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The effect of coping strategies on the risk for suicidal ideation and behavior in adolescents

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Abstract

The aim of this paper was to analyze the predictive effect of coping strategies on the risk for suicidal ideation and behavior in 309 adolescents between 11 and 18 years of age (*M*=13.51; *SD*=1.9). This was a quantitative study, with a cross-sectional-correlational design. The Suicide Orientation Scale (Iso-30) and the Coping Strategies Inventory (CSI) were used. Findings suggest that 12.9% of the sample reported high risk of suicide. Adolescents at low risk of suicide, compared with those reporting moderate and severe risk, had higher scores on problem solving, cognitive restructuring, social support, emotional expression, and problem avoidance, and lower scores on desiderative thinking, social withdrawal, and self-criticism. Suicidal ideation and behavior were found to correlate negatively with problem solving, cognitive restructuring, social support, emotional expression, problem avoidance, and positively with desiderative thinking, social withdrawal and self-criticism. Multinomial logistic regression analysis showed that coping strategies explained between 46 % and 56 % of the variance of the risk of suicidal ideation and behavior. Social withdrawal and self-criticism strategies contributed significant effects that increased the probability of high suicide risk. These findings can be used to help guide suicide prevention and intervention strategies in school settings.

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1. Introduction

The World Health Organization ([WHO], 2021) has estimated that close to 700 000 people die due to suicide every year. In the United States, it has been projected that approximately 7% of the adolescent population had at least one suicide attempt, and 17% thought about suicide (Benton et al., 2021). The age between 15 and 29 is proving to be the most vulnerable period to

take one´s life and is the fourth leading cause of death in this population worldwide (WHO, 2021).

Suicide mortality accounts for 10% of injuries in Latin America, and has increased significantly between 1990 and 2019, with a higher proportion in men and young population (Dávila-Cervantes, 2022). About 45 800 people take their own lives each year in Latin America (Mascayano et al., 2015). In 2019, the mortality rate due to suicide in Latin America and the Caribbean was 6.2 per 100 000 inhabitants (WHO, 2022). Seventy-seven percent of suicides worldwide occur in low- and middle-income countries (WHO, 2021).

According to the National Institute of Legal Medicine and Forensic Sciences (NILMFS, 2022), from 2013 to 2018, there was an increase in suicide cases in Colombia, from 1 810 to 2 696 suicides. 2 420 people took their own lives in 2020 and 2 595 committed suicide in 2021 in Colombia (NILMFS, 2021). Children under 14 years of age (*n*= 122), adolescents aged 15-19 years (*n*=304), and youth aged 20-24 years (*n*=369) recorded the highest rates of suicidal behavior (NILMFS, 2021). This points to a high risk of suicidal behavior in the young population. This indicates a high risk for suicidal behavior in this population. Previous studies found that adolescents have high psychosocial vulnerability and are more prone than adults to display suicidal behaviors (Gómez, 2021a; Gomez et al., 2019). Regarding the state of Quindío, 40 cases were reported in 2020, and in the city of Armenia (Colombia), 23 cases were reported in 2020 and 20 cases in 2021 (NILMFS, 2021)

According to suicide attempts, for every suicide there are thirteen people who attempt suicide (Gómez, 2020; Gómez et al., 2020a). In Colombia, the National Institute of Health (NIH, 2021) showed that between February and March 2021 the total adjusted rate of suicide attempts was 12 per 100 000. However, there was a decline when compared to 14 attempts per 100 000 in 2020. Adolescents between 15 and 19 years old showed the highest rates of suicide attempt in Colombia (12 per 100 000). Nevertheless, the total adjusted rate of suicide attempts was higher in the state of Quindío in 2021 when compared to 2020 (NIH, 2021).

