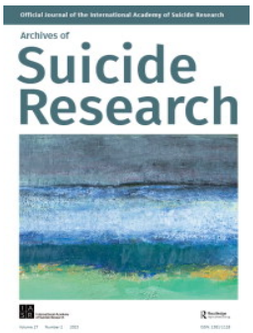

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Predictive Model of Suicide Risk in Young People: The Mediating Role of Alcohol Consumption

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ABSTRACT

Suicidal behavior is one of the public health problems that cause most deaths in young people and has been associated with emotional and affective problems, so predictive models are required to account for the relationship between depression, anxiety, hopelessness, and alcohol consumption to propose actions for its prevention. The Plutchik Suicide Risk Scale, the CAGE Questionnaire, the Hopelessness Scale, the Depression Inventory and the Beck Anxiety Scale were applied. A total of 1.379 young people ($M = 20.45$; $SD = 3.23$) from the cities of Manizales ($n = 739$; 53.6%) and Medellín ($n = 640$; 46.5%) in Colombia were evaluated. The variables of anxiety, hopelessness and depression explained 51% ($R^2 = 0.509$; 95% $CI = 0.467–0.552$; $p = 0.001$) of the variation in suicidal risk. Likewise, alcohol consumption is a mediating variable between depression and anxiety in the prediction of suicidal risk, whose total, direct and indirect effects are statistically significant. The findings support the role of alcohol consumption as a mediating variable between anxiety, depression, hopelessness and suicidal risk in young people, given the difficulties it causes in information processing, regulation of emotions and therefore in having an adequate coping with the demands of the environment. This justifies the importance of directing suicide prevention actions through strategies for the reduction of alcohol consumption and the management of emotions in young people.

HIGHLIGHTS

- Alcohol modulates the effect of depression and anxiety on suicide risk
- This is a study on the risk of suicide in young people in Colombia
- The findings have implications for timely clinical interventions.

KEYWORDS

Alcohol consumption anxiety; depression; suicide

INTRODUCTION

Suicide is considered a public health problem that generates a negative psychological and social impact in communities, a phenomenon that responds to the multicausal interaction of biological, genetic, environmental, sociological, anthropological, and cultural factors which are integrated into the transactional model of suicidal behavior that

allows identifying the relationship between these factors, such as alcohol consumption with emotional and affective problems, to propose prevention strategies (Hidalgo-Rasmussen, Chávez-Flores, Yanez-Peñúñuri, & Navarro, 2019).

It is estimated that every year there are more than 800,000 deaths by suicide worldwide (Serrani Azcurra, 2017), becoming the second leading cause of death among college students (Veloso et al., 2019). By sex, women attempt suicide three times more than men due to interpersonal problems; while in men, due to academic and work failure (Almaghrebi, 2021; Nock et al., 2008; Villalobos Galvis, 2009).

According to the *Instituto Nacional de Medicina Legal y Ciencias Forenses* (INMLCF, 2020) [National Institute of Legal Medicine and Forensic Sciences (INMLCF, for its Spanish acronym)], suicide in Colombia showed high figures between January and November 2020, with 1,732 cases reported in men and 410 in women, making it the fourth leading cause of violent death at the national level. In terms of age, the highest number of cases was reported among young people between 20 and 24 years of age (307 cases). Among the cities that reported the most suicides are Medellín with 155 cases and Manizales with 29 suicides.

In a study carried out in Colombia, Castaño Castrillón et al. (2015) concluded that a risk factor for suicide in college students is stress, which is aggravated by insufficient psychological resources necessary to solve problems. Other factors that predispose suicide in young people are estrangement from family support networks, social isolation, low self-esteem, feelings of loneliness, hopelessness, and bereavements at work, family, and financial levels (Barrera-Herrera, Neira-Cofré, Raipán-Gómez, Riquelme-Lobos, & Escobar, 2019).

Among the mental health problems associated with suicidal behavior in university students, the presence of depression, hopelessness, and anxiety, as well as alcohol consumption have been found (Carrasco-Farfan et al., 2019; Dambrauskiene et al., 2019; Wiebenga et al., 2021). Previously, it has been reported that the relationship between suicide with depression, negative cognitions, hopelessness (Rugo et al., 2020) and alcohol consumption (Kim, Jeon, Cho, Shin, & Park, 2021).

