

Examining the Mediating Role of Coping and Emotion Regulation in Stress Models in Adolescents

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Abstract

The aim of this research was to analyze the relationship between stressful events, coping, and emotion regulation in adolescents from marginalized settings. A cross-sectional study was conducted with 523 adolescents aged 13 to 15 years. The Global Scale of Perceived Stress for Adolescents, the Coping Scale for Adolescents, and the Multidimensional Scale of Emotion Regulation for Adolescents, were used. Several mediation models were tested considering whether coping mediated the relationship between stressful events and emotion regulation responses, or, on contrary, emotion regulation assumes a mediating role between stressful events and coping. Data indicate significant direct and indirect effects in all models, with the highest explained variance in the models which included emotion regulation as a mediating variable. Results are discussed considering the role of coping and emotion regulation as mediating variables, and their relationship with diverse stressful events. In this research, emotion regulation strategies lead to adolescent coping.

Keywords: adolescence; coping; emotion regulation; marginalized settings; mediation analysis; sobel test; stress

Running head: Mediating role of coping and emotion regulation in stress models

Introduction

From a transactional perspective, stress is a dynamic and complex process that emerges when an individual perceives internal or external demands as threatening, challenging or harmful [1]. So, stress is a consequence of the interaction between both the individual and the environment. Conceptual models of stress in adolescence [2, 3, 4] propose that stressful life events are determined when the adolescent's assessment of the situation or environmental conditions is experienced as a threat [5, 6]. Stress in adolescence are often relational nature associated with family, school, and life project, which may include puberty concerns, conflicts with peers and family, academic problems, school transitions, initiating and maintaining romantic relationships [4]. There are, a large variability of responses to stress, due to individual factors, such as, subjective appraisal and perceived control of situation, associated with gender and age [4, 6]. For example, girls report more stressors in interpersonal domain and react higher, whereas boys report more stressors related with academic issues and lower gradient of stress [7, 8]. Also, contextual factors, for example, sources or domain of stress [8], the characteristics of a stressor situation (e. g. kind of stressor, frequency, intensity), as suggested by Fluori and Kallis [9], are elements that should be considered in research with adolescents. Events can be major life events, which affect

many adolescents with a great emotional impact (e.g. death of parents) and minor life events (e.g. physical changes) and daily life events or daily hassles, with high frequency but apparently with less emotional impact [5]. Therefore, both major or minor life events in diverse domains could represent a potential threat to the well-being and healthy development of adolescents via accumulation, so, daily hassles, can lead negative outcomes as depression or anxiety, in the same way that major life events [2, 10]. There is evidence that intensity of stress depends on perceived control of situation as well as the way of coping of adolescent [6, 11]. However, adolescents are not passive receptors to environmental demands, they can actively determine their environment [12]. In this sense, coping is a mechanism that involves cognitive and behavioral effort oriented to manage, reduce, minimize, or tolerate external and internal demands that generate stress [2]. During adolescence, coping implies dealing with stressors through concrete actions to face or avoid the situation, so, coping can be functional or dysfunctional. Functional or active coping involves efforts to manage the situation or problem which has been associated with positive outcomes and resilience [12, 13, 14], such as, prosocial behavior despite adverse events [9], or social competence facing stressful interpersonal relationships [15]. On the other hand, dysfunctional or passive coping involved avoiding the source of stress due to an anticipated negative appraisal of the situation and the own

resources to deal with, so, is related with negative outcomes, for example, victimization [16], internalizing behaviors [17], and suicide risk [18]. Coping is a fundamental adaptive process which involves the regulation of multiple subsystems (e. g. emotion and attention) that are activated by stress and which also show regular development according to how this regulation is achieved [14]. However, more recently it has been proposed that coping and emotion regulation are different, but at the same time, linked adaptive mechanisms [19, 20].

Emotion regulation implies responses aimed at the generation and modulation of emotions, that is, involves extrinsic and intrinsic processes of supervision, evaluation and modification of emotional expression specially their intense and temporal characteristics in order to maintaining, increasing or suppressing an ongoing affective state [21, 22]. Although emotions can arise in response to stressful and adverse situations, emotions can occur as part of ongoing normative experiences of daily lives that do not involve stressful events or adverse circumstances [20, 23]. Studies showed that negative strategies of emotion regulation, such as, expressive suppression, are linked to negative outcomes, such as, maladaptive social functioning and internalizing problems [24], whereas positive strategies, are associated with adaptive behavior and psychological adjustment, nevertheless, depend on the context and the source of stress, therefore, it is important examining the interplay of both coping and emotion regulation at different situations or stressors. In addition, recent research indicates gender differences on coping and emotion regulation strategies, with girls using problem-solving coping strategies, emotional expression, wishful thinking and rumination, more often than boys, however, boys use more positive thinking, cognitive restructuring, and acceptance than girls did [25] and boys have difficulty regulating negative emotions according to contextual demands and thus may lead them to show, for example, greater levels of unmodulated anger, and used suppression more often than avoidance. [26].

Summarizing, coping and emotion regulation are important processes in mental health, maintenance of a wide range of psychological disorders and psychopathology during adolescence [19]. So the adolescent mental health outcome can be considered as result of the complex interaction of coping and emotional mechanisms which involved diverse individual and contextual variables [27], for example, the characteristics and nature of stressor which are important issues involved in coping and emotion regulations responses [4, 10, 11]. So, ability to cope with stressful events and regulate emotions through situations, takes account the individual's resources and the interactional context in which adolescent development take place [3] contributing in building resilience and reducing risk of psychopathology during childhood and adolescence [11, 12, 14].

