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# The Effect of Parental Autonomy Support and Psychological Control on the Relation Between Stressful Life Events and Anxiety Symptoms in Adolescents

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## Abstract

Anxiety symptoms are common among adolescents. Research has demonstrated that stressful life events, childhood emotional maltreatment, and parental behavior are related to anxiety symptoms. The current study aims to expand on existing research by testing the following hypotheses: more stressful life events are related to more anxiety symptoms, more childhood emotional maltreatment is related to more anxiety symptoms, these relations are stronger for lower levels of parental autonomy supportive behavior, and these relations are stronger for higher levels of parental psychologically controlling behavior. This study uses a cross-sectional multimethod design. The sample contains a depression group ( $N = 34$ ) and a healthy control group ( $N = 80$ ). Questionnaires were completed regarding stressful life events, childhood emotional maltreatment, and anxiety symptoms. Autonomy support and psychological control were measured through coded behavioral observations. A hierarchical multiple regression analysis indicated that stressful life events and anxiety symptoms were related ( $\beta = .21, p < .001$ ), and autonomy support moderated this relation ( $\beta = -.12, p = .014$ ), while psychological control did not ( $\beta = -.07, p = .169$ ). Childhood emotional maltreatment and anxiety symptoms were not related ( $\beta = -.01, p = .828$ ) and there was no moderating effect of autonomy support and psychological control ( $\beta = -.02, p = .776; \beta = -.09, p = .155$ ). These findings imply that parental autonomy support could be a target for intervention after stressful life events for adolescents. Explanations for nonsignificant results and implications for future research are provided.

## **Introduction**

Anxiety disorders are common among children and adolescents. These disorders are characterized by excessive fear. Fear is a useful emotional response to real or perceived imminent danger and is associated with a surge of autonomic arousal necessary for a fight or flight response. Anxiety, however, has more to do with the anticipation of future threats and is associated with muscle tension, vigilance, and cautious or avoidant behavior (American Psychiatric Association, 2013). According to Beesdo-Baum and Knappe (2012), the lifetime prevalence of anxiety disorders in children and adolescents in Western countries is fifteen to twenty percent. Anxiety disorders in children and adolescents are rarely isolated diagnoses as comorbidity is often present, mainly with other anxiety disorders and depressive disorders. Additionally, anxiety in childhood is a predictor for anxiety and other mental health problems later in life (Rapee et al., 2009). In recent years possible antecedents of anxiety symptoms in children and adolescents have been investigated. Two factors that have been shown to be related to the development of anxiety symptoms in children and adolescents are stressful life events and childhood emotional maltreatment. According to Young and Dietrich (2015) stressful life events are predictive of anxiety symptoms in adolescents. This study illustrated that both higher levels of stressful life events at baseline and increasing levels of stressful life events over time during the study were predictive of anxiety and depressive symptoms in the sample of adolescent participants. Childhood emotional maltreatment can be defined as acts of verbal abuse or of neglect that are potentially damaging to the emotional development of the child (Van Harmelen et al., 2013). According to research by Guo et al. (2021) childhood emotional maltreatment is a predictor for the development of anxiety symptoms in adolescents. In particular, this study showed a positive association between childhood emotional abuse, physical abuse, and sexual abuse and anxiety symptoms at follow-up. Although these factors are known to be related to the development of anxiety symptoms, less is known about possible contributing factors to this effect. For instance, not much is known about the possible influence of parental behavior on the development of anxiety symptoms after the occurrence of stressful life events or childhood emotional maltreatment. Because of the crucial role that parents play in a child's life, more research on how parental behavior affects the development of anxiety symptoms in adolescents could be useful. This study aims to explore whether parental autonomy support and psychological control have a moderating effect on the development of anxiety symptoms in adolescents after the occurrence of stressful life events or childhood emotional maltreatment.