Other studies have found links between anxiety, depression, impulsivity, and suicidal behavior; However, there has been variability in the findings since some studies have reported a higher risk with depression and others with anxiety (Almaghrebi, 2021; López Steinmetz, Godoy, & Fong, 2020; Moustafa, Tindle, Frydecka, & Misiak, 2017).

Some studies in Colombia (Forero, Siabato, & Salamanca, 2017; Restrepo et al., 2018) show that depression, alcohol consumption and some clinical factors play an important role in the explanation and occurrence of suicidal behavior because when associated with other relational phenomena such as family dysfunction, stress, and low academic performance, act as possible predictors of suicide (Hernández-Cervantes & Alejandre-García, 2015; Mars et al., 2019; Perales et al., 2019). Even so, such studies have highlighted the need to determine how affective and emotional variables, as well as alcohol consumption, are related to each other to predict suicidal risk in young people.

To contribute to the development of suicide prevention methodologies in young university students, this study aims to show the relationship between depression, anxiety, hopelessness, and especially the role of alcohol consumption as a mediating and risk factor for suicidal behavior in young university students from two Colombian cities,

Medellin and Manizales. The hypothesis is that alcohol plays a mediating role between anxiety, depression and hopelessness in the prediction of suicidal risk.

MATERIALS AND METHODS

Participants

A random probability sampling stratified by semesters was used, composed of 1,379 students belonging to two private universities in two Colombian cities, Manizales ($n = 739$; 53.6%), and Medellín ($n = 640$; 46.5%). Concerning sex, 942 were women (68.3%) and 437 were men (31.7%). The mean age was 20.45 ($SD = 3.23$). At the socio-economic level, 23.9% belong to low strata, 66.4% to middle strata, and 9.6% to high strata. Participants from both cities are from urban areas and do not differ in terms of socioeconomic status ($z = -1.048$, $p = 0.295$). There was no presence of indigenous or rural population.

Instruments

Plutchik Suicide Risk Scale (RS)

It is a Likert-type scale designed to assess the level of risk for a suicide attempt, depression, and hopelessness (Plutchik & Van Praag, 1989). It consists of 15 items whose response options are Yes or No. Each affirmative response adds one point to the score, for a total of 15 with a cutoff point of 6. The scale has been validated with the Colombian population by Ramírez and Olivella (2015) obtaining a .77 Cronbach's Alpha reliability coefficient. In Colombia, it has been used with a young population, showing internal consistency with Cronbach's Alpha = .75 (Cañón et al., 2012; Gómez Tabares et al., 2019).

A confirmatory factor analysis (CFA) was performed using the generalized least squares method to contrast a one-dimensional model. Acceptable goodness of fit indices were found ($\chi^2/df = 2.948$, $GFI = 0.979$, $AGFI = 0.966$, $RMSEA = 0.037$). The internal consistency was 0.75 (Cronbach's alpha) and 0.80 (McDonald's Omega).

Beck Hopelessness Scale (BHS)

The instrument was developed by Beck, Weissman, Lester, and Trexler (1974). It allows the assessment of hopelessness and pessimism in people at risk of suicide. It consists of 20 statements. The response options are true and false. The items indicating hopelessness are scored with 1 point, and those not indicating it are scored with 0 points, for an overall score ranging from 0 to 20. The level of severity of hopelessness is established as follows: minimum = 0–3, mild = 4–8, moderate = 9–14 and severe 15–20. This instrument was validated with a Colombian sample, showing an internal consistency of Cronbach's alpha ranging from .82 to .93, and test-retest reliability between .60 and .69 (Rueda-Jaimes et al., 2018).

A CFA was performed using the generalized least squares method to contrast a one-dimensional model. Acceptable goodness of fit indices were found ($\chi^2/df = 2.767$, $GFI = 0.967$, $AGFI = 0.958$, $RMSEA = 0.036$). The internal consistency was 0.82 (Cronbach's alpha) and 0.87 (McDonald's Omega).