Although some contextual conditions cannot be changed, programs that involve the teaching of coping strategies [3], emotional regulation skills [28], and ways of reframe the perception of events, or cognitive reappraisal [29], could be designed from a preventive intervention perspective aimed to teach productive way of coping and positive emotion regulations strategies during adolescence to improve resilience [30].

Summarizing, despite the extensive research on coping and emotion regulation, examining their relationship is important since controversies remain about their relationship. Some researchers suggest that coping and emotional regulation are different but related processes [19, 20], whereas others refer to emotion regulation process as if they were coping strategies [23]. In addition, some types of stressors, as daily stressors or daily hassles, have been less studied in comparison with major events, in relationship with emotion regulation, even though the daily stressors have been linked with psychopathology, due their seeming emotional low impact; however, they are high probability of occurs in social risk and marginalized contexts [31], impacting the physical and well-being, due ineffective coping and emotion regulation strategies [32, 33].

So, we ask some questions: is coping mediator between stressful situations and emotional responses? or conversely, emotion management leads the way of the adolescent cope with stressful situations? Strategies of coping and emotion regulation change depending on the stressful situation? The general purpose of this study was to analyze the relationship between stressful events, coping, and emotion regulation. Therefore, this study examined whether coping mediated the relationship between stressful events and emotion regulation responses, or, on contrary, emotion regulation assumes a mediating role between stressful events and coping.

The general conceptual model guiding the current study propose as an independent variable, the specific source of stress or type of stressors, mediating the emotional responses by coping (path a) or the specific sources of stress or stressors, mediating the coping strategies by emotional responses (path b). We expect that: a. Type of stressful events, coping and emotion regulation strategies are related; b. The way of coping and emotion regulation strategies change depending on type of stressful events; c. Coping is a mediator between stressful events and emotion regulation strategies; and d. Emotion regulation strategies are mediator between stressful events and coping.

Method

Participants

A sample of 523 adolescents aged between 13 and 15 years old was intentionally selected ($M = 13.89$; $SD = .777$). Participants were students from public high schools in marginalized metropolitan areas of Mexico City. According to the National Population Council of Mexico [34], marginalized areas are characterized by low development rates ranging from 1,10318 to 1,22461, with overcrowding, a high rate of violence, poor health and education services, and low income [35]. As part of the inclusion and exclusion criteria, only students from high school located in marginalized areas of Mexico City were included in this research. A cross-sectional correlational study was conducted.

Measures

To assess the stress responses, the Global Scale of Perceived Stress for Adolescents was used [36]. This scale consists of 48 items in a Likert scale of six points ranging from 0 to 5 (0 = It did not happen to me, 1 = It does not stress me, 2 = It stresses me little, 3 = It stresses me regularly, 4 = It stresses me a lot, 5 = It stresses me too much). Six factors are evaluated: 1. Critical events ($\alpha = .765$) refers to unexpected and non-normative life events such as losses and accidents (e. g. "death of any of the parents") ; 2. Daily hassles ($\alpha = .756$) identifies some daily events, which can be perceived as stressful, for example, not having internet or lack of transportation; 3. Social exposure ($\alpha = .807$) explores situations in which adolescents may feel socially exposed, such as going to parties or traveling to school; 4. Family concerns ($\alpha = .788$) assesses events that may occur in a family context and generate financial pressure, for example lack of money to buy school supplies; 5. Academic stressors ($\alpha = .799$) refers to events that can occur within the school context and that can generate pressure such as having too much homework or exposing in class; and 6. Social pressure ($\alpha = .763$) includes situations related to limitations in social interaction and perception of difficulties in relating to others. The six factors explain the 46.69% of the variance and show a global Cronbach's alpha of .962.

The Coping Scale for Adolescents (EA-A) was administrated [37]. The scale includes 27 items on a five-point Likert scale (1= strongly disagree, 2= disagree, 3=neutral, 4= agree, 5= strongly agree). The scale evaluates seven factors: 1. Positive thinking and seeking solutions ($\alpha = .89$) allows evaluating efficient coping strategies aimed at solving the problem and approaching it in a positive way (e. g. "I try to change things so that the problem does not recur"); 2. Physiological responses related to anxiety

($\alpha = .82$) is an aspect of coping related to the possibility of developing physical illnesses (e. g. *"I feel my heartbeat"*); 3. Obsessive thoughts and hopelessness ($\alpha = .74$) identifies dysfunctional strategies that involve negative thoughts and emotions that revolve around the problem (e. g. *"I think about the problem a lot and I can't get it out of my head"*); 4. Seeking family support ($\alpha = .84$) refers to resorting to passive or active family intervention to solve the problem and obtain emotional support (e. g. *"I discuss the problem with my parents and siblings for advice"*); 5. Passive avoidant ($\alpha = .65$) strategies that represent the denial and repression of the problem, which are reflected in attitudes and actions that lead to immobility or withdrawal (e. g. *"I don't care about the situation"*); 6. Seeking social support ($\alpha = .64$) assesses the use of social resources, such as tools for solving the problem or emotional support (e. g. *"I ask advice from a friend to solve the problem"*); and 7. Religion ($\alpha = .68$) implies resorting to religious beliefs to lessen the discomfort generated by a stressful or problematic situation (e. g. *"I seek relief in religion"*). The total scale explains 51.58% of the variance.

