepen this line of research (Moreta-Herrera & Reyes-Valenzuela, 2022). With this, the implications for the development of improved explanatory models of the phenomenon of consumption and combined consumption are augmented, as well as the elements for the improvement of intervention and treatment processes.

## Objective and hypothesis

The aims of the study are a) To know about the relationship between attitudes towards alcohol and tobacco consumption, as well as the relationship between alcohol consumption and tobacco consumption in a sample of university students in Ecuador; b) To establish a structural explanatory method about tobacco consumption by using the method SEM based on alcohol consumption and attitudes towards it. Additionally, it is hypothesized that consumption attitudes are related to alcohol consumption, as alcohol consumption is related to tobacco consumption; and that there is an appropriate adaptation of the structural explanatory model of tobacco from alcohol consumption and attitudes to consumption.

## Method

### Design

The present study is framed as a descriptive, structural explanatory and cross-sectional design (Ato et al., 2013) of tobacco consumption through alcohol consumption, and this through attitudes towards consumption by applying SEM techniques in a sample of university students in Ecuador (see graphic 1).

## Participants

A total of 546 participants took part in the study. 69,2% were women and 30.8% were men; besides, the ages ranged from 17 to 41 years old ( $M= 21.3$  years old;  $SD= 2.6$ ). 95,4% were mestizos, while the remaining 4.6% of the participants were indigenous, afro-Ecuadorians and white people; 80.2% live in urban areas and 9.8% in rural areas; 34.4% live in vulnerable socioeconomic conditions.

The sample includes university students from four educational centers (45.1% public and 54.9% private) from two cities of Ecuador, who study from first to tenth level of undergraduate courses of medicine and psychology careers; 20.9% say that they study and work at the same time and 3% report academic vulnerability due to poor performance.

Participants were selected by non-probabilistic convenience sampling with inclusion criteria. The criteria include a) Voluntary participation; b) Adult; c) Written consent to participate in the study; d) Being a student at one of the study centers under analysis.

## Instruments

Scale of Attitudes Towards Alcohol (SATA, López-Sánchez et al., 2000). Spanish version of SATA by García del Castillo et al. (2012). It was designed to assess attitudes towards alcohol consumption. It has 13 items that are measured on a five-choice Likert scale: Totally agree (5) to totally disagree (1); with three sub-scale: a) Predisposition for Alcohol Consumption (PAC); b) Enjoyment of Alcohol (IAA); c) Predisposition to Consume Alcohol (PAA). Regarding the psychometric properties, in the Latin American population, values of  $\alpha= .84$  were found, which is equivalent to appropriate (Telumbre-Terrero et al., 2017); while for the current study, it corresponds to a  $\omega= .77$ ;  $IC95\% [.73 - .81]$  which is equivalent to acceptable.

Alcohol Use Disorders Identification Test (AUDIT, WHO, 1992; Saunders et al., 1993) Spanish version by Babor et al. (2001), it has factorial validation in the Ecuadorian context. (Moreta-Herrera et al., 2021). It evaluates alcohol consumption behavior and its consequences in primary prevention. It includes 10 items that are evaluated on a five-choice Likert scale (except for questions 9 and 10, which have three options) and create three factors (risky consumption, dependence symptoms and harmful consumption). The total of the items ranges from 0 to 40 points, where scores above 7 are indicators of risky consumption. Regarding psychometric properties, the AUDIT shows reliability in the Ecuadorian sample.  $\alpha= .84$  (Mayorga-Lascano et al., 2019) equals to appropriate; while in the current study, it presents a value of  $\omega= .85$ ;  $IC95\% [.83- .88]$  with similar results.

Questionnaire for the classification of tobacco users (C4) aiming young people. (Londoño et al., 2011). It has been designed to determine the type of tobacco use in the young population and the diagnosis. It includes 15 items that range from 0 to 50 points globally. The results from 6 to 17 points show moderate consumption, from 18 to 29 points show high consumption with signs of dependence, and from 30 to 50 points show nicotine dependence. Regarding the psychometric properties, the internal consistency among the items report values of  $\alpha= .90$  equals to very high in the original version, while in the test sample it is  $\omega= .93$ ;  $IC95\% [.92 - .94]$ , corresponding to very high reliability, as well.