Beck Depression Inventory (Beck Depression Inventory, BDI)

The instrument was designed by Beck, Rush, Shaw, and Emery (1979). It is composed of 21 items that allow identifying the presence and severity of depression. Fifteen items evaluate psychological-cognitive symptomatology, and the other six, somatic-vegetative symptomatology. Each item is grouped on a scale ranging from 0 to 3. The cutoff points for establishing the level of severity of depression are: minimum = 0–9; mild = 10–16; moderate = 17–29; severe = 30–63. The instrument has evidenced high reliability in a Colombian sample of adult and young population, showing a sensitivity of 100%, a specificity of 99% and a positive predictive value of .72 (Molina et al., 2018).

A CFA was performed using the generalized least squares method to contrast a one-dimensional model. Acceptable goodness of fit indices were found ($\chi^2/df = 2.843$, $GFI = 0.967$, $AGFI = 0.956$, $RMSEA = 0.037$). The internal consistency was .88 (Cronbach's alpha) and .90 (McDonald's Omega).

Beck Anxiety Scale (BAI)

Designed by Beck, Epstein, Brown, and Steer (1988), it is composed of 21 items, which allow the evaluation of different anxiety symptoms. The rating of each item ranges from 0 to 3, (0 = not at all, 1 = slightly, it does not bother me much, 2 = moderately, it was very unpleasant but I could stand it and 3 = severely, I could hardly stand it). The BAI has shown high internal consistency with alpha coefficients above .90, moderate divergent validity with correlations below .60, and adequate convergent validity with correlations above .50.

A CFA was performed using the generalized least squares method to contrast a one-dimensional model. Acceptable goodness of fit indices were found ($\chi^2/df = 2.917$, $GFI = 0.965$, $AGFI = 0.953$, $RMSEA = 0.037$). The internal consistency was .91 (Cronbach's alpha) and .92 (McDonald's Omega).

The CAGE Questionnaire

The instrument was developed by Ewing (1984) and allows the evaluation of alcohol abuse through four key questions: social criticism, feelings of guilt, morning intake and intense need to consume alcohol. These questions take the value of 0 when the answer is negative and 1 if it is affirmative. Two or three affirmative answers are indicators of high suspicion of alcoholism; while four is an indicator of pathological alcoholism. Regarding the psychometric properties found in Colombia by Campo-Arias, Barros-Bermúdez, and Rueda-Jaimes (2009), the internal consistency of the questionnaire was between .75 and .83; the sensitivity was 66.7%; the specificity, 86%; the negative predictive value, 90.7% and the positive predictive value, 55.6%.

A CFA was performed, and acceptable goodness of fit indices were found (χ^2/df = .923, $GFI = 0.999$, AGFI = 0.997, $RMSEA = 0.000$). The internal consistency was .74 (Cronbach's alpha) and .79 (McDonald's Omega).

Data Analysis Plan

The SPSS version 25.0 statistical package was used for the analysis. Initially, a sociodemographic description of the sample was made, followed by a reliability analysis of the

instruments using Cronbach's alpha and composite Omega, followed by a CFA to verify that the factorial loadings of the items were adjusted to a one-dimensional model and the goodness of fit indicators were presented (Byrne, 2016). Descriptive analysis of the study variables was performed. The normality of the data was verified using the Kolmogorov-Smirnov test, which showed that the variables did not follow a normal distribution (p-value < 0.05); therefore, the non-parametric Mann–Whitney U and Kruskal–Wallis tests were used to perform the comparative analysis based on sex, suicide risk, and alcohol consumption. R Studio Cloud was used to calculate the effect size of the differences found in the comparative analysis, which was estimated using the eta-squared statistic (n^2). Subsequently, a correlation analysis was performed using Spearman's *rho* coefficient. The procedure and interpretation established by Fritz, Morris, and Richler (2012) were followed: small effect (0.01), medium effect (0.06), large effect (0.14). Finally, two structural equation models were proposed to determine the direct and indirect effects between the variables considered in this study. The generalized least squares method was used (Byrne, 2016).

