ANXIETY, DEPRESSION AND ACADEMIC ACHIEVEMENT AMONG PORTUGUESE ADOLESCENTS: THE MODERATION EFFECT OF NEGATIVE LIFE EVENTS

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Abstract

Adolescence is a period characterized by physiological and psychosocial changes. When these transformations are not well integrated by the adolescent, the development of psychopathology can occur, namely depression and anxiety disorders. These conditions have consequences in interpersonal and academic life areas of teens. Social withdrawal, irritability, sleeping problems and attention difficulties are associated with low academic achievement ([1], [2]). The experience of negative life events (NLE) by adolescents can also modify their normal trajectory.

The aims of this study were to examine: i) the association between sociodemographic variables with anxiety; ii) the relationships between anxiety, depression and academic achievement; iii) the moderator effect of negative life events in the relationship between anxiety and depression.

The sample was composed by 319 adolescents (217 female and 102 male), aged between 13 to 15 years. The assessment protocol used was: Children's Depression Inventory (CDI) [3], Multidimensional Anxiety Scale for Children (MASC) [4], and Daily Hassles Microsystem Scale (DHMS) [5].

The results showed that girls present more anxiety symptoms than boys. Concerning to age, there was no significant correlation between age and anxiety. Adolescents with separate parents obtained higher levels of somatic symptoms and performance fear.

Relating to scholar context, there was no significant relationship between anxiety levels and the experience of reprobation. Concerning academic achievement, we obtained a positive and significant correlation between academic achievement and the harm avoidance factor.

Anxiety and NLE were predictors of depressive symptoms in adolescence and a moderation effect was obtained of NLE in the relationship between anxiety (separation anxiety and harm avoidance) and depression.

One of the main contributions of this research relates to the clarification of the impact of NLE and anxiety as risk factors for the development of depression. These results can have important implications for depression prevention programs and for the promotion of school success.

Keywords: anxiety, negative life events, depressive symptoms, academic achievement, adolescence

1 INTRODUCTION

Adolescence is a stage of maturation between childhood and adulthood, and is in this period that the individual builds its autonomy from the family and their identity. It's characterized by several relevant physiological, neurological, hormonal and physical, as well as social and interpersonal changes [6]. Normative changes of adolescence, when not properly integrated, are risk factors for the development of various psychopathological conditions such as depression and anxiety disorders ([7], [8]). Studies have shown that anxiety disorders have high levels of comorbidity with depression, predisposing the adolescent to the experience of depressive symptomatology ([9], [10], [11]). Negative life events (NLE) have also emerged as risk factors for the development of major depressive episodes ([12], [13]).

1.1 Anxiety and depression

Anxiety is characterized by physiological arousal, threat perception and behavioral avoidance [14]. Anxiety symptoms appear during childhood and worsen in early adolescence, whereas depression is uncommon in children, developing mainly in adolescence [15]. With regard to gender differences concerning anxiety, girls express higher levels of symptoms that increase between the age of 12 to 15

([16], [17], [18]). Hale, Raaijmakers, Muris, Hoof and Meeus [19] indicate that the most prominent anxiety disorders in young girls are the Generalized Anxiety Disorder, Separation Anxiety and Social Phobia. Regarding depression, some authors emphasized that gender differences appears between the age of 13 and 15, in which girls show higher levels of depressive symptomatology [20]. Studies have shown that anxiety disorders develop earlier, prior to depression in about two years. This temporal relationship suggests that it is the anxiety that makes teens vulnerable to the development of depressive symptomatology ([9], [10]). However, there are similar features regarding the etiology of both disorders, such as hormonal and brain changes, abstract thought, introspection and rumination associated to cognitive maturation, increased stress as a result of developmental processes and relational changes with parents, peers and romantic relationships [9]. Anxiety disorders are the clinical conditions that co-occur more frequently in depressed youths [19]. The comorbidity between anxiety and depression is 10% to 15%, although adolescents with primary depressive disorder show higher rates of comorbidity with anxiety disorders (25% to 50%) than young teens with a primary anxiety disorder, who are less likely to develop depressive symptoms [11]. So anxiety emerges as an antecedent of depression.