First, the direct link between stressful life events and anxiety symptoms should be explored. Plenty of research has been done on this link, which has led to various theories on how stressful life events lead to anxiety symptoms. One of these theories is that stressful life events increase anxiety sensitivity. Anxiety sensitivity is described as the fear of anxiety symptoms. This fear is thought to be caused by beliefs about the possible harmfulness of anxiety symptoms socially, psychologically, or physiologically. Anxiety sensitivity has been found to be a risk factor for the onset of panic attacks and anxiety symptoms, and it was found to mediate the relation between stressful life events (specifically events related to health and family discord) and anxiety symptoms (McLaughlin & Hatzenbuehler, 2010). Another theory about how stressful life events lead to anxiety symptoms is derived from research into Generalized Anxiety Disorder. This theory states that some persons become hypervigilant for signs of threats as a result of the experience of stressors in the past that came without warning and were uncontrollable. Patients with Generalized Anxiety Disorder will often worry excessively, resulting in the maintenance of a constant state of anxiety. This constant and familiar level of anxiety is thought to be preferred to being left open to sudden shifts in emotion as a result of negative events (Nolen-Hoeksema, 2017). In conclusion, stressful life events are thought to lead to anxiety symptoms directly by increasing one's vigilance to possible threats and indirectly by increasing anxiety sensitivity. Additionally, the direct link between childhood emotional maltreatment and anxiety symptoms should be assessed. One theory on how childhood emotional maltreatment can lead to anxiety symptoms, is that this relation might be mediated by brain activity. This theory states that exaggerated activation of the limbic system was found in response to negative valence facial expressions (threat-conveying emotional cues) in a sample of adults with anxiety symptoms who have experienced childhood emotional maltreatment. The authors hypothesized that this excessive limbic activation might link childhood emotional maltreatment to anxiety symptoms (Fonzo et al., 2015). Another theory is that the relation between childhood emotional maltreatment and anxiety symptoms is mediated by internalized maladaptive schemas. A study by O'Dougherty-Wright et al. (2009) demonstrated that childhood emotional maltreatment was related to anxiety symptoms and that this relation was mediated by maladaptive schemas related to vulnerability to factors such as shame or harm. This suggests that participants in this study have internalized their experienced of childhood emotional maltreatment and that this might be even more important than the event itself for the development of anxiety symptoms. To conclude, childhood emotional maltreatment is thought to lead to anxiety symptoms

through exaggerated activation of the limbic system, or through internalization of experiences with childhood emotional maltreatment in the form of maladaptive schemas.

This study is interested in the effects of two parental behaviors on the relationship between stressful life events or childhood maltreatment, and anxiety symptoms: autonomy supportive behavior and psychologically controlling behavior. An autonomy supportive parent within this study is defined as a parent who will explain why they make certain decisions, while also allowing the adolescent to express their opinions and feelings, as well as stimulating input from the adolescent and helping to deepen the conversation (Soenens & Vansteenkiste, 2010). A psychologically controlling parent is defined as a parent who will manipulate and intrude into their child's feelings and thoughts by behaving in ways that invalidate the child's feelings and pressures them to think a certain way (Barber et al., 2005). When researching the effect of parental behavior, it stood out that not much is known about the influence of parental behavior on the relation between stressful life events or childhood emotional maltreatment and anxiety symptoms. However, research has been done on the direct influence of parental behavior on anxiety symptoms. A study regarding the link between social anxiety symptoms in adolescents and parental behavior (reported by adolescents and their mothers) found that social anxiety symptoms were related to lower autonomy support (reported by the mother) and higher psychological control (reported by the mother and the adolescent) in between-persons associations. At within-person level, the mother reported higher levels of autonomy support and lower levels of psychological control after phases with more social anxiety symptoms in adolescents. This means that mothers reported a more facilitating parenting style in response to social anxiety symptoms. This more facilitating style was likely not perceived by adolescents however, as they reported higher levels of psychological control at times when high levels of social anxiety symptoms were present (Nelemans et al., 2019). Another study demonstrated that many adolescents reported increasing levels of parental psychologically controlling behavior over time during adolescence. The adolescents that reported experiencing these trajectories developed a problematic growth in anxiety symptoms across adolescence (Rogers et al, 2020). These studies suggest that low levels of parental autonomy supportive behavior and high levels of parental psychologically controlling behavior, or the perception thereof by the adolescent, are related to the development of higher levels of anxiety symptoms in adolescents. It can therefore be concluded that parental autonomy support and psychological control have a direct effect on the development of anxiety symptoms. The influence of parental behavior on

the development of anxiety symptoms after the occurrence of stressful life events or childhood emotional maltreatment specifically, remains to be further investigated.