For the modeling of structural equations, the software Amos v. 24.0. Standardized total, direct, and indirect effects were calculated using the bootstrap method with a 95% confidence interval (Byrne, 2016; Hayes, 2018). To evaluate the goodness of fit of the models, the chi-square probability level ($\chi 2$) and the chi-square/degrees of freedom ratio (χ^2/df) were used. A probability level of x2 equal to or greater than 0.05 ($p \geq 0.05$) would indicate a good fit (Jöreskog & Sörbom, 1993), and (χ^2/df) should be less than 3 (Schermelleh-Engel, Moosbrugger & Müller, 2003). Comparative fit indices ($IFI \geq 0.90$ and $CFI \geq 0.90$), goodness of fit index ($GFI \geq 0.90$) and its corresponding corrected ($AGFI \geq 0.90$), normalized fit index ($NFI \geq 0.90$) and the Tucker–Lewis index ($TLI \geq 0.90$) and the root of the mean square residual approximation ($RMSEA \leq 0.08$). *IFI, CFI, GFI* and *AGFI* values equal to or greater than 0.90 and a value equal to or less than 0.08 in *RMSEA* are adequate (Byrne, 2016; Hu & Bentler, 1999; McArdle & Nesselroade, 2014).

A metric invariance analysis was carried out by sex (man/woman) and city (Manizales/Medellín) to the proposed structural equation model (Byrne, 2008). Due to the sensitivity of χ^2 to sample size and non-normality (Hair, Anderson, Tatham, & Black, 2006), Cheung and Rensvold (2002) propose to analyze the increase in *CFI* (ΔCFI) to determine if the compared models are equivalent. If the change in the *CFI* is equal to or less than 0.01 ($\Delta CFI \leq 0.01$), the invariance between the groups is accepted.

Ethical Considerations

In the framework of Law 1090 of 2006 and Resolution 008430 of 1993, this research follows the ethical principles of respect, privacy, and dignity, ensuring the confidentiality and anonymity of the participants. The study had the approval of the Ethics Committee of the Corporación Coetika, Manizales, Colombia, and the informed consent of the participants as well the consent of the parents and the informed of the young people who were 17 years old. Students identified as at risk were referred to the university wellness psychology area.

RESULTS

Table 1 shows the risk indicators for alcohol consumption, depression, hopelessness, and suicide risk both in the total population and in men and women. It was identified that 15.1% report problems with alcohol consumption, that is, they show levels that include risk, harmful and dependence. Regarding anxiety, symptomatic indicators were found in 24.1% of them. A symptomatic indicator of mild depression was reported in 19%. In general terms, 35% of the population studied presented some indicator of depression. Also, 25.7% reported expressions of hopelessness and a suicidal risk factor of 23%.

Table 2 shows the comparative analysis with the Mann–Whitney U test of the study variables according to sex. Since nonparametric statistics were used, in addition to the mean value and standard deviation, the mean ranges and the median were reported, as well as the z-values of the Mann–Whitney U test and the p value. It was found that men had significantly higher scores in alcohol consumption ($z = -4.639$, $p < 0.001$) and women had higher scores in suicide risk ($z = -2.622$, $p = 0.009$) and anxiety ($z = -3.369$, $p = 0.001$). When evaluating the effect size of the significant differences in terms of sex, a small effect size was identified ($n^2 < 0.039$).

A comparative analysis of the study variables was carried out according to the suicide risk factor. At a general level, students who presented a suicidal risk factor evidenced higher scores in hopelessness ($z = -14.34$; $p < 0.001$; $n^2 = 0.149$), depression ($z = -19.12$; $p < 0.001$; $n^2 = 0.265$), alcohol abuse ($z = -3.998$; $p < 0.001$; $n^2 = 0.012$) and anxiety ($z = -13.64$; $p < 0.001$; $n^2 = .131$) compared to the group without risk. All differences were statistically significant ($p < 0.001$).

Using the Kruskal–Wallis test, it was observed that the young people who presented higher risk indicators related to the abusive consumption of alcohol showed, in a significant way ($p < 0.001$), higher averages in suicide risk ($H = 22.12$; $df = 3$; $p < 0.001$), hopelessness ($H = 13.89$; $df = 3$; $p = 0.003$), depression ($H = 21.46$; $df = 3$; $p < 0.001$) and anxiety ($H = 21.39$; $df = 3$; $p < 0.001$) (see Table 3).

TABLE 1. Indicators of mental health events: alcohol consumption, depression, hopelessness and suicidal risk.