The Multidimensional Scale of Emotion Regulation for Adolescents was used [38]. The scale includes 47 items on a five-point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The scale is distributed in eight factors that explain 49.3% of the variance: 1. Recognition of positive emotions ($\alpha = .930$) allows to identify and differentiate the positive emotions that the individual experiences (e. g. *"I can recognize when I'm glad"*); 2. Expression of positive emotions ($\alpha = .870$) is the behavioral manifestation of positive emotions and involves interaction with other people (e. g. *"When I have positive emotions, I express them"*); 3. Emotional control ($\alpha = .848$) refers to the perception of the individual about the domain of the emotions and the way of expressing them (e. g. *"I think I have control over my negative emotions"*); 4. Suppression ($\alpha = .941$) is the inhibition of the expressive behavior of the emotion that is being experienced (e. g. *"I usually hide that I feel sad"*); 5. Cognitive change ($\alpha = .852$) assesses the modification of the perception of the situation in addition to directing attention within the situation in order to influence emotion (e. g. *"When I feel sad, I think of things that make me feel better"*); 6. Physical responses ($\alpha = .906$) refers to physical and physiological indicators of the emotional process in progress (e. g. *"When I feel fear, I start to cry"*); 7. Recognition of negative emotions ($\alpha = .953$) allows the identification and distinction of the negative emotions that is being experienced (e. g. *"I can recognize when I'm sad"*); 8. Difficulty to regulate ($\alpha = .915$) the behavioral manifestation of negative emotions in an exaggerated way (e. g. *"I break things when I feel angry"*).

Procedure

Authorization was requested from school authorities. For ethical issues participants received information regarding the study purpose and procedure and the voluntary nature and anonymous of the evaluation. Informed consent was obtained before administering the scales according to national and international ethical standards [39, 40]. The evaluation was carried out by two psychologists, in groups of 30 students and it took them, about 50 min to answer.

Statistical analyses

Descriptive statistics, mean differences, bivariate and multivariate correlations analyses were performed with SPSS 24. Mediation models were carried out within a regression framework as described by Baron and Kenny [41]. The initial variable, the mediating variable and the outcome variable were analyzed to be significantly correlated. It was also evaluated that the initial variable and the mediating variable were significant predictors of the outcome variable in separate regression equations. It was analyzed whether the proposed mediator totally or partially mediated the relationship between the initial variable and the outcome variable. It was evaluated whether the proposed mediator mediates or partially mediates

the relationship between the initial variable and the outcome variable. The Sobel test was used to assess whether the indirect effect was significant [42], since it provides a more direct test of an indirect effect and tests the product of the path that represents the relationship between the independent variable and the mediator and the path that represents the relationship between the mediator and the dependent variable [43]. The mediation analysis and the Sobel's test were performed with the MedGraph-I [44].

Results

Table 1 reports data of 523 adolescents, considering the variables of gender, age, family type, and monthly income. The table shows that almost half of adolescents belong to a nuclear family, and a quarter live with only one parent. Regarding the monthly economic income, it is shown that 15.3% report less than 125 dollars, and around half of the participants report an income between 125 and 335 dollars. According to the data provided by the National Institute of Statistics and Geography [35], the average total monthly income per household was 844.21 dollars. These data, compared to our sample, indicate that half of the participants in this study are well below the national average.

Variables	n (%)
Gender	
Male	266 (50.9%)
Female	257 (49.1%)
Age	
13	185 (35.4%)
14	208 (39.8%)
15	130 (24.9%)
Family type	
Nuclear family	254 (48.6%)
Only one parent	133 (25.4%)
Extended family	98 (18.7%)
Another type	38 (7.3%)
Family monthly income	
Less than \$125	80 (15.3%)
Between \$125 and \$225	128 (24.5%)
Between \$225 and \$335	110 (21.0%)
Between \$335 and \$425	77 (14.7%)
Between \$425 and \$525	54 (10.3%)
Between \$525 and \$625	30 (5.7%)
More than \$625	27 (5.2%)
Does not know	17 (3.3%)

Table 1: Participant sociodemographic information

A mean difference analysis by gender was performed, and the results are shown in Table 2. Statistically significant differences were observed in critical events, daily hassles, and school stressors, with girls scoring higher than boy. In emotion regulation strategies such as recognition and expression of positive emotions, suppression, physical responses, and difficulty to regulate, girls obtained the highest scores. For coping strategies, differences by gender were observed in positive thinking and seeking solutions, obsessive thoughts and hopelessness, and seeking social support, with the highest means for girls. However, the effect size of these differences was small [45], therefore the entire sample was considered for subsequent analyzes.