## Procedure

Approval from the educational center under analysis was obtained, some groups of students were contacted to inform them of the research project in progress, its objectives, and the activities to be carried out by participants. Then, they were invited to be part of the study as volunteers. Those who accepted, read and signed a letter of consent to participate. The evaluation was carried out as a group in the classrooms by those in charge of the project. Participants took about 30 minutes to fill out the surveys and tests. (It is important to highlight that a pilot test was previously carried out with 50 participants). Once the evaluation was completed, the data was processed; only those with complete information were accepted (15 cases were discarded), therefore, the final sample size was 546 cases. Then, the results were processed and the statistical analysis of the results, the contrast of hypotheses and the formulation of the conclusions for the issuance of the different research reports were completed. Finally, the research followed the respective standards and protocols of ethical care for human research as stated in the Helsinki Convention.

## Data Analysis

The statistical management of the data was applied in three phases. The first phase is the descriptive analysis of the three assessment instruments, including: arithmetic mean ( $M$ ), weighted mean ( $M_w$ ), standard deviation ( $SD$ ), skewness ( $g_1$ ) and kurtosis ( $g_2$ ). Also, the prevalence of participants with risk values (according to cut-off points). The second phase is the factorial validity analysis of the tests. This process includes the verification of multi-variate normality through the Mardia test, which is fulfilled in the absence of significance ( $p > .05$ ) (1970). As subsequent, it corresponds to robust Diagonally Weighted Least Squares (DWLS) CFA estimation given the absence of multivariate normality and the ordinal nature of the response items (Cain et al., 2017; Holtmann et al., 2016; Li, 2016). Evidence of validity is identified in terms of indicators as: a) absolute such as Chi-Square ( $\chi^2$ ), Standardized Chi-Square ( $\chi^2/df$ ) and Standardized Root Mean Square Residual (SRMR); b) relative as the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI); and c) the non-centrality based one which is the Root Mean Square Error of Approximation (RMSEA). Validating adjustments are when  $\chi^2$  is not relevant ( $p > .05$ ) or the  $\chi^2/df$  is less than 4; the CFI and the TLI higher than .90, and the SRMR and the RMSEA less than .08 (Byrne, 2008; Wolf et al., 2013; Brown, 2015; Mueller & Hancock, 2018). This is complemented by the study of the factor loadings ( $\lambda$ ) of the items, for which values higher than  $\lambda > .40$  are expected (Dominguez-Lara, 2018).

The third phase refers to the development of the general adjustment model through the CFA with DWLS estimation. The covariances of the latent factors of the measures are analyzed in order to know the degree of relationship between them, and also the factorial setting of the general model. Finally, structural regression analysis of the general model is performed using SEM techniques with DWLS estimation in order to identify the setting of the explanatory model of tobacco (Endogenous variable 2) consumption based on alcohol consumption (Endogenous variable 1) and attitudes towards consumption (Exogenous variable). The model settings of the AFC and SEM models are analyzed in terms of the values of indicators  $\chi^2$ ,  $\chi^2/df$ , CFI, TLI, SRMR, RMSEA and  $\lambda$  to conclude on its suitability or not.

Statistical management of the results was managed using the software R in the version 4.0.0 (R Core Team, 2019) then descriptive analyses, latent correlations and SEM with: foreign, Multivariate Normality Tests (MNV) and Lavaan packages.

## Results

### Descriptive Analysis

Table 1 shows that attitudes towards alcohol consumption do not express a positive or negative tendency towards alcohol consumption (ambivalence). The analysis of this variable highlights the alcohol preference rate, which exceeds that of the other factors. The presence of behaviors that are largely favorable to consumption, and consequently risky, represents about 5% of the cases. About alcohol consumption, it is moderate. The most predominant factor is associated with risky consumption. Abstinence is 16.3% and prevalence of consumption is 83.7%. A total of 27.8% of the participants in the study presented risky consumption. Tobacco consumption is also low, with a prevalence of 31.4% and abstinence of 69.6%. 10.1% of the participants presented risky tobacco use and probable smoking.