		Total		Women		Men	
Variables	Risk indicators	*n*	%	*n*	%	*n*	%
Alcohol consumption	Social consumption	1,170	84.8	822	87.3	348	79.6
	Risk consumption	117	8.5	76	8.1	41	9.4
	Abuse or harmful use	75	5.4	38	4.0	37	8.5
	Alcohol dependence	17	1.2	6	0.6	11	2.5
Depression	No depression	896	65.0	599	63.6	297	68.0
	Mild	262	19.0	190	20.2	72	16.5
	Moderate	188	13.6	128	13.6	60	13.7
	Severe	33	2.4	25	2.7	8	1.8
Hopelessness	None	1,024	74.3	705	74.8	319	73.0
	Mild	265	19.2	171	18.2	94	21.5
	Moderate	71	5.1	51	5.4	20	4.6
	Severe	19	1.4	15	1.6	4	0.9
Anxiety	Very low	1,047	75.9	702	74.5	345	78.9
	Moderate	226	16.4	160	17.0	66	15.1
	Severe	106	7.7	80	8.5	26	5.9
Suicide risk	No risk	1,062	77.0	719	76.3	343	78.5
	Suicide risk	317	23.0	223	23.7	94	21.5

TABLE 2. Differences between sexes based on alcohol abuse, suicide risk and the variables of depression, hopelessness and anxiety.

	Women ($n = 942$)				Men ($n = 437$)						
Variable	*M*	*SD*	*Rp*	*Me*	*M*	*SD*	*Rp*	*Me*	*z*	*p*	*n*
CAGE	1.47	0.85	661.80	1.0	1.75	1.09	750.79	1.00	−4.639	0.000	0.016
SR	3.47	2.68	709.01	3.0	3.14	2.78	649.03	2.00	−2.622	0.009	0.005
BHS	2.91	3.22	701.78	2.0	2.65	2.95	664.61	2.00	−1.636	0.102	0.002
BDI	9.04	8.22	702.46	7.0	8.26	7.77	663.15	6.00	−1.708	0.088	0.002
BAI	15.67	11.76	714.59	13.0	13.67	11.37	636.99	11.00	−3.369	0.001	0.008

Note: CAGE: Alcohol abuse; SR: suicide risk; BHS: hopelessness; BDI: depression; BAI: anxiety.

TABLE 3. Differences between young people based on alcohol consumption and the variables of suicide risk, hopelessness, depression, and anxiety.

Association variables	Abusive alcohol consumption CAGE	*M*	*SD*	*Ar*	*Me*	$H^{(gl)}$	*p*
Suicide risk	Social consumption	3.24	2.66	673.03	3.00	22.119 (3)	0.000
	Risk consumption	3.74	2.86	738.82	3.00		
	Abuse or harmful use	4.11	2.75	803.40	4.00		
	Alcohol dependence	6.12	3.35	1,021.97	5.00		
Hopelessness	Social consumption	2.72	3.02	678.55	2.00	13.893 (3)	0.003
	Risk consumption	3.09	3.69	693.71	2.00		
	Abuse or harmful use	3.84	3.35	850.69	3.00		
	Alcohol dependence	4.00	4.61	743.68	2.00		
Depression	Social consumption	8.43	7.81	673.55	6.00	21.461 (3)	0.000
	Risk consumption	9.66	8.73	731.67	7.00		
	Abuse or harmful use	11.21	8.93	806.84	10.00		
	Alcohol dependence	17.12	11.73	1,019.74	14.00		
Anxiety	Social consumption	14.62	11.55	674.07	12.00	21.394 (3)	0.000
	Risk consumption	15.90	11.67	730.46	13.00		
	Abuse or harmful use	18.15	12.63	796.77	15.00		
	Alcohol dependence	24.41	9.94	1,036.88	23.00		

Note: *M*: Media; *DS*: standard deviation; *Ar*: average range; *Me*: median; *H*: *H* of Kruskal–Wallis; *df*: degree of freedom; *p*: statistical significance.

Table 4 shows the results of the correlational analysis of the various study variables using Spearman's *Rho* coefficient. Statistically significant correlations ($p < 0.001$) of positive sign were found between alcohol abuse and suicidal risk ($rho = .127$; $p < 0.001$), hopelessness ($rho = .091$; $p = 0.001$), depression ($rho = .111$; $p < 0.001$) and anxiety ($rho = .119$; $p < 0.001$). Similarly, strong correlations between the different study variables are evident.