1.2 Anxiety and negative life events

Negative life events, particularly stress-inducing situations, have been cited as a significant risk factor for the emergence of anxiety symptoms ([14], [21]). NLE lead to the increase of self-focused attention on cognitive symptoms, bodily sensations and ruminative thoughts about threatening situations and their consequences ([22], [23]). Studies with clinical samples suggest that higher values of NLE relate to psychopathology. Events related to social environment are more characteristic of depression and situations evaluated with a high degree of threat are specific of anxiety [24]. Additionally, Lewis, Bird and Ollendick [25] found that children with a higher experience of NLE and threatening situations experienced more anxiety symptoms. In fact, events perceived as uncontrollable (e.g. death in the family) can cause feelings of helplessness and increase cognitive vulnerability of adolescents to the emergence of anxiety disorders ([14], [21]). In the literature there are several studies that conceptualize NLE as antecedents of depression ([26], [27]), but we couldn't find studies in which NLE are moderators of the relationship between anxiety and depression.

1.3 Anxiety and academic achievement

Anxiety symptoms are the most common psychological problems among students. Literature has highlighted that moderate levels of anxiety is helpful in academic performance, in the sense that students are more motivated to do better in school, and thus obtain higher achievement. But, when students reach high levels of anxiety this can be problematic [28]. Researches about the relationship between anxiety and academic performance have been shown that high anxiety was significantly and negatively correlated with grades and other measures of academic achievement. Authors have pointed out that high levels of anxiety influence the students' perception and experience about their academic subjects which in turn may lead to a poorer performance [29]. Vogel and Collins [30] list several factors that can influence the relation between academic achievement and high anxiety, such as, motives, aptitudes, cognitive assessments of the task and past experience. There is other study that pointed out that adolescents who demonstrate moderate levels of perfection, avoidance and socially desirable behaviours are more likely to be motivated in school and, thus improve their academic performance [31].

The aims of this study were to examine: i) the association between sociodemographic variables with anxiety; ii) the relationships between anxiety, depression and academic achievement; iii) the moderator effect of negative life events in the relationship between anxiety and depression.

2 METHODS

2.1 Participants

The sample consisted of 319 adolescents from the general population and was composed by 217 females (68%) and 102 males (32%), aged between 13 and 15 years (M = 13.94, SD = .69), which

attended the eighth or ninth grade in public or private school (M = 8:53, SD = .50). With regard to the family context of adolescents, 76.5% (n = 244) were living with both parents and 23.2% (n = 74) were under the care of only one parent. Regarding the socioeconomic level, 40.1% (n = 128) held a low level, 36.1% (n = 115) a medium level and 23.8% (n = 76) a high socioeconomic level. Concerning school performance, 8 students in this sample (2.5%) rated it with "insufficient", 60 (18.8%) with "enough", 38 (11.9%) with "very good" and the majority of students rated school performance as "satisfactory" (n = 98; 30.7%) and "good" (n = 115; 36.1%). Regarding retentions, most students never failed (n = 274; 85.9%), 39 students (12.2%) failed one year and 6 students (2.9%) had two retentions. No significant differences were found between genders, regarding the number of years in school (t (317) = -1.452, p = .147), academic achievement (x^2 (4) = 3.456, p = .485), number of failures (t (151, 583) = 1.729, p = .086), socioeconomic status (x^2 (2) = 1.076, p = .584) and age (t (179, 602) = -.433, p = .665).

All subjects participated in a Portuguese study entitled "Prevention of depression in Portuguese adolescents: study of the efficacy of an intervention with adolescents and parents" (PTDC/MHC-PCL/4824/2012).

2.2 Procedures

Prior to the collection of data, authorization from national entities that regulate scientific research was required. Later, schools were contacted to request the participation of students and their parents, emphasizing the anonymous, confidential and voluntary nature of their participation in the investigation. The researcher gave informed consent to students and parents interested in participate in the study. The data collection was performed through the completion of a battery of psychological assessment tests, that was applied during school hours, collectively and in the presence of the class directors and researchers. The incorrect or incomplete filling of the evaluation questionnaires was considered an exclusion criterion.