**Table 1.** Descriptive Analysis

Factors	M	$M_w$	DE	$g_1$	$g_2$	Risk
Predisposition for consumption	12.67	2.53	3.17	0.02	0.34	-
Alcohol preference rate	15.35	3.07	4.17	-0.24	0.28	-
Predisposition for action	5.15	1.71	2.13	0.80	-0.03	-
Attitudes towards drinking	33.17	-	7.17	-0.27	0.04	5.1%
Risky drinking	2.46	0.82	2.09	1.17	1.42	-
Symptoms of dependence	1.06	0.35	1.66	2.59	9.08	-
Harmful drinking	2.24	0.56	2.99	1.78	3.03	-
AUDIT	5.76	-	5.78	1.54	2.50	27.8%
Tobacco use (C4)	4.45	-	7.86	1.60	1.37	10.1%

Note: M: arithmetic mean;  $M_w$ : weighted mean; SD: standard deviation;  $g_1$ : skewness;  $g_2$ : kurtosis. Source: Own elaboration

## Confirmatory factor analysis and general adjustment model

Regarding the multi-variate normality assumption of the tests, it is evident that it is not fulfilled in the measures of Attitudes towards Consumption. (Mardia  $g_{1(EAHA)} = 2107.9$ ;  $p < .05$  y Mardia  $g_{2(EAHA)} = 30.09$ ;  $p < .05$ ), Alcohol Consumption (Mardia  $g_{1(AUDIT)} = 4200.6$ ;  $p < .05$  y Mardia  $g_{2(AUDIT)} = 83.48$ ;  $p < .05$ ) and Tobacco Consumption (Mardia  $g_{1(C4)} = 27922.0$ ;  $p < .05$  y Mardia  $g_{2(C4)} = 2369.1$ ). Therefore, the use of robust estimates is necessary for calculations with SEM tests.

Table 2 shows the AFCs for the EAHA, AUDIT and C4 measures. In all cases, the adjustment indicators are suitable for the sample under analysis. The factor loadings ( $\lambda$ ) of the items with values equal to or higher than  $\lambda = > .40$  (Dominguez-Lara, 2018) this is expected to ensure proper model consistency and timely explanation of variance.

**Table 2.** Confirmatory Factor Analysis with DWLS estimation of the measures of attitudes towards drinking, alcohol consumption and tobacco consumption.

Items	SATA ( $\lambda$ )	AUDIT ( $\lambda$ )	C4 ( $\lambda$ )
Item 1	.80	.78	.66
Item 2	.87	.53	.60
Item 3	.81	.72	.81
Item 4	.83	.68	.87
Item 5	.62	.68	.63
Item 6	.69	.72	.90
Item 7	.43	.64	.79
Item 8	.71	.79	.77
Item 9	.68	.43	.41
Item 10	.77	.62	.66
Item 11	(-)		.46
Item 12	(-)		.45
Item 13	(-)		(-)
Item 14			(-)
Item 15			.72
$\chi^2$	82.8***	32.4***	71.9***
gl	32	32	65
$\chi^2/gl$	2.6	1.0	1.1
CFI	.98	.99	.99
TLI	.97	.99	.99
SRMR	.066	.049	.067
RMSEA	.054 [.040 - .068]	.005 [.000 - .032]	.014 [.000 - .030]

Note:  $\lambda$ : factor loadings; (-) dropped items;  $\chi^2$ : \*\*\*  $p < .001$ ; Chi-Square; gl: degrees of freedom; CFI: Comparative Fit Index; TLI: Tucker Lewis Index; SRMR: Standardized Root Mean-Square; RMSEA: Root Mean Square Error of Approximation; RMSEA: Root Mean Square Error of Approximation.