To establish the total direct and indirect effects of the independent variables on suicide risk, two structural equation models were estimated using the generalized least squares method (Byrne, 2016). In the first model, the direct effect of the dependent variables on suicide risk was estimated, but it did not yield good indicators of goodness of fit, especially in the *RMSEA* indicator, which should be less than 0.08 (Byrne, 2016), so that the model was specified again. In model 2, alcohol consumption was used as a mediating variable between depression, anxiety, and suicide risk, which obtained better indicators of goodness of fit (Byrne, 2016; McArdle & Nesselroade, 2014) (see Table 5). An invariance analysis by sex and city was also carried out to corroborate whether model 2 was equivalent between men and women and young people from the cities of Manizales and Medellín (see Table 5).

Table 5 shows satisfactory goodness-of-fit results for model 2, with which it can be established that there is a good fit of the data to the constructs proposed for the case of

metric invariance by sex and city (Byrne, 2008). Considering the criterion of Cheung and Rensvold (2002) regarding the difference in the CFI ($\Delta CFI \leq 0.01$), it was possible to corroborate the invariance in the sub-samples of sex (male/female) and city (Manizales/Medellín).

Figure 1 shows that the anxiety, hopelessness, and depression variables explain by 51% ($R^2 = 0.509$; 95% $CI = 0.467$–0.552; $p = 0.001$) the variance in suicide risk. Likewise, it was found that alcohol consumption is a mediating variable between depression and anxiety in the prediction of suicide risk, whose total, direct, and indirect effects are statistically significant (see Table 6).

TABLE 4. Spearman's correlation coefficient (Rho) between alcohol abuse suicide risk and the variables of depression, hopelessness and anxiety.

Correlations	CAGE	RS	BHS	BDI	BAI
CAGE		.127**	.091**	.111**	.119**
RS			.434**	.656**	.470**
BHS				.488**	.274**
BDI					.516**
BAI					

**The correlation is significant at the 0.01 level (bilateral).
Note: CAGE: Abusive alcohol consumption; RS: suicidal risk; BHS: hopelessness; BDI: depression; BAI: anxiety.

TABLE 5. Goodness-of-fit statistics of the structural models for predicting risk and suicide attempt.

Model	χ^2	*df*	χ^2/df	*IFI*	*CFI*	*NFI*	*TLI*	*GFI*	*AGFI*	*RMSEA*
1	11.893	1	11.893	0.980	0.980	0.978	0.796	0.997	0.948	0.09
2	0.523*	1	0.523	1,007	1.0	0.999	1.01	1.0	0.998	0.000
Metric invariance by sex (men/women) of model 2										
Without restrictions	0.892*	2	0.446	1.002	1.0	.998	1.021	1.0	0.996	0.000
Structural weights	20.487*	8	2.561	0.977	0.997	.963	0.942	.994	9.78	0.034
Structural covariances	33,553	14	2.397	0.964	0.964	.940	0.948	.990	0.979	0.032
Metric invariance by city (Manizales/Medellín) of model 2										
Without restrictions	1,253*	2	0.627	1.001	1.0	.998	1.014	1.0	.995	.000
Structural weights	12,861*	8	1.608	.991	.991	.976	.977	.996	.986	0.021
Structural covariances	72,927	14	5.209	.888	.886	.865	.838	.979	.955	0.055