Suicidal behavior is considered a deliberate, planned, self-inflicted damage with intent to end with one`s life independent of resulting damage (Ordoñez, 2010). Suicidal behavior is a complex and multifactorial phenomenon with multiple risk factors (biopsychosocial, culture) that impact an individual´s thought, behavior and decision making (Arango et al., 2021; Lensch et al., 2021). Furthermore, it is key to clear up some concepts around the suicidal act: risk, ideation and suicidal attempt. Suicidal risk includes but it is not limited to repetitive behaviors, emotions and thoughts that expose the physical and psychological integrity and leads to an attempt on one´s

own life (Jans et al., 2018). Suicide attempt is an act of self-harm that is intended to result in death but does not (Jans et al., 2018; Mortier et al., 2018). Several studies have focused on analyzing risk and protective factors for suicidal behavior in adolescents during school (Bahamón et al., 2019; Liang et al., 2020; Oktan, 2021), and how they cope adverse social events that lead to a higher suicide risk (Gómez & Rojas, 2021; Gómez & Montalvo, 2021; Gould et al., 2018). Thus, it is essential to study the psychological factors related to suicidal behavior in adolescents, mainly the effects of coping strategies on adverse social events that lead to higher or lower suicidal risk/ideation/behavior. This analysis and the mechanisms used to cope with a social world is relevant to develop evidence-based strategies to an early detection or intervention of suicidal behavior.

1.1 Coping strategies and suicidal behavior

Coping strategies refer to specific psychological efforts used in meeting a stressful or unpleasant situation or in modifying one's reaction to such a situation (Solla & Morales, 2021). Coping strategies are even associated with quality of life. According to Kahn and colleagues (2020) there are several changes from childhood to adulthood that trigger a set of emotional, cognitive and behavioral strategies along life. The repertoire of coping strategies is dynamic across the stages of human development because they are subject to the individual experiences and circumstances of each person. (Kahn et al., 2020). Thus, coping strategies involve gaining skills and abilities to cope with several situations (Castaño & León, 2010).

In recent studies, there is a common trend to mix the terms: coping styles and coping strategies. Coping styles refer to single psychological dispositions to get through events. They establish the coping strategies that may be used according to each situation (Nava et al., 2010). Both terms define a group of psychological resources or skills to cope with psychosocial stress (Solís & Vidal, 2006). Thereby, in this study, both terms are alike and coping strategies will be used along the research.

Various coping strategies have been reported. For instance, those focused on problems (problem solving, cognitive restructuring) and those focused on emotional expression and social support (Nava et al., 2010). These strategies are negatively associated to suicidal behavior because they reduce its risk (Mathew & Nanoo, 2013). Conversely, coping strategies, based on ruminative and superstitious thoughts, are associated with a higher risk of suicidal behavior in adolescents (Bahamón et al., 2019; Cornejo et al., 2018; Nava et al., 2010). Lazarus and Folkman (1984) stated that coping skills focused on emotion and problems may ease or prevent coping

a stressful event. Strategies focused on emotion make life easier and interfere with strategies focused on problems (Lazarus & Folkman, 1984).

Likewise, Liang and colleagues (2020) analyzed the association among several coping strategies and suicide risk in two groups of 2074 adolescents in China (suicide risk and non-suicide risk). The authors found that active coping skills: active removal of stressors and positive reframing strategies (thinking about a negative or challenging situation in a more positive way) were less used by the suicide risk group than the non-suicide risk group. These strategies diminish the psychosocial risk and serve a protective role in suicidal behavior. Besides, it was reported that instrumental support strategies (give advice and emotional support) and planning and acceptance strategies are negatively associated with suicide risk which suggests that these are protective factors (Morán et al., 2009). A previous study examined the relationship between coping strategies and suicide risk in 617 adolescents between 14 and 18 years old (Bahamon et al., 2019). It reported that males were more prone to use problem solving strategies than females. On the other hand, females were more inclined to use strategies focused on avoidance and help-seeking. Besides, there were positive correlations between suicide risk and avoidance coping strategies, both in males and females, and negative correlations between problem solving strategies and suicide risk. Consequently, another work studied stressors and coping patterns associated to suicide attempts in two groups in a sample of 200 adolescents between 13 and 19 years old (Mathew & Nanoo, 2013). The first group was composed by adolescents with suicide attempt history while the second group did not and findings suggest that self-control coping strategies (self-regulate behaviors/feelings), help-seeking (ask for support), acceptance of responsibilities (get to know the problem), problem solving (strategies to solve the problem), positive assessment (effort to solve a problem) were used by the group with no suicide attempt history and were also negatively associated to suicide risk. On the contrary, strategies focused on distancing (not solving the problem) and avoidance or escape (run away from the stressful event) were used by the group with suicide attempt history and were positively associated with suicide risk.