Source: Own elaboration

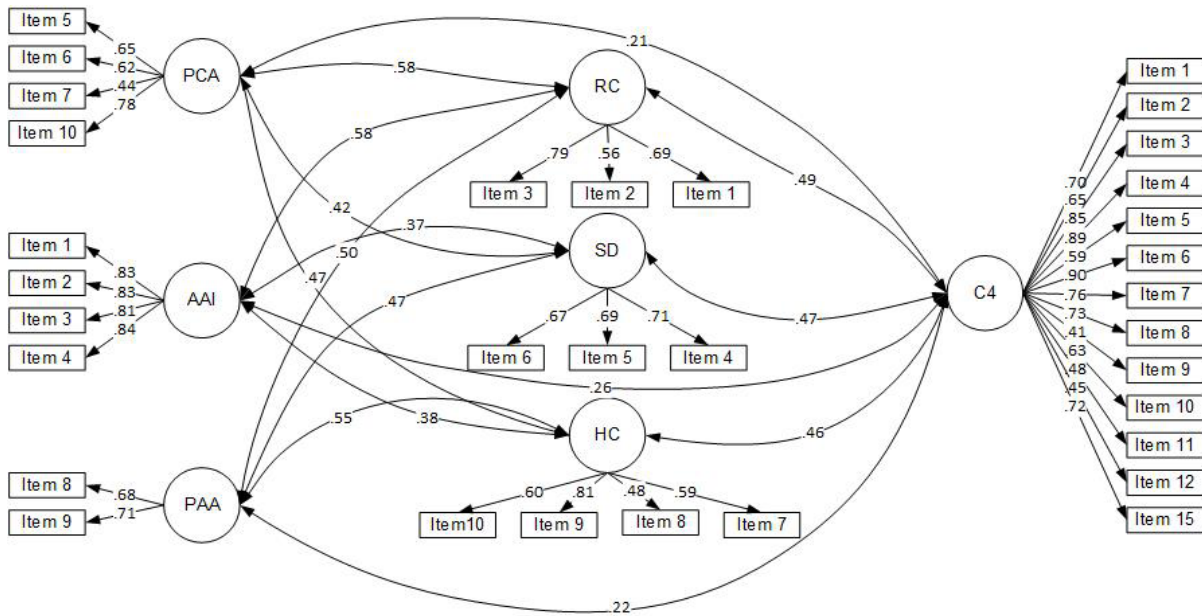
## General setting model and explanatory model of tobacco consumption

Figure 2 shows the general adjustment model of the measures of interest. The latent factors of attitudes towards alcohol consumption are moderately and positively related to the latent factors of alcohol consumption and in the

same way the factors of alcohol consumption with the variable of tobacco consumption.

In the framework of the existing relationships between the latent variables of the three variables, the suggested general adjustment model shows that it has an appropriate factorial adjustment, which is reflected in the results of the absolute indicators ( $\chi^2/df$  y SRMR), relative (CFI y TLI) and non-centrality-based indicators (RMSEA).

**Figure 2.** Latent relationships and overall adjustment of measures of attitudes toward drinking, alcohol consumption, and tobacco use.



$\chi^2 = 655.99$ ;  $df = 474$ ;  $\chi^2/df = 1.38$ ; CFI = .95; TLI = .94; SRMR = .049; RMSEA = .027 [.021 - .031]