2.3 Measures

Children's Depression Inventory (CDI). CDI was used to evaluate depressive symptomatology during the past two weeks. This instrument consists of 27 items and five factors: *negative mood, interpersonal problems, ineffectiveness, anhedonia* and *negative self-esteem*. Each item is composed by three possible responses ranging from 0 (no problem), 1 (mild symptom) and 2 (severe symptom). The total score is obtained by summing the 27 items and varies between 0 and 54 points, with higher values corresponding to higher levels of depressive symptoms [3]. Items 2, 5, 7, 8, 10, 11, 13, 15, 16, 18, 21, 24 and 25 are rated in reverse. In the original version, the internal consistency values were high for the total and for sub-factors of the scale (α between .83 and .94) [3]. The Portuguese version of the CDI showed good internal consistency, with *Cronbach's alpha* of .80 for a one-dimensional structure [32]. In the present study, an alpha of .90 for the one-factor structure CDI was found, indicating a very good internal consistency.

The Multidimensional Anxiety Scale for Children (MASC). MASC is a self-report instrument that assesses anxiety symptoms in children and adolescents aged from 8 to 19 years [4]. It consists of 39 items, rated on a Likert scale of 4 points (from 0 = "never or almost never true" to 3 = "often true"). The original authors found four factors, three of which presented two sub-factors: a) *physical symptoms* (12 items), with sub-factors *tense/restless* (6 items) and *somatic* (6 items); b) *harm avoidance* (9 items), with sub-factors *perfectionism* (4 items) and *anxious coping* (5 items); c) *social anxiety* (9 items) that includes the sub-factors *humiliation* (5 items), *public performance* (4 items) and d) *separation anxiety* (9 items).

The original version of the scale revealed high level of internal consistency with *Cronbach's alpha* of .90 for the total scale, which is a good consistency [4]. In the Portuguese version of Salvador et al. [33], *Cronbach's alpha* for the total scale was .89 and internal consistency values for the factors were: .83 for the factor *physical symptoms*, .85 for *social anxiety*, and .70 for *separation anxiety* and *harm avoidance*. For sub-factors, alphas obtained were .73 for *tense/restless* and *somatic*, .86 for *humiliation*, .69 for *performing in public*, and .54 to .58 for p*erfectionism* and *anxious coping*.

In this investigation, the alpha value for the total scale was .91, which indicates a very good internal consistency. *Separation anxiety* (α = .72) and *harm avoidance* (α = .71) had a reasonable consistency, while *social anxiety* (α = .89) and *physical symptoms* (α = .85) factors revealed a good internal consistency. The sub-factors, *tension/restless* (α = .76), *somatic* (α = .71) and *performing in public* (α = .75) showed an acceptable consistency and *anxious coping* (α = .66) held a reasonable coefficient. The sub-factor *perfectionism* stood out (α = .49) for its low value, corresponding to an unacceptable consistency while the sub-fator *humiliation* (α = .90) held the highest alpha value, which indicates a very good internal consistency.

Daily Hassles Microsystem Scale (DHMS). The DHMS is a self-report instrument consisting of 28 items that evaluate minor daily events, perceived as negative (daily hassles), which occurred in the last month. This scale assesses five factors involved in the occurrence of minor NLE: a) *school hassles* (4 items); b) *family hassles* (4 items); c) *neighborhood hassles* (5 items); d) *peers hassles* (items 3) and e) *resources hassles* (items 5) [5]. Each item consists of five choices of response ranging from 1 ("not at all a hassle") to 4 ("a very big hassle"). However, before signaling the severity of the problem, the teenager indicates whether the situation has occurred or not during the last month.

In the present study, in addition to the 28 items of the original scale, was included 15 items that assess dimensions similar to the original scale [34]. However, for data treatment, we maintained the factor structure of DHMS for the 28 items proposed by Seidman et al. [5] as suggested by Paiva [34].

In the original version, internal consistency obtained for the total scale was .89, which is considered good. In the Portuguese version [34], the total scale presented a *Cronbach's alpha* of .82 (good) and the factors *school hassles* (α = .69) and *family hassles* (α = .62) achieved a low internal consistency. The factor *peers hassles* (α = .72) revealed a reasonable internal consistency. The factors *resources hassles* (α = .48) and *neighborhood hassles* (α = .50) presented an unacceptable internal consistency, thus they were not studied in this investigation.

In this study, the *Cronbach's alpha* for the total scale was .94 (very good internal consistency), the factors *school hassles* (α = .68), *neighborhood hassles* (α = .65) and *resources hassles* (α = .66) held values considered weak. The factor *family hassles* (α = .71) had a reasonable consistency and the factor *peers hassles* (α = .85) revealed a good internal consistency.

2.4 Analytic plan

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) version 20.0 for Windows.