A previous study by Solla and Morales (2021) with 153 adolescents assessed coping strategies associated with anxiety, stress and suicide risk. Preliminary results found that strategies focused on self-criticism, desiderative thinking and social isolation positively correlated with anxiety, stress and suicide risk which points out these strategies may increase both suicide ideation and behavior. In regard to problem solving, cognitive restructuring and emotional expression

negatively correlated with anxiety, stress and suicide risk which shows that these strategies might diminish suicide risk in adolescents.

Consistently, a longitudinal study by Gould and colleagues (2004) in six schools from New York assessed the relationship between suicide attitudes, depression, gender, drug use, suicide ideation and behavior and contact with suicide peers between 1998 and 2001 in 2,419 adolescents between 13 and 19 years old. Males scored higher than females on maladaptive coping skills -dysfunctional attitudes and isolation-. Depressed adolescents who used drugs and showed suicidal behavior scored higher on maladaptive coping skills when compared to non-suicide risk adolescents. On the other hand, adolescents who previously interacted with a peer that took his own life or that displayed suicidal behavior scored higher in maladaptive coping skills when compared to their peers who were not exposed to peers that took their own life. Also, low suicide risk adolescents scored higher in adaptive coping skills (help-seeking). Lastly, adolescents who used adaptive coping skills were less prone to display suicidal behavior and showed better ability to handle depression and suicidal behavior. But adolescents who used maladaptive coping skills showed higher suicidal risk and used to socially isolate as a mechanism to cope with depression and suicidal behavior.

A longitudinal study with 2,792 Norwegian adolescents between 13 – 15 years old examined the relationship between depression, suicide ideation risk and coping oriented on emotions and problems in 22 schools (Nrugham et al., 2012). Adolescents were allocated in two groups: suicide attempt/non-suicide attempt. Those who attempted suicide often used coping strategies oriented on emotions (emotion expression, social support) but, adolescents who did not attempt suicide often used coping strategies oriented on problems (problem solving, cognitive restructuring). Also, adolescents who attempted suicide reported higher levels of depression and lower skills to use problem-centered strategies. Accordingly, adolescents with a history of depression diminished the use of coping strategies focused on the problem and increased the use of strategies oriented on emotions. Thus, coping strategies oriented on problems were not related to depression or suicide ideation and emotional coping related to depression and suicide ideation in both groups. These results were stable for five years.

Consequently, another study assessed the relationship between coping strategies, depression and suicide ideation in 167 adolescents between 13 – 17 years (Mirkovic et al., 2015). The authors suggest that adolescents often use social support strategies and illusory thinking. Likewise, it was found that adolescents with non-suicidal ideation scored higher on productive coping skills when compared to suicidal ideation adolescents who often used non-productive coping

strategies (excessive anxiety, illusory thinking, self-criticism). Besides, an additional work described the relationship between coping skills, help-seeking, retaliation, avoidance and depression in 11,110 bullied adolescents (*M*=15.14 years) in Austria, France, Estonia Germany, Hungary, Ireland, Israel, Italy, Rumania, Slovenia, Spain and Switzerland (Benatov et al., 2020). These results pointed out that avoidance coping positively correlated with depression and suicidal ideation when compared to other coping strategies (social support among peers), indicating that avoidance behaviors in the face of psychosocial stress may increase depressive symptoms and suicide risk. Furthermore, it was reported that an increase of 25% in suicidal ideation positively associated with avoidance strategies. Help-seeking negatively correlated with depression and suicidal ideation symptoms. On the other hand, victimization among peers was not associated with depression or suicidal risk increase in adolescents. Retaliation (to hurt someone because they have harmed oneself) was not associated with an increase in depression or suicidal ideation. These findings support the fact that help-seeking coping strategies reduce the risk of suicidal ideation and behavior. Meanwhile, avoidance coping strategies are risk factors that increase ideation and behavior.