Variables	Total sample N= 523		Boys n= 266		Girls n= 257		t	p	Cohen's d
	M	SD	M	SD	M	SD			
Stressors									
Critical events	2.65	1.28	2.53	1.11	2.77	1.43	-2.11	.035	.187
Daily hassles	2.80	.963	2.68	.877	2.92	1.03	-2.84	.005	.250
Social exposure	2.66	.786	2.65	.757	2.66	.817	-1.06	.916	.012
Family concerns	2.38	1.00	2.38	.931	2.39	1.07	-1.35	.892	.009
School stressors	3.14	.845	2.98	.773	3.31	.886	-4.48	.000	.396
Social pressure	2.49	.920	2.56	.879	2.42	.957	1.82	.069	.152
Coping strategies									
Positive thinking and seeking solutions	3.10	.802	3.02	.796	3.18	.801	-2.31	.021	.200
Physiological responses related to anxiety	2.30	.812	2.24	.753	2.37	.866	-1.81	.070	.160
Obsessive thoughts and hopelessness	2.32	.741	2.26	.678	2.39	.796	-2.11	.035	.175
Seeking family support	2.79	1.05	2.77	1.01	2.82	1.10	-.570	.569	.047
Passive avoidant	2.81	.710	2.78	.670	2.84	.749	-.931	.352	.084
Seeking social support	3.03	.953	2.89	.896	3.18	.989	-3.53	.000	.307
Religion	2.04	1.03	2.05	1.02	2.02	1.05	.282	.778	.028
Emotion regulation									
Recognition of positive emotions	3.79	.638	3.71	.620	3.87	.647	-2.91	.004	.252
Cognitive change	3.27	.729	3.32	.709	3.21	.748	1.67	.094	.150
Physical responses	2.65	.730	2.43	.696	2.88	.693	-7.45	.000	.647
Difficulty to regulate	2.79	.797	2.64	.726	2.94	.839	-4.25	.000	.382
Expression of positive emotions	3.86	.750	3.78	.744	3.94	.750	-2.41	.016	.214
Recognition of negative emotions	3.95	.652	3.91	.660	3.98	.643	-1.30	.191	.107
Suppression	3.21	.649	3.09	.640	3.35	.632	-4.66	.000	.408
Emotional control	3.14	.652	3.19	.665	3.09	.635	1.86	.063	.153

Table 2: Mean differences between boys and girls

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 CE	.72**	.22**	.69**	.33**	.33**	.07	.15**	.19**	-.03	.09*	.04	.10*	.01	-.14**	.12**	.12**	.00	.01	.09*	.03
2 DH	-	.37**	.60**	.47**	.44**	.06	.26**	.27**	-.08	.13**	.09*	.08	.06	-.12**	.21**	.21**	.09*	.06	.14**	-.01
3 SE		-	.31**	.34**	.43**	.04	.23**	.22**	.08	.14**	.02	.24**	-.02	.01	.20**	.14**	.05	-.03	.06	-.02
4 FC			-	.27**	.51**	.02	.24**	.26**	-.01	.05	.02	.17**	.01	-.06	.18**	.15**	.05	.00	.09*	.02
5 SS				-	.28**	.27**	.15**	.14**	.13**	.23**	.20**	.15**	.13**	.00	.15**	.11*	.10*	.16	.09*	.04
6 SP					-	-.02	.27**	.30**	.00	.10	.02	.21**	-.06	-.06	.23**	.21**	.07	-.05	.06	-.02
7 PTSS						-	-.02	.27**	.30**	.00	.10*	.02	.21**	-.06	-.06	.23**	.21**	.07	-.05	.06
8 PRRA							-	.60**	.12**	.22**	.11**	.29**	.04	.00	.36**	.34**	.08	-.03	.17**	.03
9 OTH								-	-.01	.25**	.09*	.30**	-.09*	-.17**	.38**	.36**	-.02	-.08	.22**	-.07
10 SFS									-	.23**	.47**	.27**	.34**	.30**	.03	-.12**	.18**	.21**	-.07**	.16**
11 PA										-	.42**	.16**	.15**	.11*	.11*	.03	.10*	.16**	.13**	.10*
12 SSS											-	.18**	.36**	.26**	.09*	.00	.25**	.24**	.00	.12**
13 R												-	.09**	.17**	.22**	.10*	.13**	.09*	.01	.06
14 RPE													-	.47**	.10*	.00	.59**	.48**	.09*	.46**
15 CC														-	.07	-.09*	.35**	.24**	.04	.42**
16 PR															-	.53**	.17**	-.02	.38**	.10
17 DR																-	.11*	-.01	.41**	.06
18 EPE																	-	.31**	.10*	.22**
19 RNE																		-	.09*	.32**
20 S																			-	.12**
21 EC																				-

*p<.05. **p<.01

Note. N=523. 1. Critical events; 2. Daily hassles; 3. Social exposure; 4. Family concerns; 5. Scholar stressors; 6. Social Pressure; 7. Positive thinking and seeking solutions; 8. Physiological responses related to anxiety; 9. Obsessive thoughts and hopelessness; 10. Seeking family support; 11. Passive avoidant; 12. Seeking social support; 13. Religion; 14. Recognition of positive emotions; 15. Cognitive change; 16. Physical responses; 17. Difficulty to regulate; 18. Expression of positive emotions; 19. Recognition of negative emotions; 20. Suppression; 21. Emotional control.