Preliminary analysis of the data to determine its normality was held by *Kolomorov-Smirnov test* and, subsequently, by observing the values of asymmetry (*skewness*) and flattening (*kurtosis*). Internal consistency of the scales was analyzed using *Cronbach's alpha* coefficient.

To explore and characterize the sociodemographic variables of the sample, descriptive statistics such as frequencies, means and standard deviations were computed. Differences between means for gender, marital status and failures were assessed by *Student-t* or *chi-square tests*. *Pearson correlations* were computed to examine the relationship between age and MASC and the relationship between CDI's total score and MASC. *Spearman correlation* was performed between anxiety and school performance. In order to examine the relationship between socioeconomic status and anxiety, a *One-Way Analysis of Variance* (ANOVA) was conducted.

The moderating effect of NLE in the relation between depressive and anxiety symptoms was also studied. Moderation occurs when specific factors can reduce or increase the direction of the relationship between the predictor and the criterion variable, or change the direction of the relationship between two variables from positive to negative or vice versa. Moderation is done through the interaction between the predictor variable and the moderator [35]. As the interaction between two quantitative variables was analyzed, it was necessary to center the values of the predictor variable (MASC) and moderating variable (DHMS) prior to the study of their interaction, by subtracting the overall mean to the values of each subject. The procedure of centering the variables allows the decrease possible problems of multicollinearity and facilitates the interpretation of the model. After the variables have been centered, we proceeded to the interaction term by multiplying the factors, sub-factors and the total score of the MASC with the total value of DHMS, reaching up three terms: 1.º) total, factor or sub-factor of MASC, 2.º) Total DHMS and 3.º) interaction term (total factor or sub-factor

of MASC * Total DHMS). Subsequently, multiple hierarchical regressions were performed, where initially a factor, sub-factor or total of predictor variable was introduced, followed by the introduction of the total of the moderating variable and, finally, the interaction between them (enter method).

3 RESULTS

3.1 Sociodemographic Data

Regarding gender, it was found that girls had higher levels of anxiety (M = 50.9, SD = 15.2) with statistically significant differences for the total MASC (t (317) = - 5.477, p ≤ .001) in the following factors: *physical symptoms* (t (317) = - 5.077, p ≤ .001), *social anxiety* (t (317) = - 5.497, p ≤ .001) and *separation anxiety* (t (317) = - 3.707, p ≤. 001), and sub-factors *tense/restless* (t (317) = - 4.034, p ≤ .001), *somatic* (t (317) = - 5.405, p ≤ .001), *humiliation* (t (317) = - 5.122, p ≤ .001) and *public performance* (t (317) = - 4.773, p ≤ .001).

There were no statistically significant correlations between age and anxiety.

The variable parents' marital status was formulated taking into account two groups: adolescents living with both parents (married or in union) named "parents together" (n = 244) and those living with only one parent (divorced, widowed or single), named "divorced parents" (n = 74). Statistically significant differences were obtained in the following sub-factors and factors of MASC: factor *physical symptoms* (t (316) = - 2.289, p = .024), subfactor *somatic* (t (316) = - 2.540, p = .013) and *subfactor public performance* (t (316) = - 2.083, p = .039). Regarding NLE (evaluated by DHMS), there were statistically significant differences in the factor *peers hassles* (t (316) = - 2.109, p = .037). Thus, adolescents with divorced parents had more depressive symptoms, more somatic symptoms of anxiety and fear of performance.

The variable socioeconomic status is divided into three groups, according to Almeida [36]: low socioeconomic status (n = 76), medium (n = 115) and high (n = 128). We compared the average of the total of MASC within these three groups and no statistically significant differences were observed (F (3) = 2, 230, p = .109).

3.2 Academic performance

From the analysis of the differences between teenagers who failed a year at least once (n = 45) and those who never failed (n = 274) in relation to depressive symptomatology and anxiety, it was found that there were no significant differences in the levels of depression and anxiety. Relationship between school performance (1 = poor, 2 = good enough, 3 = satisfactory, 4 = good, 5 = very good) and MASC (total and factors), proved to be positive, very low and statistically significant between the variable and the factor harm avoidance (r = .173, p = .002).