Finally, another study showed how adolescents who were exposed to suicide behaviors use coping strategies and how these are associated to depression and suicidal ideation and behavior in 5,284 students from high schools that reported deaths by suicide behavior (Gould et al., 2018). The authors found that 2,865 students from 6 schools were exposed to at least one death by suicide in the previous 6 months and 2,419 students from 6 schools were never exposed in the same period. It was also reported that suicidal ideation and behavior increased in students exposed to suicidal behavior. There was also a significant association between closeness to the deceased, depression and suicidal ideation and behavior. On the other hand, students who experienced the death of a peer by suicide increased the use of maladaptive coping skills or avoidance centered (drugs/alcohol use or hiding feelings).

Other studies point out that problem-solving coping strategies and cognitive restructuring coping strategies can influence the degree to which people perceive that they are in control of their lives, which in turn can improve mental health and reduce the risk of suicide (Craparo et al., 2018; Faraci et al., 2021; Midolo et al., 2020; Myles et al., 2020, 2021; Myles & Merlo, 2021, 2022a; Tomai et al., 2019; Urban & Urban, 2020). Thus, coping strategies that promote agency and greater perceived control in adolescents may be protective factors against suicidal behaviors.

1.2 The current study

The aim of this study was to examine the effect of coping skills on suicidal ideation and behavior risk in adolescents between 11 - 18 years old from Armenia (Colombia) due to high suicidal risk. An analysis of these factors might help to reduce suicidal rates and strength some psychological resources (protective factors). It also contributes to the literature of local communities to be able to understand suicidal behavior in Armenia (Colombia) where incidence rates (suicidal behavior/attempt) are high (NIH, 2021). Besides, this work will show the main coping skills used by adolescents to be able to cope with stressful events.

2. Materials and Methods

2.1 Participants

This was a non-experimental quantitative study. It is designed as a correlational predictive study. The sample was composed by 309 school adolescents from a public institution in Armenia (Colombia). The mean age was 13.51 (*SD*= 1.886). This is a representative sample due to the high rates of suicidal behavior and ideation in adolescents from Armenia (Colombia) according to the social observatory from the Caldas sectional (Delgado et al., 2017) and the NILMFS (2019). The sociodemographic characteristics of the sample are shown in table 1.

Table 1. Descriptive statistics of the sample (distribution of sociodemographic variables)

Characteristics	***n***	***%***
Sex		
Male	124	40.1
Female	185	59.9
Age		
11-14	213	68.9
15-18	96	31.1
Academic course		
Sixth grade	71	23.0
Seventh grade	72	23.3
Eighth grade	44	14.2
Ninth grade	40	12.9
Tenth grade	31	10.0
Eleventh grade	51	16.5
Socioeconomic status		
Very Low (1)	61	19.7
Low (2)	80	25.9

Middle Class (3)	139	45.0
Upper middle class (4)	25	8.1
High (5)	4	1.3
Family tipology		
Extended	48	15.5
Reconstituted	12	3.9
Nuclear	141	45.6
Single Parent (Mother)	66	21.4
Single Parent (Father)	5	1.6
Other	37	12.0