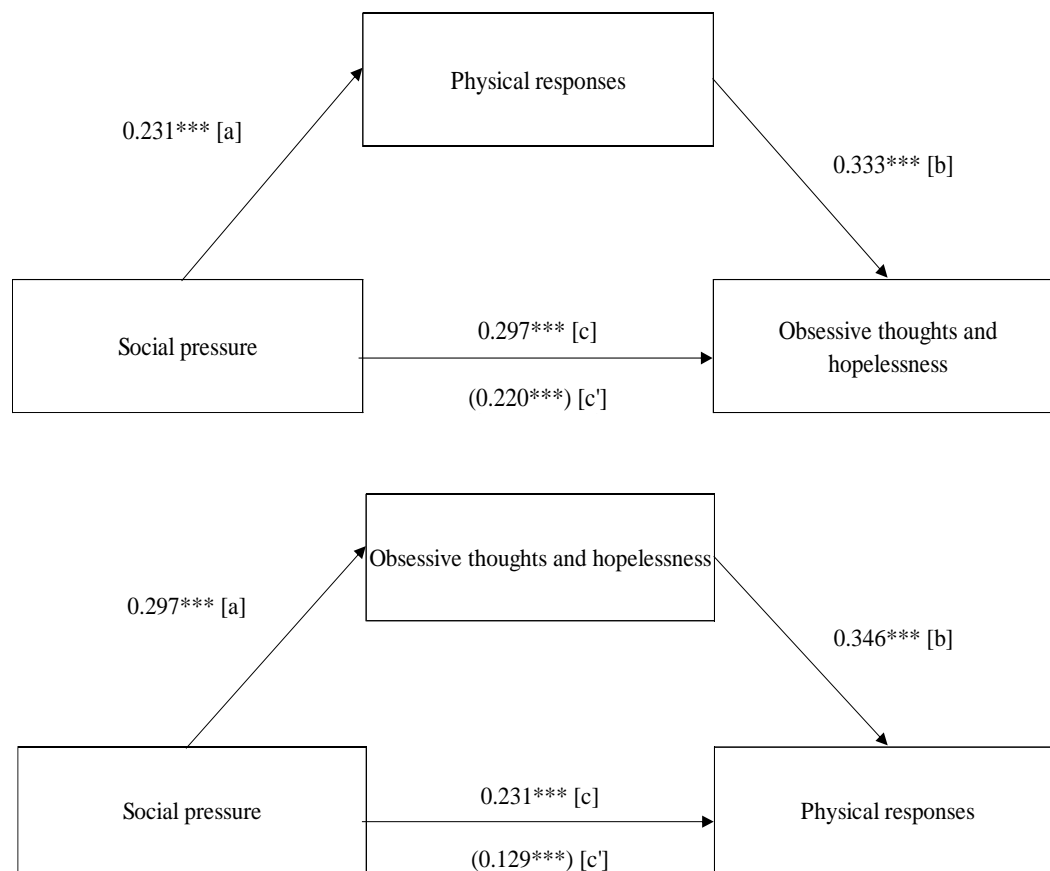
Table 3: Pearson's correlations between stressors, coping and emotion regulation strategies (N= 523)

Table 3 shows the results of the Pearson's correlation analysis between stressful events, coping and emotion regulation strategies. It was observed low to moderate statistically significant correlation coefficients between variables.

Mediation models were conducted based on proposed by Baron and Kenny [42], therefore, linear regression analyzes were performed using the enter method. The assumptions of homoscedasticity, independence of errors, non-collinearity, and normality were verified. Mediation analyzes were carried out to assess the direct relationship between stressful events and coping, and how this relationship changes when emotion regulation is included as a mediating variable. The direct relationship between stress and emotion regulation was also analyzed, and the change in this relationship with the inclusion of coping as a mediating variable.

Models one and two are shown in figure 1. In the first model, social pressure was considered as the initial variable, the dependent variable was obsessive thoughts and hopelessness, and the mediating variable was

physical responses such as emotion regulation. The results of this model showed that the indirect effect of physical responses was significant (estimate = .076; Sobel's test = 4.52; 95% CI [.03-.08]; $p < 0.001$). The direct effect of social pressure on obsessive thoughts and hopelessness was significant ($\beta = 0.220$; $p < 0.001$) and it was smaller than the total effect ($\beta = 0.297$; $p < 0.001$). It was found that the whole model was significant ($F(2-520) = 62.38$, $p < 0.001$) and explained 19.4% of the total variance of obsessive thoughts and hopelessness. In the second model remained initial variable social pressure, physical responses as the dependent variable, and obsessive thoughts and despair as mediating variable. In this model, the indirect effect of the obsessive thoughts and hopelessness coping strategy was significant (estimate = .102; Sobel's test = 5.36; 95% CI [.05-.11]; $p < 0.001$). Also, it was observed that the total effect of social pressure on physical responses ($\beta = 0.231$; $p < 0.001$) was greater than the direct effect ($\beta = 0.129$; $p < 0.001$). The whole model explained 16.3% of the variance of physical responses and was significant ($F(2-520) = 50.52$, $p < 0.001$).



*** $p < .001$

Figure 1: Mediating models of social pressure with physical responses and obsessive thoughts and hopelessness as mediating variables