This study aims to further investigate possible factors contributing to the development of anxiety symptoms in adolescents after the occurrence of stressful life events or childhood emotional maltreatment. In particular, this study aims to investigate the role parental behavior might play within this process. This study will attempt to answer two questions, namely whether stressful life events in general and childhood emotional maltreatment in specific are related to adolescent anxiety symptoms, and whether this relation is moderated by parental autonomy supportive and psychologically controlling behavior. A moderation effect of parental autonomy support and psychological control is investigated in order to examine whether low levels of autonomy support and high levels of psychological control could serve as cumulative risk factors after the occurrence of stressful life events or childhood emotional maltreatment. As parental autonomy support and psychological control have been found to be related to the development of anxiety symptoms in adolescents, as aforementioned, it could be possible that these behaviors also play a role in the process of the development of anxiety symptoms after stressful life events or childhood emotional maltreatment. If this were found to be the case, parental behavior could become a target for treatment after the incidence of stressful life events or childhood emotional maltreatment. As no research has been done on the effect of parental behavior on the relation between stressful life events and anxiety symptoms yet, this study is explorative in nature. This study contains several hypotheses. Firstly, it is hypothesized that more stressful life events and more childhood emotional maltreatment are related to more anxiety symptoms. This is hypothesized because this relation has been found in previous research, such as the studies by Young and Dietrich (2015) and Guo et al. (2021) mentioned earlier. It is further hypothesized that these relations are stronger for lower levels of parental autonomy supportive behavior. This hypothesis is based on the finding by Nelemans et al. (2019) that low levels of parental autonomy support are related to more anxiety symptoms in adolescents. It is theorized that low levels of autonomy support could also serve as a cumulative risk factor for the development of anxiety symptoms after stressful life events or childhood emotional maltreatment. Conversely, it is theorized that it might be the case that high levels of autonomy support could act as a protective factor for the development of anxiety symptoms. Lastly, it is hypothesized that the relations between stressful life events and anxiety symptoms, and childhood emotional maltreatment and anxiety symptoms, are stronger for higher levels of parental psychologically controlling behavior. This hypothesis is based on the finding that parental psychological control is related

to more anxiety symptoms in adolescents (Nelemans et al. (2019); Rogers et al. (2020)). It is hypothesized that high levels of parental psychological control could be a cumulative risk factor for the development of anxiety symptoms in adolescents after stressful life events or childhood emotional maltreatment. If the hypotheses were confirmed, this could provide more information on the factors contributing to the development of anxiety symptoms in adolescents as well as implications for interventions within the families of children and adolescents who have experienced stressful life events or childhood emotional maltreatment.

## Methods

### Design

This study is part of the Dutch RE-PAIR study, in which the bi-directional interplay between parent-child interactions and adolescent depression is examined. The study concerns a cross-sectional, multimethod design.

### Participants

The sample for this study consisted of two subsamples. The first subsample concerned 34 adolescents between the ages of 11 and 17 years old ( $M_{\text{age}} = 15.74$  years old,  $SD_{\text{age}} = 1.41$ ) who have been diagnosed with Major Depressive Disorder (MDD) or dysthymia, and their parents (62 parents). A total of 8 participants (23.5%) within the group were male and 26 (76.5%) were female. The second subsample included 79 healthy control adolescents ( $M_{\text{age}} = 15.94$  years old,  $SD_{\text{age}} = 1.33$ ) and their parents (150 parents). In this group 28 of the participants (35.4%) were male and 51 (64.6%) were female. The mean age for the full sample of adolescents was 15.84 years old. The youngest participant was 12 years old on the testday and the oldest was 18 years old. Most participants were attending high school at preuniversity level (47.8%), and 83.2% of the participants were Caucasian, Turkish, or Moroccan. Further descriptive information for the participants is provided in Table 1. A total of 212 parents participated in the study across both subgroups. Of these parents, 102 were male (48.1%) and 110 were female (51.9%). Most participating parents were biological mothers (49.5%) or biological fathers (42.5%). The mean age for the full sample of participating parents was 49 years old. The youngest parent was 33 years old on the testday and the oldest was 70 years old. Most of the participating parents completed a degree on Secondary Higher Vocational Education level (37.7%), and most families had a net income of

over €4500 per month (47.2%). A total of 92% of participating parents were Caucasian, Turkish or Moroccan. Further descriptive information for the parents is provided in Table 2.