2.2 Instruments

Inventory of Suicide Orientation, ISO-30; *(*King & Kowalchuck, 1994). It is a 20 items Likert-type inventory designed to assess suicidal ideation and behavior risk factors (Galarza et al., 2019). Each item ranges from 0 (not at all true of me) to 3 (extremely true of me). The ISO-30 is designed to assess five dimensions of risk factors related to suicide: Low self-esteem (item 1,6,11,16,21 and 26), Inability to cope with emotions (item 3,8,13,18,23 and 28), hopelessness (item 2,7,12,17,22 and 27), social isolation (item 3,8,13,18,23 and 28) and suicide ideation (5,10,15,20,25 and 30) (Valdés & González, 2019). The first version of this inventory reported coefficient alpha estimate of 0.90 (King & Kowalchuck, 1994) and the Spanish version reported coefficient alpha of 0.87. The reported test-retest was 0.80 (Fernández & Casullo, 2006). In Colombia, this inventory was used in adolescents and reported a high index of internal consistency (α=.83) (Paniagua Suárez et al., 2016).

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 ($\chi 2/df = 1.236$, $GFI = 0.903$, $AGFI = 0.896$, $RMSEA = 0.028$). The internal consistency was 0.92 (Cronbach's alpha) (See table 3).

Coping Strategies Inventory- CSI*;* (Tobin et al., 1989). It is a 40 items Likert-type inventory. The Spanish version was adapted by Cano et al. (2007). Respondents are asked to rate the general frequency with which they used each of eight (8) coping strategies listed in the survey and to indicate their options as follows: 1. Never, 2. Seldom, 3. Often and 5. Almost always (Loayza, 2021). The eight strategies are: Problem solving (item 1,9,17,25,33), cognitive restructuring (item 6,14,22,30,38), social support (item 5,13,21,29,37), emotional expression (item 3,11,19,27,35), problem-avoidance (item 7,15,23,31,39), social withdrawal (item 8,16,24,32,40), desiderative thinking (item 4,12,20,28,36), self-criticism (item 2,10,18,26,34)

(Cano et al., 2007). The reported internal consistency in the Spanish version was 0.85 (Cano et al., 2007).

A confirmatory factor analysis (CFA) was performed using the generalized least squares method to contrast a multidimensional model consisting of the eight coping strategies of the instrument used. Acceptable goodness of fit indices were found ($\chi 2/df = 2.449$, $GFI = 0.980$, $AGFI = 0.928$, $RMSEA = 0.069$). The internal consistency was between 0.73 and 0.85 for the subscales, and 0.87 for the total scale (Cronbach's alpha) (See table 3).

2.3 Procedure and ethical aspects

Ethical approval for this study was obtained from Universidad Católica Luis Amigó. The subject´s decision to participate was voluntary and no compensation was given for participating in the study. Informed consent was obtained from the parents. The research protocol complied with the ethic requirements from the Colombian Law (1090 law from 2006) (confidentiality, respect, integrity, anonymity). This study was also authorized by an academic institution in Armenia (Colombia) to administer the informed consent form.

2.4 Data Analysis

Data were stored in database in excel. First, the authors examined for missed data. Data analysis was performed using SPSS v.25. Then, Cronbach's alpha (α) was used to measure internal consistency (scales and subscales), followed by a CFA to verify that the factor loadings of the items fit a unidimensional model of the ISO-30 inventory and a multidimensional one of the CSI inventory and goodness-of-fit indicators were presented (Byrne, 2016). Third, a descriptive and frequency analysis was performed (sociodemographic characteristics of the sample, suicidal ideation and behavior). The Kolmogorov-Smirnov normality test reported that the variables were not normally distributed ($p>.05$). The Kruskal-Wallis test was used to compare the suicidal ideation and behavior risk segmented by coping strategies. The R Studio Cloud software was used to estimate the effect size of the comparative analysis (computed by eta squared test (η^2)). The authors followed the procedure proposed by Fritz et al. (2012) (small effect =.01, medium effect =.06 and large effect =.14). Finally, a correlation analysis was performed using the Rho Spearman coefficient and a multinomial logistic regression was carried out as well. The aim was to analyze how coping strategies predict suicidal ideation and behavior. Moderate or high suicidal risk were used as the dependent variable and low suicidal risk was the reference category.