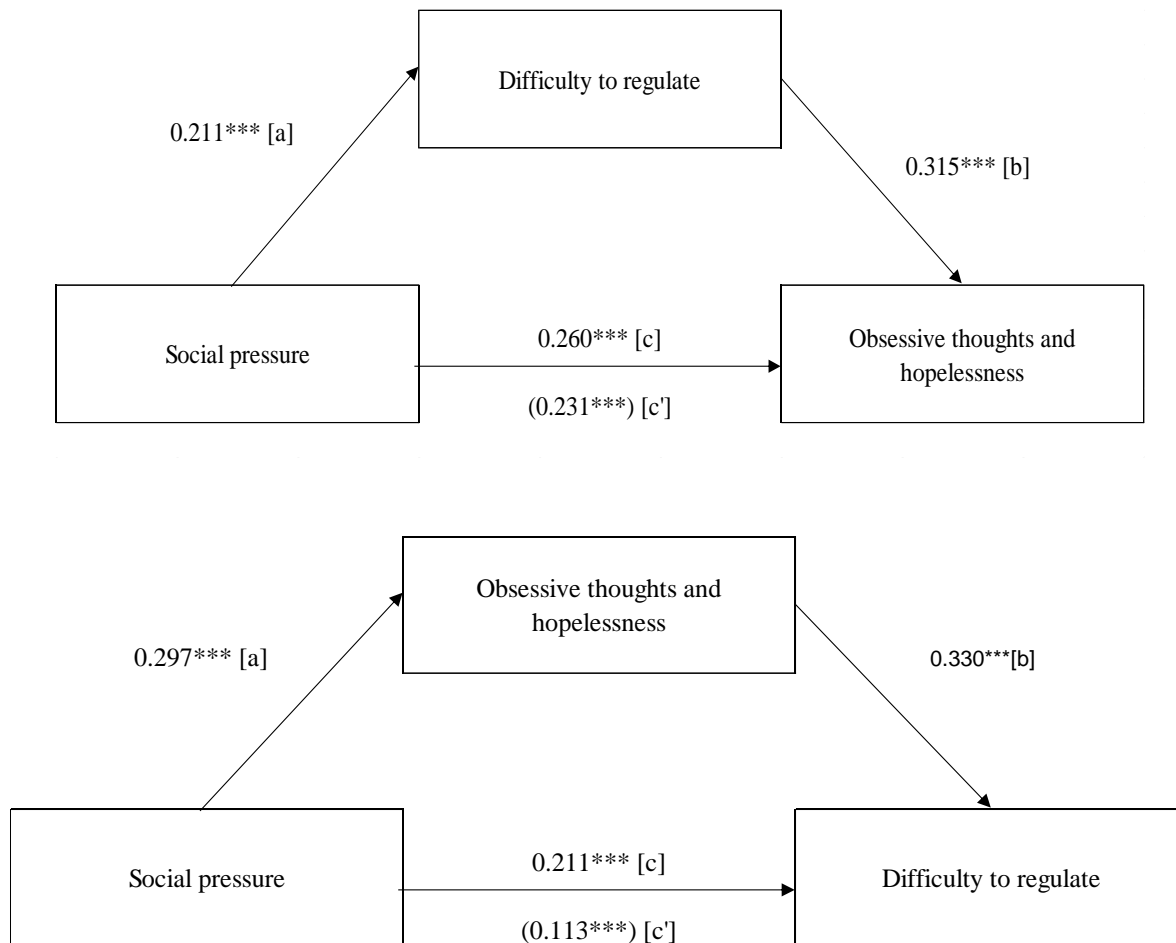
Note. For the first model, social pressure was the initial variable, the dependent variable was obsessive thoughts and hopelessness, and as a mediating variable the physical responses of emotion. For the second, the dependent variable and the mediator were exchanged. Path values indicate standardized regression coefficients (a, b, c) and c' represents the direct effect.

The results of the mediation analysis with social pressure as the independent variable, obsessive thoughts and hopelessness as the dependent variable, and difficulty to regulate as the mediating variable

are shown in figure 2. The indirect effect of difficulty to regulate on obsessive thoughts and hopelessness was significant (estimate = 0.066; Sobel test = 4.16, 95% CI [0.02, 0.07]; $p < 0.001$), as was the total effect of social pressure on obsessive thoughts and hopelessness ($\beta = 0.260$; $p < 0.001$). The direct effect of social pressure on coping strategy obsessive thoughts and hopelessness ($\beta = 0.231$; $p < 0.001$) was smaller than was the total effect. This model was significant ($F(2-520) = 58.32$, $p < 0.001$) and explained the 18.3% of the total variance of obsessive thoughts and hopelessness.

Another model was carried out with social pressure as the initial variable, the difficulty to regulate as the dependent variable and obsessive thoughts and hopelessness as the mediating variable (figure 2). The indirect effect of obsessive thoughts and hopelessness on difficulty to regulate was significant (estimate = 0.098; Sobel's test = 5.19, 95% CI [0.05, 0.11]; $p < 0.001$).

A significant direct effect of social pressure on the difficulty to regulate was obtained ($\beta = 0.113$; $p < 0.01$) and this was smaller than the total effect ($\beta = 0.211$; $p < 0.01$). The whole model explains the 14.4% of total variance of difficulty to regulate and was significant ($F(2-520) = 43.75$, $p < 0.001$).