**Table 1**

*Descriptive information adolescents*

		Depressed group	Healthy control	Complete sample
Gender	Male	8	28	36
	Female	26	51	77
Age <sup>a</sup>		15.61 (1.58)	15.94 (1.33)	15.84 (1.41)
Ethnic Background	Caucasian (white), Turkish, Moroccan	22	72	94
	Asian	2	2	4
	African	0	1	1
	Latin-American	1	0	1
	Antillean/Surinamese	1	1	2
	Mixed	6	3	9
	Another European country	2	0	2
	Education	Lower Vocational Education	6	10
	Higher Vocational Education	5	19	24
	Preuniversity education	15	39	54
	No current education	1	0	1
	Other	0	4	4
	Secondary Vocational Education	5	5	10

Secondary higher	2	2	4
Vocational			
Education			

<sup>a</sup> indicates *M (SD)*

**Table 2**

*Descriptive information parents*

		Depressed group	Healthy control group	Total sample
Gender	Male	29	73	102
	Female	33	77	110
Age <sup>a</sup>		50.32 (5.65)	49.12 (5.84)	49.46 (5.79)
Type of parent	Biological mother	32	73	105
	Biological father	27	63	90
	Stepfather	2	6	8
	Adoption mother	1	3	4
	Adoption father	0	3	3
	Foster mother	0	1	1
	Foster father	0	1	1
Ethnic Background	Caucasian (white), Turkish, Moroccan	49	146	195
	African	0	1	1
	Latin-American	1	0	1
	Antillean/Surinamese	3	0	3
	Mixed	5	2	7
	Another European country	3	1	4
	Highest completed education	None	1	1
Secondary		2	5	7
Vocational Education				

Lower Vocational Education	9	5	14
Secondary Vocational Education	11	27	38
Mix of Higher Vocational Education and Preuniversity Education	3	12	15
Secondary Higher Vocational Education	16	64	80
University	18	33	51
Other	1	3	4

<sup>a</sup> indicates  $M (SD)$

Although the sample for the RE-PAIR study contained participants with depression, comorbidity with anxiety disorders was high in this sample (44.1%). Of the 34 depressed adolescents included in this study, 15 had a comorbid anxiety diagnosis. The most common comorbid anxiety disorder was Social Anxiety Disorder, as 12 adolescents were found to have a current diagnosis of Social Anxiety Disorder according to the K-SADS-PL. In addition to measures for depression, the RE-PAIR study also contained measures for the assessment of anxiety symptoms, and data from these measures were examined in the current study. Participants with depression were recruited through (social) media, and mental health care facilities in the area of Leiden: Curium-LUMC, GGZ Rivierduinen, PEP junior, and GGZ-Hollands Midden. Adolescents receiving treatment at these facilities could be referred to the RE-PAIR study. Healthy control adolescents were recruited through (social) media, general practitioners, and municipal health services.

Several inclusion criteria applied for participation in the study. These criteria applied to both depressed participants, and the healthy controls. Firstly, the adolescents had to be aged between 11 and 17 years old and had to at least be attending high school. Secondly, the adolescents had to be living with at least one primary caregiver. Lastly, at least one primary caregiver of the participant had to participate in the study as well, although ideally both

caregivers would participate. The K-SADS-PL interview was used to determine whether a diagnosis of current Major Depressive Disorder (MDD) or dysthymia was present. Several exclusion criteria for depressed adolescents applied. Firstly, the presence of a primary psychological disorder (Axis 1), other than MDD or dysthymic disorder, would result in exclusion. Secondly, the following comorbid disorders could not be present: mental retardation, psychosis, addiction, autism, and eating disorders. Thirdly, the adolescent could not be using antidepressants, unless a stable dose was used. Lastly, participants would not be included if their safety in the case of suicidality or severe auto-mutilation could not be guaranteed. The following exclusion criteria applied to the healthy control participants: the presence of (assessed using the K-SADS-PL) a current psychological disorder, a history of a psychological disorder in the last two years, a lifetime history of depressive disorder, a history of psychotherapy or other psychological treatments, or the use of medication for psychological disorders or the use of sleep medication. Additionally, for depressed individuals as well as healthy controls, a lack of proper understanding of the Dutch language would result in exclusion.