3. Results

A risk factor was found (suicidal ideation and behavior) through the Iso-30 inventory (33.6%), (specificity= 20.7%, moderate risk and 12.9% high risk). 14.6% of the sample reported suicidal ideation and 2.9% reported suicidal attempt in the last year. 16.8% of the sample also reported self-injury behavior (cutting, burns, scratches). Table 2 shows the analysis with the Kruskal-Wallis H-test based on the average rank (AR) to corroborate whether there are statistically significant differences between the levels of risk of suicidal ideation and behavior (low, moderate and high) and coping strategies. These findings suggest that the higher the score in solving problems, cognitive restructuring, social support, emotional expression and problem avoidance, the lower the suicidal ideation and behavior risk. Conversely, the higher the score in desiderative thinking, social isolation, self-criticism, the higher the score in suicidal risk. The differences were significant (p<.001) with large effect size (n^2>.14).

Table 2. Suicidal ideation and behavior risk differences segmented by coping strategies

Suicidal ideation and behavior (Iso-30)		***n***	***AR***	***H*** $^{(gl)}$	***p***	n^2
Coping strategies Total	Low risk	205	167.50	12.065$^{(2)}$	.002	.033
	Moderate Risk	64	127.78			
	High Risk	40	134.49			
Problem solving	Low risk	205	186.82	78.845$^{(2)}$	<.001	.251
	Moderate Risk	64	100.00			
	High Risk	40	79.91			
Cognitive Restructuring	Low risk	205	187.85	85.271$^{(2)}$	<.001	.272
	Moderate Risk	64	101.51			
	High Risk	40	72.25			
Social Support	Low risk	205	179.73	50.509$^{(2)}$	<.001	.159
	Moderate Risk	64	119.54			
	High Risk	40	84.99			
Emotional expression	Low risk	205	175.89	35.619$^{(2)}$	<.001	.11
	Moderate Risk	64	124.00			
	High Risk	40	97.53			
Problem Avoidance	Low risk	205	168.17	13.722$^{(2)}$	.001	.038
	Moderate Risk	64	133.52			
	High Risk	40	121.88			
Desiderative Thinking	Low risk	205	141.86	18.698$^{(2)}$	<.001	.055
	Moderate Risk	64	164.71			

	High Risk	40	206.79			
Social Isolation	Low risk	205	121.53	92.158(2)	<.001	.295
	Moderate Risk	64	203.62			
	High Risk	40	248.75			
Selfcriticism	Low risk	205	132.48	55.432(2)	<.001	.175
	Moderate Risk	64	171.22			
	High Risk	40	244.46			

Table 3 shows the results of the correlational analysis between suicidal ideation and behavior and coping strategies. These results suggest that problem solving, cognitive restructuring, social support, emotional expression and problem avoidance negatively correlated (p<.001) with suicidal ideation and behavior (Iso-30). Besides, desiderative thinking, social isolation and self-criticism strategies showed positive correlations (p<.001) with suicidal ideation and behavior (Iso-30). All coping strategies assessed showed statistically significant correlations with suicidal ideation and behavior (Iso-30).

Table 3. Correlation between suicidal ideation and behavior and coping strategies

Variables	Suicidal ideation and behavior (Iso-30)		
	α	***Rho***	***p***
Coping styles total	.87	-,235	<.001
Problem solving	.83	-.575	<.001
Cognitive restructuring	.85	-.594	<.001
Social support	.83	-.484	<.001
Emotional expression	.73	-.382	<.001
Problem Avoidance	.73	-.252	<.001
Desiderative Thinking	.80	.232	<.001
Social Isolation	.78	.639	<.001
Selfcriticism	.83	.481	<.001
Iso-30	.92	----	----