*** $p < 0.001$

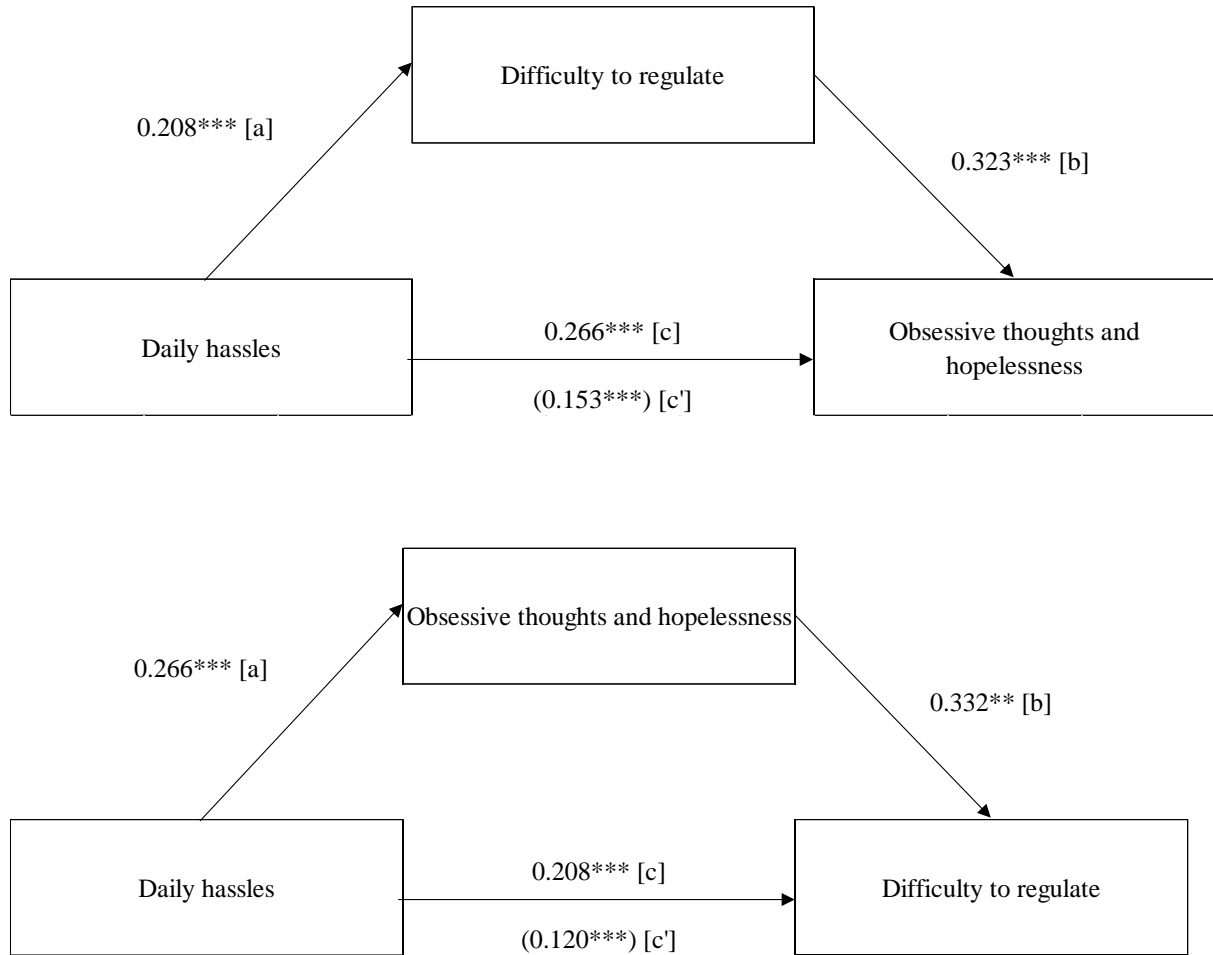
Figure 2: Mediating models of social pressure with difficulty to regulate and obsessive thoughts and hopelessness as mediating variables

Note: For the first model, social pressure was the initial variable, the dependent variable was obsessive thoughts and hopelessness, and as a mediating variable the difficulty to regulate. For the second, the dependent variable and the mediator were exchanged. Path values indicate standardized regression coefficients (a, b, c) and c' represents the direct effect.

A model was carried out with daily hassles as the independent variable, obsessive thoughts and hopelessness as the dependent variable, and the difficulty to regulate emotions as the mediating variable (Figure 3). The indirect effect of difficulty to regulate on obsessive thoughts and hopelessness was significant (estimate = 0.067, Sobel's test = 4.17, 95% CI [0.02, 0.07], $p < 0.001$). The total effect of daily hassles on obsessive thoughts and hopelessness was significant ($\beta = 0.266$; $p < 0.001$), and the direct effect of daily hassles on obsessive thoughts and hopelessness ($\beta =$

0.153; $p < 0.001$) was also significant and smaller than the total effect. This model was significant ($F(2-520) = 53.29$, $p < 0.001$) and explain 17% of the total variance of obsessive thoughts and hopelessness.

To examine whether the obsessive thoughts and hopelessness mediates the association between daily stressors and the difficulty to regulate emotions, a simple mediation analysis was carried out (Figure 3). The results showed that the indirect effect of obsessive thoughts and hopelessness on the difficulty to regulate was significant (estimate = 0.088, Sobel's test = 4.87, 95% CI [0.04, 0.10], $p < 0.001$). The direct effect of daily hassles on the difficulty to regulate was significant ($\beta = 0.120$; $p < 0.001$), and this effect was smaller than the total effect ($\beta = 0.208$; $p < 0.001$). It was found that this model was significant ($F(2-520) = 44.33$, $p < 0.001$), and explain 14.6% of the total variance of difficulty to regulate emotions.



*** $p < .001$

Note. For the first model, daily hassles were the initial variable, the dependent variable was obsessive thoughts and hopelessness, and as a mediating variable the difficulty to regulate. For the second, the dependent variable and the mediator were exchanged. Path values indicate standardized regression coefficients (a, b, c) and c' represents the direct effect.

Figure 3: Mediating models of daily hassles with difficulty to regulate and obsessive thoughts and hopelessness as mediating variables

Discussion

This study examined whether coping mediated the relationship between stressful events and emotion regulation responses, or, on contrary, emotion regulation assumes a mediating role between stressful events and coping. In first place we observed mean differences between boys and girls showed that girls had slightly higher scores than boys in seeking social support and recognition and expression of positive emotions, which is consistent with previous findings with the adolescent population [23, 25, 26], however, the effect size in whole differences was considered small [45]. Regarding the first hypothesis the relationship between stressful events, coping and emotion regulation has been investigated, and associations ranging from moderate to high have been reported between these variables [20], however, in this study, low to moderate correlations were observed between coping strategies and emotion regulation and stressors, which may be related to low perception of the stressful event, since the sample comes from a marginalized setting in which is usual to lead with a wide type of stressors [31]. Besides, the stress levels perception, as well as, the stress tolerance depend on that each adolescent has [7], as this research show.