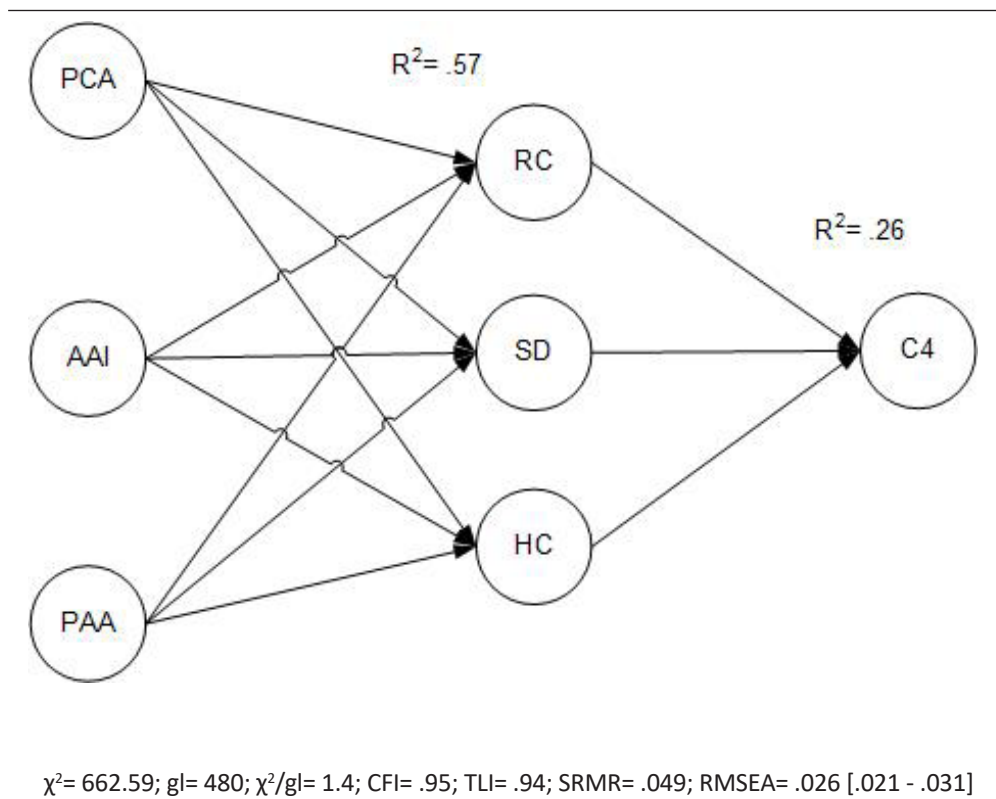
Note: PCA: Predisposition to alcohol consumption; AAI: Alcohol Agreeableness Index; PAA: Predisposition to action to alcohol consumption; RC: Risky Consumption; SD: Symptoms of Dependence; HC: Harmful Consumption; C4: Cigarette Consumption.

Source: Own elaboration

On the other hand, after demonstrating the adequate adjustment of the general model, Figure 3 shows the explanatory model of tobacco consumption based on alcohol consumption, which average explains 26% of the changes in the variation and, at the same time, alcohol consumption which is predicted by attitudes towards alcohol consumption with 57% of the changes in the variance. The results of the structural regression analysis with the SEM technique show that the adjustment rates are correct and within the acceptable ranges (Byrne, 2008; Wolf et al., 2013; Brown, 2015; Mueller & Hancock, 2018). It is considered that the suggested model for explaining alcohol and tobacco consumption based on attitudes towards consumption is accurate, given that they are mutually influential processes.



**Figure 3.** Explanatory model of tobacco consumption based on alcohol consumption and attitudes towards consumption.



Note: PCA: Predisposition to alcohol consumption; AAI: Alcohol Agreeableness Index; PAA: Predisposition to action to alcohol consumption; RC: Risky Consumption; SD: Symptoms of Dependence; CP: Harmful Consumption; C4: Cigarette Consumption.

Source: Own elaboration

## Discussion

The aims of the study were to identify the association between the variables of attitudes towards alcohol consumption, alcohol consumption and tobacco consumption, as well as the reliability of an explanatory model in a sample of university students in Ecuador.

The prevalence of alcohol consumption is approximately 80%, with abstinence being low, and 28% of the cases present risky consumption. These results are consistent with similar studies in the university population, both inside and outside the local and Ecuadorian context (Gómez et al., 2017; Roosen & Mills, 2015), which indicate the low practice of consumption, although it has slight consumption indicators patterns. Tobacco consumption is lower than alcohol consumption, with a predominance of 31.4% and abstinence of approximately 70%; 10.1% present indicators of risk consumption and possible smoking. These findings are slightly higher than those reported by Bautista-Pérez (2014); and Castro-Sánchez et al (2017) who found lower rates of prevalence. Alcohol consumption is more prevalent than tobacco use and it has a higher risk of effects derived from excessive consumption (Gajecki et al., 2014; Gómez et al., 2017; Halperin et al., 2010; Mayorga-Lascano et al., 2019; Nelson et al., 2015). However, both substances are widely spread as mentioned by WHO (2014). Attitudes towards consumption are ambivalent and have no clear definition. Alcohol preference prevails mainly as an attitudinal factor favoring alcohol consumption. There are indicators of enjoyment towards the practice of consumption, although the predisposing factors to perform the behavior are less intense.