Table 4 shows the multinomial logistic regression model (introduction method) to determine the relationship between coping strategies and moderate/high suicidal ideation and behavior risk. The low risk factor is assumed as a reference category. The Odds Ratio (OR) show how the risk odds increase according to the variance of the factors evaluated. The β values determine if the odds increase or decrease. The model reported proper goodness of fit (verisimilitude log-2=341.329; Chi-squared test=191.994; df=16; p<.001) and goodness of fit (Pearson chi-squared test= 472.390; df=600; p=.998). The independent variables explained between 46% (R^2 Cox y Snell=.462) and 56% (R^2 Nagelkerke=.563) the variance of the suicidal ideation and behavior

risk. Besides, problem solving contributed a significant effect (p<.01) that diminishes the odds of moderate (*OR*=.854), high suicidal risk (*OR*=.786). On the contrary, social isolation increased the odds of moderate (*OR*=1.184), high suicidal risk (*OR*=1.228) and self-criticism increased 1.3 times (*OR*=1.278) the odds of suicidal ideation and behavior in scholar adolescents who reported high risk. The remaining variables did not contribute a significant effect (p<.05).

Table 4. Multinomial logistic regression: Effects of coping strategies on suicidal ideation and behavior risk

Suicidal ideation and behavior		*β*	*SE*	*χ2Wald*	*df*	*p*	*OR*	*IC 95% OR*	
Iso-30*								Lower	Upper
Moderate	Problem solving	-.157	.057	7.533	1	.006	.854	.764	.956
Risk	Cognitive restructuring	-.064	.061	1.123	1	.289	.938	.833	1.056
	Social support	-.009	.041	.047	1	.828	.991	.914	1.074
	Emotional expression	.013	.049	.073	1	.787	1.013	.921	1.115
	Problem Avoidance	-.041	.056	.538	1	.463	.960	.861	1.071
	Desiderative Thinking	.029	.039	.548	1	.459	1.030	.953	1.112
	Social Isolation	.169	.051	10.926	1	.001	1.184	1.071	1.309
	Selfcriticism	.051	.043	1.366	1	.242	1.052	.966	1.145
High Risk	Problem solving	-.241	.082	8.612	1	.003	.786	.669	.923
	Cognitive restructuring	-.077	.086	.806	1	.369	.926	.782	1.096
	Social support	-.056	.054	1.114	1	.291	.945	.851	1.050
	Emotional expression	-.026	.068	.147	1	.702	.974	.853	1.113
	Problem Avoidance	-.013	.073	.033	1	.856	.987	.855	1.139
	Desiderative Thinking	.031	.060	.256	1	.613	1.031	.916	1.160
	Social Isolation	.206	.071	8.400	1	.004	1.228	1.069	1.412
	Selfcriticism	.245	.061	15.890	1	<.001	1.278	1.133	1.441

*Reference category: Low Risk. **Note:** β = beta coefficient; SE = standard error; Wald = Contrast power; DF= degree of freedom; p = statistical significance; OR = Odds Ratio (β).

4. Discussion

The aim of this paper was to analyze the predictive effect of coping strategies on the risk for suicidal ideation and behavior in adolescents from Armenia (Colombia). The prevalence of suicide risk in scholar population was 33.6% (specificity= 20.7%, moderate risk and 12.9% high risk). 14.6% of the sample reported suicidal ideation and 2.9% reported suicidal attempt in the last year. Several studies in Colombia have shown that the average risk of suicide in scholar population was 25% (hopelessness feelings, social isolation, suicide attempt or ideation)

(Andrade & Gonzáles, 2017; Ceballos et al., 2015; Fuentes et al., 2009; Gómez et al., 2020a, 2020b; Núñez et al., 2022; Siabato et al., 2017; Villalobos, 2009). The most common risk factors are adverse events, child abuse, physical, psychological and sexual abuse, bullying, history of suicide attempts, use of drugs, family neglect. (Gómez, 2021a, 2021b; Mortier et al., 2018; Tan et al., 2016). These are also strong psychosocial predictors of suicidal behavior in adolescents.