*$p \geq 0.05$

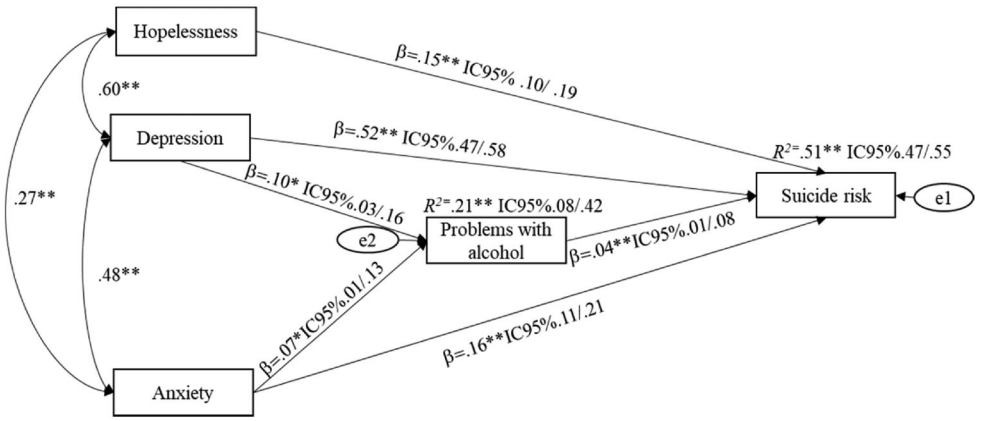

Figure 1. Structural equation model of suicide risk and the mediating role of alcohol consumption. *Note*: *$p < 0.01$; **$p < 0.001$.

TABLE 6. Total direct and indirect standardized effects of the predictor variables on the response variables.

	Alcohol consumption (mediator)			Suicide risk		
		CI 95%			*CI* 95%	
Effects	Value β	Lower	Upper	Value β	Lower	Upper
Anxiety						
Total	0.068**	0.012	0.128	0.159***	0.113	0.207
Direct	0.068**	0.012	0.128	0.156***	0.11	0.204
Indirect	---	---	---	0.003*	0.00	0.008
Depression						
Total	0.10**	0.03	0.163	0.524***	0.471	0.576
Direct	0.10**	0.03	0.163	0.52***	0.467	0.573
Indirect	---	---	---	0.004*	0.00	0.01
Hopelessness						
Total	---	---	---	0.148***	0.101	0.194
Direct	---	---	---	0.148***	0.101	0.194
Indirect	---	---	---	---	---	---
alcohol consumption						
Total	---	---	---	0.044*	0.006	0.083
Direct	---	---	---	0.044*	0.006	0.083
Indirect	---	---	---	---	---	---

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 6 shows the total, direct and indirect standardized effects of the independent, mediating, and dependent variables. Depression contributed the largest total effect on alcohol consumption ($\beta = 0.10$; *95%* $CI = 0.03$–0.163; $p < 0.01$) and suicide risk ($\beta = 0.524$; *95%* $CI = 0.471$–0.576; $p < 0.001$). Likewise, alcohol consumption is a mediator between anxiety and depression, whose indirect effects are significant ($p < 0.05$). Given that the direct and indirect effects are statistically significant, it can be concluded that the mediation effect of the alcohol consumption variable is partial.

DISCUSSION

The present study aimed to show the relationship between depression, anxiety, hopelessness, and especially the role of alcohol consumption as a risk mediating factor for suicidal behavior in young university students in two Colombian cities, Medellin and Manizales. The findings illustrate the magnitude of the variables studied in the young university students evaluated, in whom a significant presence of clinical indicators of anxiety, depression, hopelessness, alcohol consumption and suicidal risk was found. Also, these findings are consistent with what was reported in a recent study by Barriga and Villalta (2019) and, in turn, constitute concrete evidence of these mental health problems in a representative sample of two cities in Colombia.

According to sex, a higher suicide risk and anxiety were found in women compared to men, which coincides with findings reported in other studies (Ballester et al., 2021; Chatard, Selimbegović, & Konan, 2009; Gómez Tabares et al., 2020); while in men, there was a higher consumption of alcohol (Richards et al., 2020). Other studies have concluded that these differences may be associated with the fact that women are more affected by the loss of interpersonal relationships; while men by experiences of academic and work failure in which they resort to alcohol as a stress-coping strategy (Almaghrebi, 2021; Nock et al., 2008; Villalobos Galvis, 2009).

In addition to the above, the students who presented suicidal risk factors showed higher scores in hopelessness, depression, alcohol abuse and anxiety compared to the non-risk group. This evidences that people with suicidal risk show much more marked indicators of alcohol abuse, anxiety, depression and hopelessness. These findings are consistent with studies carried out in Latin America (Forero et al., 2017; Gómez Tabares, 2020; Gómez Tabares & Rojas González, 2021; Hernández-Cervantes & Alejandre-García, 2015; Perales et al., 2019; Restrepo et al., 2018).

An interesting relationship was found between suicidal risk, hopelessness, depression and anxiety. According to Jie, Xinxia and Le (2019), the interaction of anxious and depressive symptoms make up the transdiagnostic dimension of high negative mood, which, in turn, is associated with hopelessness and greater functional impairment in people who present it, which would constitute a risk factor for suicide.