3.3 The relationship between depressive symptoms and anxiety

Results showed that the total MASC (r = .580, p ≤ .01) was positively, moderately and significantly correlated with depressive symptoms. The factor *physical symptoms* (r = .661, p ≤ .01) and *social anxiety* (r = .582, p ≤ .01) also showed a positive, moderate and significant relationship with total CDI, contrary to the factor *separation anxiety* (r = .256, p ≤ .01), in which the correlation was significantly positive, but with a low magnitude. The factor *harm avoidance* (r = .062, p = .266) was not statistically significant. Regarding the sub-factors *tense/restless* (r = .583, p ≤ .01), *somatic* (r = .582, p ≤ .01), *humiliation* (r = .485, p ≤ .01) and *public performance* (r = .580, p ≤ .01) all were positively, moderately and significantly correlated with the CDI.

Similar results were achieved to those obtained and just described for the entire sample, both in females and in males, regarding correlations of the MASC (total, factors and sub-factors) with CDI. We do not present these results in this article by the same be very extensive.

3.4 The moderating effect of negative life events in the relationship between anxiety and depression in adolescents

In order to study the impact of NLE (evaluated by DHMS total) in the relationship between anxiety (as measured by the total, factors and sub-factors of MASC) and depressive symptoms (measured by the total value of CDI), multiple hierarchical regressions were performed. The ones that were statistically significant are presented below.

Multiple hierarchical regressions that included the factor *separation anxiety* (predictor variable) produced a statistically significant interaction term. In the first step, *separation anxiety* (predictor variable) was inserted, which produced a significant model (Step 1: $R^2 = .063$, $F (1, 311) = 22.910$, $p <.001$). In the second step, we inserted the DHMS (moderating variable), which produced a significant model (Step 2: $R^2 = .325$, $F (2, 310) = 77,429$, $p <.001$), despite the fact that the predictor effect of the variable *separation anxiety* cease to be significant. In the third step, the interaction term was inserted, which also caused a significant model (Step 3: $R^2 = .354$, $F (3, 309) = 54.139$, $p <.001$) and an increase in the explanation of the variables in relation to depressive symptoms (criterion variable) was observed. Thus, the term of interaction is a significant predictor explaining 35.4% of the variance in depression together with the other two predictors. In the third step, the interaction term indicates the existence of a negative moderating effect of NLE in the prediction of depression by *separation anxiety* ($\beta = -.064$, $p = .021$) (see Tabel 1).

Tabel 1. Regression coefficients for the three steps of the hierarchical multiple regression ($n = 319$)

Predictors	R^2	Adjusted R^2	β	F	t	p
Model 1	.256	.063		22.910		.000
SA			4.101		4.721	.000
Model 2	.573	.325		77.429		.000
SA			1.298		1.667	.097
NLE			.172		11.132	.000
Model 3	.583	.354		54.134		.000
SA			1.447		1.864	.063
NLE			.180		11.444	.000
SA*NLE			-.064		-2.324	.021

Note: SA= Separation Anxiety; NLE = Negative Life Events

The results of the multiple hierarchical regressions also demonstrated the moderating effect of DHMS on the relationship between the factor *harm avoidance* (predictor variable) and depression (criterion variable). In the first step, *harm avoidance* factor was added, which was not revealed as a significant predictor (Step 1: $R^2 = .004$, $F (1, 310) = 1.241$, $p > .05$). In the second step, DHMS was inserted as a moderator variable and a significant model was produced (Step 2: $R^2 = .324$, $F (2, 309) = 75.872$, $p <.001$). In the third step, we inserted the interaction term which also caused a significant model (Step 3: $R^2 = .336$, $F (3, 308) = 53.084$, $p <.001$) and an increase in the proportion of variability explained of depression was observed. NLE and the interaction term explained 33.6% of the variance in depression (see Tabel 2).

Upon analysis of regression coefficients, it appears that only NLE ($\beta = .182$, $p \le .001$) were significant predictors in the first two steps of the model. In the third step, the interaction term indicated the existence of a moderating effect of NLE in the relationship between *harm avoidance* and depression ($\beta = -.067$, $p = .021$).