Originally the sample for this study consisted of 35 depressed participants and 80 healthy controls. However, due to missing data two families were removed from the sample. A total of 2 fathers and one mother had missing data on observational measures for parental behavior. In one case, this missing data was due to the test being too burdensome for the adolescent within this family. For consideration of the mental wellbeing of this adolescent, the interaction task was not completed. For the other two cases, the missing data was due to delays in the coding of parental behavior during the interaction task for these parents. Adolescent participants for whom observational data of both parents were absent were excluded from the sample for this study. This concerned one adolescent in the depressed group and one in the control group. The final sample for this study thus contains 34 depressed adolescents and 79 healthy controls.

## **Procedure**

Participants of the RE-PAIR study completed several online questionnaires two weeks before participating in a research day at the lab at Leids Universitair Behandel- en Expertise Centrum (LUBEC). During the research day participants performed various tasks, including the interaction task used in this study. After the research day participants partook in the Ecological Momentary Assessment (EMA) for fourteen days. Additionally, families were asked to undergo an fMRI scan at Leiden University Medical Centre (LUMC). Participants

who gave consent were contacted for follow-up measures six months, one year, and two years after the research day. These follow-up measures consisted of several online questionnaires.

In the current study, data derived from a few of the online questionnaires, and one of the tasks performed on the research day was used. The following questionnaires were used: the Life Events Scale, the Childhood Trauma Questionnaire Short Form, and the Screen for Child Anxiety Related Emotional Disorders. Additionally, the Reminiscence Task (REM; six minutes) was used. For this task, the adolescent was asked to write down two events that had made them feel sad, bad, or disappointed at the start of the research day, and was asked to discuss the event(s) with their parent during the interaction task. The researcher selected the event the dyad started the discussion with (i.e., the one that was most frequent and experienced as most intense by the adolescent), and the dyad could proceed with the second event if there was time left after finishing the discussion of the first event. If both parents participated in the study, this task would be performed twice, once with each parent. Preferably the discussed event would be one that the parent would have no knowledge of and that they were not involved in.

## **Measures**

### ***Stressful Life Events and Childhood Emotional Maltreatment***

The Life Events Scale (LES) was used to assess stressful life events. This scale is a self-report measure consisting of 23 items scored on a 4-point Likert Scale. Three types of life events are assessed by this scale: Loss (1 item), Health threat (8 items), and Relational challenges (14 items) (Stikkelbroek et al., 2016). The Life Events scale has been validated in previous research (Stikkelbroek et al., 2016; Clements & Turpin, 1996). For this study, the LES consisted of questions with multiple possible subquestions. The first question of each section would be whether the adolescent has experienced a certain event (e.g., loss of a family member or pet, or moving house), and if this question would be answered 'yes', follow up questions would be when this event occurred and how much the event upset the adolescent. Level of upset was measured on a 4-point scale, where 1 = Not, 2 = A little, 3 = Fairly, and 4 = Extremely. Only events that were considered distressing (that received a score of 2 or higher) were included in the analysis. A sum of the scores on the items reflecting these events was used. Reliability of the LES in the present study was Cronbach's  $\alpha = .724$ . This reliability score was calculated for the first questions of each section (i. e. the main questions of the questionnaire).

The Childhood Trauma Questionnaire Short Form (CTQ-SF) was used to assess childhood emotional maltreatment. This measure is a self-report form containing 27 items scored on a 5-point Likert scale (1 = never true, 5 = very often true). The questionnaire consists of the following subscales: Emotional abuse, Physical abuse, Sexual abuse, Emotional neglect, and Physical neglect. The CTQ-SF was validated in prior research (Bernstein et al., 2003). For the current study, the subscales of Emotional abuse and Emotional neglect (total of 10 items) were combined to indicate the level of childhood emotional maltreatment. A sum of the scores on these subscales were used for the analysis. Cronbach's  $\alpha$  for the subscales relevant to this study was  $\alpha = .886$ , indicating good internal consistency reliability.

### ***Anxiety symptoms in adolescents***

The Screen for Child Anxiety Related Emotional Disorders (SCARED) was used to assess anxiety symptoms in adolescents. The scale contains 71 items which are rated on a 3-point scale (0 = almost never, 1 = sometimes, 2 = often). The following subscales were used in this study: Panic disorder (13 items), Generalized anxiety disorders (9 items), Social phobia (9 items) (Van Steensel & Bögels, 2014). The SCARED was validated for use for children and adolescents with anxiety disorders (Monga et al., 2000). A sum score of the scores on the items in these subscales was used to indicate the level of anxiety symptoms. Internal consistency reliability for this scale was high (Cronbach's  $\alpha = .945$ ).