Regarding the associations found between depression, alcohol consumption and suicide risk in previous studies with young adults, it has been concluded that people who report a higher alcohol consumption and negative consequences derived from such drinking pattern, experience negative thoughts about themselves, greater feelings of guilt and therefore, depressive symptoms. In turn, bidirectional relationships have been observed between these problems which is consistent with the transactional model of suicide (Hidalgo-Rasmussen et al., 2019; Kim et al., 2021; Miller, DiBello, Merrill, Neighbors, & Carey, 2020; Rugo et al., 2020), which could put them at risk of evidencing self-injurious behaviors.

In the structural equation modeling analysis, depression and anxiety were found to be predictors of alcohol consumption. This finding is in line with previous studies that have documented that this relationship could be associated with the fact that both in anxiety and depression there are difficulties in coping strategies in the face of environmental demands so that people would end up resorting to an inappropriate strategy such as alcohol consumption. Likewise, these findings seem to indicate that people with fear to tolerate the physiological responses of anxiety and who experience high depressive symptoms, choose to consume alcohol to manage emotional and affective distress (Lechner et al., 2014).

The data from the present study lead to the conclusion that anxiety, depression and hopelessness are predictors of suicide risk. These findings are consistent with current perspectives on these psychological problems, which point out the tendency to develop all forms of psychopathology in terms of a unidimensional, superordinate factor with transdiagnostic characteristics that explains the interaction between various problems such as anxiety and depression and their relationship with alcohol consumption (Kim et al., 2021; Rugo et al., 2020; Teesson et al., 2020; Wiebenga et al., 2021).

For his part, in a study with young people, Abreu (2018) found that anxiety, as an independent factor, was not associated with suicidal risk. However, when it occurred in comorbidity with depression and hopelessness, it increased suicidal risk, i.e., when combined effects are present, probably characterized by a negative mood in which the person perceives a future that has nothing positive to offer them.

Additionally, previous evidence has accounted for the role of hopelessness in suicidal risk (Núñez, 2004; Tsujii et al., 2020). In contrast to the above, a positive state of mind would constitute a protective factor to avoid suicidal risk, as it would enable young

people to focus more on positive thoughts about themselves, with greater self-esteem, so that they could experience more satisfaction in their lives (Gómez-Baya, Mendoza, Paíno, & Gillham, 2019).

It is important to highlight that alcohol consumption is a predictor of suicidal risk, and works as a mediating variable between depression, anxiety, and suicidal risk. In this regard, alcohol consumption is like a self-medication behavior assumed by young people for the management of depressive and anxious symptoms, which can promote aggressiveness, impulsivity, and intentional self-injurious behaviors (Khemiri, Jokinen, Runeson, & Jayaram-Lindström, 2016).

This predictor of alcohol consumption has a higher risk in youth and may be associated with social and contextual factors typical of this stage of the life cycle, such as the reduction of perceived stress, the desire to belong, and peer pressure (Gómez Tabares, Núñez, Agudelo Osorio, & Caballo, 2020; Núñez, Castrillón, & Bañol, 2002; Zalsman et al., 2020) and social disinhibition (Kuo, Gardner, Kendler &, Prescott, 2006).

From an intercultural and contextual perspective, these findings highlight the importance of establishing prevention and risk detection programs in educational institutions (Nuñez, Tobón, Bañol, & Arias, 2006), especially focused on the articulation of intervention components and the strengthening of support networks (Hernández-Calle, Martínez-Alés, Román-Mazuecos, Rodríguez-Vega, & Bravo-Ortiz, 2020; Muehlenkamp & Hagan, 2020), in order to identify psychosocial, clinical and demographic indicators conducive to suicide in this population (Cayuela et al., 2020).

The findings found in the present study support the role of alcohol consumption as a mediating variable between anxiety, depression, hopelessness and increased suicidal risk in young people, given the difficulties it causes in information processing, in regulating emotions, and therefore, in coping adequately with the demands of the environment. This justifies the importance of displaying suicide prevention actions through the reduction of alcohol consumption and the management of emotions in young people. It also justifies the importance of directing suicide prevention actions through strategies for reducing alcohol consumption in men and managing emotions and strengthening social support in women.

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