Tabel 2. Regression coefficients for the three steps of the hierarchical multiple regression ($n = 319$)

Predictors	R^2	Adjusted R^2	β	F	t	p
Model 1	.062	.004		1.241		.266
HA			1.002		1.114	.266
Model 2	.570	.324		75.872		.000
HA			-.617		-.810	.414
NLE			.182		12.244	.000
Model 3	.579	.336		53.084		.000
HA			-1.137		-1.455	.147
NLE			.185		12.487	.000
HA*NLE			-.067		-2.323	.021

Note: HA= Harm avoidance; NLE = Negative Life Events

In order to understand the moderating effect, two graphs showing the results were computed through the *Modgraph* program. In Figure 1, it can be seen that when *separation anxiety* is low, high levels of NLE predict higher levels of CDI. However, when *separation anxiety* is high, higher levels of NLE tend to lead to lower levels of CDI, in comparison to lower levels of NLE (which tend to lead to higher levels of CDI).
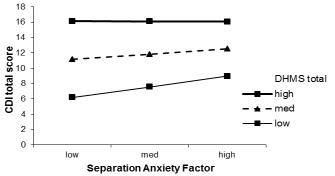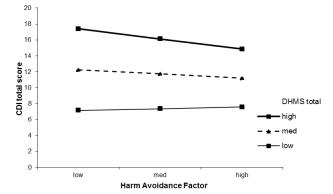

Figure 1. Moderating effect of NLE in the relationship between SA and depression

In Figure 2, it is observed that when the *harm avoidance* is low, high levels of NLE predict higher levels of CDI. However, when *harm avoidance* is high, higher levels of NLE tend to lead to lower levels of CDI, in comparison to lower levels of NLE (which tend to lead to higher levels of CDI).

Figure 2. Moderating effect of NLE in the relationship between HA and depression

4   DISCUSSION

Regarding gender differences, girls obtained higher means in all dimensions of MASC. These results are in accordance with previous studies, where authors observed that young girls experience higher rates of anxiety ([16], [17], [18]).

The marital status of the parents was related to the factor physical symptoms and to sub-factors somatic and public performance. The fact that the probability of emergence of these anxiety symptoms in adolescents with single parents is higher, may be related to a higher incidence of inducing events of emotional distress, which leads to the emergence of somatic symptoms of anxiety and a greater susceptibility to negative evaluation by others ([37], [38]).

Analyzing the school context, there was a significant positive correlation between the factor of harm avoidance and school performance. These results are consistent with those obtained by Grills-Taquechel et al. [31], and taking into account that the factor harm avoidance is composed by sub-factors perfectionism and anxious coping, we can hypothesize that adolescents who have perfectionist behaviors and adolescents who are anxious when dealing with situations, are more motivated to achieve better school results. It should also be noted that the vast majority of teenagers that compose our sample present academic success, which may have influenced the results obtained regarding the relationship between anxiety and academic performance.

The interaction term between separation anxiety and NLE produced a significant model. Thus, adolescents with high levels of separation anxiety, when exposed to more NLE, experience lower levels of depressive symptomatology. In literature, no studies that address this interaction were found. As a possible explanation of this result, and given that separation anxiety is characterized by persistent and excessive worry that an adverse event may lead to the separation of an important attachment figure, it is thought that these adolescents, in the presence of a lot of negative life events, narrow even more their relations with their parents and can interpret the relationship they have with these, as safe and protective and consequently, do not become so vulnerable to depression.

NLE also had a moderating effect on the relationship between harm avoidance factor and depression, producing a significant model. Thus, we found that when young people experience high levels of harm avoidance and are faced with a high incidence of NLE, depression symptoms decrease. Again, we do not know of any studies that address the moderating effect of this interaction term. However, we can hypothesize that when these adolescents experience more NLE, they tend to want to reach perfection and to avoid negative and dangerous situations (harm avoidance factor is composed by two sub-factors - perfectionism and anxious coping) and may be under the illusion that they have the situation under control, which can reduce symptoms of depression.

Limitations and future directions

With regard to the limitations of this research, we highlight that the sample was disproportional regarding gender (with double number of females) and the fact that it is a community sample, which does not include high levels of depressive symptoms and anxiety. The collection of data was obtained only through self-report instruments, having no other source of information.

In future studies it would be interesting to use a clinical sample, and include an instrument to assess major NLE and use other sources of information such as parents and teachers.

In general, the present study found that NLE have a moderating effect on the association between anxiety and depression. This work is innovative in that, to the best of our knowledge, no studies evaluating this moderating effect of NLE exist. We also highlight the importance of the outcomes for the prevention and treatment of depression in adolescence.

5   AKNOWLEGMENTS

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