Regarding the links between variables, a general adjustment model was proposed (see Figure 2) in which the latent connections are explored. From this adjustment model, it is shown that attitudes towards alcohol consumption are related to the practice of moderate and positive alcohol consumption. This is similar to what has already been discussed by DiBello et al. (2018); Moreta-Herrera et al. (2021a); Telumbre-Terrero et al. (2017) in university population in which the relationships fluctuate between mild and moderate and invariantly between gender, career or level. Additionally, alcohol consumption is moderately and positively related to tobacco consumption, which also has similar conclusions to previous reports in university population (Gómez et al., 2017; Moreta-Herrera et al., 2018; Tsili-gianni et al., 2012; Wetzels et al., 2003). These results in both cases allow us to understand the practice of combined consumption in the sample of interest and the determinant factor of the consumption of one substance (alcohol) to encourage the consumption of others. It should be noted, however, that referential evidence was obtained from statistical techniques based on observable research variables (correlation, linear regression, among others). In the meanwhile, about the current study, referential evidence was used with latent levels (use of the SEM technique); therefore, the results must be addressed carefully. Something similar happens with the development of a general adjustment model for the three variables under analysis, which, although the adjustment indicators showed evidence of factorial validity, since no similar studies have been found, caution is required for its validity. Nevertheless, it represents a significant advance in the intention of offering a broad view of the shaping of the phenomenon of substance use and poly-consumption.

Following this premise, we analyzed the existence of an explanatory model to determine the degree of influence that attitudes towards alcohol consumption and alcohol consumption have on tobacco consumption. Structural regression analysis with SEM found that attitudes towards alcohol consumption predicted changes in the variance of alcohol consumption by approximately 57%; the latter is a determinant of 26% of the changes in the variance of tobacco consumption. These findings demonstrate the predictive potential of these variables, which are in agreement with the studies by Cooke and others (2016); Moreta-Herrera et al. (2021a) y Halperin et al. (2010); Powers et al. (2013) respectively.

In addition, these results allow us to understand the structure dynamics of alcohol and tobacco consumption by using an explanatory model at the level of latent variables (see Figure 3). This explanatory model keeps an adequate setting on the indicators  $\chi^2$ ,  $\chi^2/df$ , CFI, TLI, SRMR, RMSEA and  $\lambda$  (Byrne, 2008; Wolf et al., 2013; Brown, 2015; Mueller & Hancock, 2018). There are no similar studies previously published with which to compare the findings. Yet, this turns out to be relevant because it is pioneering and innovative in pointing out previously unreported mechanics of substance use of greater extent and complexity. The implications of these results allow us to clarify and update the state of the art regarding the current situation of alcohol and tobacco consumption in the university population of Ecuador. This contributes more clearly to the current picture of these phenomena. In addition, given the existing connections between the variables under study, the mechanics of the consumption of substances such as alcohol and tobacco are also considered. This provides relevant information for the improvement of the diagnostic processes of people in risk situations associated with consumption and in the development of proposals for psychological and social intervention at both the preventive and levels.

## Limitations

This research report has certain limitations that are explained below. First, the study is restricted to the analysis of alcohol and tobacco consumption in the university population. For this reason, these results cannot be considered for understanding the explanation of the variance with other substances or in other population groups. In this sense, similar studies are recommended for the future, expanding the analysis to other substances with psychoactive effects and to other groups of individuals such as adolescents and adult population not linked to the academic context. Additionally, it should be mentioned that the SEM techniques employed, although they propose an adequate statistical modeling setting that has not been reported before, since there are no similar reports to contrast these results, they should be taken with caution. Although it makes it a pioneer, further studies are required in the future to draw general conclusions.

Finally, in this same aspect, SEM techniques allow us to identify a better explanation of the variance by integrating the dynamics of more variables than the classical linear regression analysis. However, these analyses are limited because they do not resolve the problem of determinacy and causality in a conclusive way. In this aspect, experimental or longitudinal studies are relevant in the future to resolve this limitation more efficiently.

## Ethical Compliance Section

Funding: The authors have no funding to disclose

Compliance with Ethical Standards: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients to be part of the study.

Conflicts of Interest: The authors RM, CB, SD, AS, AO, and DB declare they have no conflict of interest.

Informed Consent: Informed consent was obtained from all individual adult participants included in the study

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