Examining coping and emotion regulation strategies simultaneously, provides a more complete picture of stress responses in marginalized youth, since stress exposure is the most potent risk factor for psychopathology during childhood, adolescence, and adulthood, as previous studies have showed by examining their relationship to specific coping strategies and emotion regulation, taking into account the development context of adolescents [19, 20].

In the three pairs of mediational models, it was observed that when we included the emotion regulation strategy as a mediating variable between stressors and coping, the total explained variance of each model was greater, whereas, in the mediational models that we included coping as a mediating variable between stressors and emotion regulation, a greater indirect effect was observed. In the first of two mediational models, an increase in the indirect effect was obtained by including obsessive thoughts and hopelessness as a mediating variable between social pressure and physical responses; however, it was also observed that the variance explained in this model was less than which on model that included coping strategies such as obsessive thoughts and hopelessness as outcome variables. These results were similar in the subsequent models that included obsessive thoughts and hopelessness as mediating variable,

between social pressure and difficulty to regulate, as well as in the model of daily hassles and difficulty to regulate. It should be considered that coping strategies in youth are developed based on the demands of the environment and the resources to face them, which may change depending on the stage of adolescence [14, 19, 21]. The sources of stress in early and middle adolescence are often family and relational in nature, such as interaction with parents and peers [5]. In this sample, daily stressors and social pressure were associated with dysfunctional strategies as obsessive thoughts and hopelessness that reflect a problem is not resolved and which are characterized by thoughts that include denial, and rumination, which leads avoidance of source of stress by adolescent [37].

The mediational model with the highest explained variance was that included social pressure as an input variable, physical responses as a mediating variable, and obsessive thoughts and hopelessness as an output variable, while the model with the highest indirect effect was that also included social pressure as an input variable, obsessive thoughts and hopelessness as a mediating variable, and physical responses as an output variable, both models are presented in Figure 1. This finding suggests that the stressors like social pressure can be predictors of the ability to express and control emotions, which in turn can be predicted adolescents' use of maladaptive coping strategies. According to some authors [28, 30] it should be considered that the patterns of emotion regulation can influence the adaptive functioning of adolescents under certain conditions, since such patterns can support the adaptation or becoming symptoms of psychopathology. Specific emotion regulation strategies should be studied in the context of other coping strategies and their linking with emotional symptoms. Adolescents who use maladaptive regulation strategies and who have difficulty regulating their emotions like in this study, may have higher levels of depressive symptoms than adolescents who use other adaptive emotion regulation strategies, nevertheless, in this research, development outcomes (e. g. depression, anxiety) no were assessed [18]. The mediating role of difficulty to regulate emotions in the models presented, suggests a decrease in obsessive thoughts and hopelessness in response to stress, as Gross [21], has been suggested, who refers that the emotion control contribute to adolescents to act front a specific situation, but does not determine his final response, since it has to go throughout a modulation process that can changes the intensity and duration of the emotion, before it is expressed in to observable behaviors..

Given the remain controversy regarding emotion regulation and coping's relationship, whether to include the process of emotion regulation as part of the coping [23], or considering it as different but related process, as well as, our second, third, and fourth hypotheses, our results provide evidence on the second statement, that coping and emotion regulation are different processes, and that type of stressor are associated and modify both processes [19, 20]. The nature of stressors and the perception of stress by adolescents was an important issue in this study. Although the adolescents of this sample did not perceive high levels of stress, the coping and emotion regulation strategies that they employ in face to stressful events can be considered dysfunctional and passive [17, 23, 25, 37].

Summarizing, this research provides data of a marginalized sample, supporting that coping and emotion regulation are different but linked processes, as wells as in both processes the type of stressful event of source of stress impact the way of coping and the emotion regulation too. Nevertheless, notice that these results are preliminary and cannot be generalized to other samples. Since limitations of this study, por example, the sample was only composed by high school students, it would be important to include larger and more diverse samples in future research (e. g. clinical samples), this would be support more comparative data and extended the findings. From a developmental perspective, comparative studies by age (e.g. earlier, middle, and older adolescents) are also needed to provide more evidence regarding the relationship among stressful

events, coping, and emotion regulation during adolescence. In addition, it would be necessary put together more variables in the same study, including several stressors, as well as different emotion regulation and coping strategies to identify the direct and indirect effects on the relationship of these variables and their relationship with developmental outcomes, testing different models by structural equations via path analysis. Despite the limitations, our study contributes to understanding that stress can influence both, emotion regulation and coping processes, although the mediating effect of the emotion regulation on coping is greater.

Conclusions

In this sample, negative emotion regulation strategies lead the adolescent's path to cope with stressors. In future studies it would be also important to integrate adaptive emotion regulation strategies to assess the relationship with coping strategies and include the perception of control of the situation that could precede both emotion regulation and coping. Furthermore, the relationship between stressful events, coping and emotion regulation in adolescents should continue to be studied, since some strategies could reduce the negative impact of stressors. These findings may be useful to understand the complex relationship between emotional regulation and coping as separate processes in a sample of marginalized contexts. Future research should consider the influence of other variables associated with these processes such as the role of physiological and cognitive development, diet, the possibility of suffering from chronic diseases in later stages of development, and the quality of health and life [46, 47], given the combination of biological and psychosocial factors in the management of emotions and responses to stress during adolescence. These results can be the basis for designing evidence-based interventions, with educational and clinical implications, from a preventive perspective in youth from marginalized backgrounds.

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Declaration of interest

The authors declare no conflicts of interest.

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