On the other hand, desiderative thinking, social isolation and self-criticism strategies showed positive correlations with suicidal ideation and behavior and higher scores in high suicidal risk adolescents when compared with low and medium risk. Furthermore, social isolation (*OR*= 1.2) and self-criticism (*OR*= 1.3) contributed a predictor effect that increased the odds of high suicidal ideation and behavior risk. These findings agree with other studies due to the restricted possibilities to handle impulsivity and emotional distress, tolerate frustration and finding possible solutions to cope with adverse events (psychosocial stress) which might increase suicidal risk in adolescents (Bahamón et al., 2019; Liang et al., 2020; Mirkovic et al., 2015; Nava et al., 2010; Oktan, 2021; Zhang et al., 2012). In regard to this point, a study by Solla y Morales (2021) found that strategies aimed at self-criticism, desiderative thinking and social isolation positively associate with anxiety, stress and suicide risk. Adolescents that lack social skills and self-condemnation behavior are prone to use coping strategies like social isolation and self-criticism which are risk factors of suicidal behavior (Bahamón et al., 2019).

These results suggest that withdrawn behavior, social isolation and proneness to self-sanctions are risk factors that increase suicide risk/attempt (Benatov et al., 2020). These findings are also similar to other studies that explain that social isolation and self-criticism positively correlate with suicidal ideation and behavior (Liang et al., 2020; Mathew & Nanoo, 2013; Mirkovic et al., 2015). Problem solving also contributed an effect that decreased the odds of high risk of suicidal ideation and behavior which is consistent with a longitudinal study by Nrugham and colleagues (2012) that reported that adolescents without history of suicide attempt compared to peers with previous suicide attempt showed a higher tendency to use problem solving and cognitive restructuring strategies. Further studies showed that strategies aimed at problem solving guide thinking and behavior to solve an adverse event. They are also related lower rates of suicide behavior in adolescents (Benatov et al., 2020, Gould et al., 2004, Mathew & Nanoo, 2013).

In regard to other coping strategies, this study found that problem solving, cognitive restructuring, social support, emotional expression and problem avoidance negatively correlated with suicidal ideation and behavior. However, problem solving was the only variable to contribute a direct effect that decreased the odds of both moderate (*OR*=.85) and high suicidal

risk (*OR*=.79). According to Zhang and colleagues (2012) these strategies are highly adaptive to regulate and cope with negative emotional states and handle adverse events. These findings are in line with similar psychological studies in adolescents (Bahamón et al., 2019; Liang et al., 2020; Solla & Morales, 2021), and point out that problem solving diminish emotional discomfort and stress by adjusting the event (Cano et al., 2007), and contribute to a decline in suicidal ideation and behavior (Nrugham et al., 2012; Mathew & Nanoo, 2013; Mirkovic et al., 2015). The results of the present research allow us to conclude that the stress coping strategies used by adolescents have an important impact on the risk of suicidal ideation and behavior. Therefore, these findings allow to design state programs aimed at scholar population to promote social and emotional strategies to prevent suicide behavior.

5. Limitations, future research and implications

This study has some limitations. First, this study did not ask for symptomatology at the assessment phase that could trigger suicidal ideation and behavior. Second, this cross-sectional study did not show changes over time. Thus, the effect of coping strategies on suicidal ideation and behavior is unknown. Third, since this was a non-clinical sample, results cannot be generalized to adolescent psychopathology. Finally, data were collected through self-reports and this implies convenience bias.

Consequently, future research should address other psychosocial and clinical features that mediate or moderate the association between stress coping strategies and suicidal behavior in adolescents. We also suggest the design of a longitudinal study with both clinical and non-clinical samples (e.g., parents, teachers, relatives).

These results contribute data about the impact of coping strategies on suicidal risk in adolescents and thus, we promote the development of social and clinical interventions focused on problem solving, social support and emotional expression to improve mental health and diminish suicidal behavior risk in adolescents.

On the other hand, these strategies should teach adolescents how to improve their internal locus of control. Other studies showed that promoting coping skills aimed at problem solving increase the internal locus of control (Myles, 2021a, 2021b; Myles & Merlo, 2022). Besides, it is relevant that clinical and non-clinical institutions rely on evidence-based medicine protocols to ease suicidal risk in adolescents.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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Availability of data

Data available on request due to privacy/ethical restrictions

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