### ***Autonomy support and psychological control***

Autonomy support and psychological control were assessed by coding parental behaviors when interacting with their adolescent child during a Reminiscence Task (REM). The level of autonomy supportive behavior was coded based on the mean of two subscales: Encouraging input of the adolescent, and Receptive to expressions made by the adolescent. The level of psychological control was assessed based on the mean of three subscales: Constraining verbal expressions, Guilt induction, and Invalidating emotions. Coding was done on a 9-point scale where the codes 1, 3, 5, 7, and 9 contained descriptions of behavior, and the scores 2, 4, 6, and 8 could be assigned when the behavior fell between two scores. The interaction task was recorded, and coders were asked to watch each video while pausing every minute, and to take notes. They were then asked to assign scores based on these notes. After this, the coders were asked to watch the video again without pausing, and to check whether the assigned codes did indeed represent the parental behavior. The coders were

master students in the field of Psychology or Child Studies. They attended five training sessions and next completed a reliability sample containing 30 videos. Intercoder reliability was calculated based on the average measures Intraclass Correlation Coefficient (ICC). The ICC for autonomy support was .96 and the ICC for psychological control was .94. The coders were blinded to participant group status and outcome variables and were never allowed to code the behavior in multiple interaction tasks for the same family as this could lead to bias. Intervention meetings were organized to promote intercoder reliability. The coding system (Wentholt et al., 2020) used in this study was developed based on literature, content of questionnaires of the constructs, and existing coding systems. Internal consistency reliability scores for autonomy support and psychological control were Cronbach's  $\alpha = .821$  and Cronbach's  $\alpha = .529$  respectively.

## **Ethics**

Ethical approval by the Medical Ethics Committee of the Leiden University Medical Centre (LUMC) has been obtained (NL62502.058.17, May 2nd, 2018).

## **Statistical analyses**

IBM SPSS Statistics 28.0.1.0 was used to analyze the data. Before running the main analysis, descriptive statistics were computed and used to provide an overview of the sample. The hierarchical multiple regression analysis was subsequently performed in order to investigate the relation between the variables. Within this analysis LES scores (stressful life events) and CTQ-SF scores (childhood emotional maltreatment) were the independent variables, and SCARED scores (anxiety symptoms) was the dependent variable. Autonomy Support (AS) and Psychological Control (PC) were added as moderators. The analysis controlled for group status (i.e., current depressive disorder or healthy control), and parental and child gender. The first independent(s) box contained the variables the analysis controlled for, namely group status and parental and child gender. The second independent(s) box contained LES scores, CTQ-SF scores, AS scores, and PC scores. Interaction predictor variables for AS and PC were added to a third independent(s) box. An alpha value of .05 was used to indicate significance.

Before running the analysis, normality and outliers were examined. Additionally, several assumptions for the multiple regression analysis were checked as part of the main analysis. The assumptions that were reviewed are assumptions of sample size, multicollinearity, linearity, homoscedasticity, and independence of residuals.

The first hypothesis would be confirmed if higher LES scores were found to be related to higher SCARED scores. Likewise, the second hypothesis would be confirmed if higher CTQ-SF scores were found to be related to higher SCARED scores.

The third hypothesis (a moderation effect of autonomy support) would be confirmed if a negative interaction effect with autonomy support was found. Lastly, the fourth hypothesis (a moderation effect of psychological control) would be confirmed if a positive interaction effect with psychological control was found.

## Results

### Preliminary Analyses

It was found that none of the variables were normally distributed. After performing Log transformations, all variables were still not normally distributed. Because of this, it was decided to use the variables without Log transformations. No outliers were found in the SCARED scores. Seven outliers were found in the scores for both the LES and the CTQ-SF. Regarding the data for parental behavior, no outliers were found in the AS scores, while six outliers were found in the PC scores. Cook's Distance was below one (.12), which suggests no major problem with regards to influential data points is present. Because of this, the outliers were not deleted from the sample.

As SCARED scores were not normally distributed, more than 20 records per predictor variable would have to be present. The restructured dataset for this analysis contains 205 records. Thus, the assumption of sample size was met. The correlations between the predictor variables are all below  $r = .70$ . Tolerance values for all predictor variables were above .10 and the VIF values for all predictor variables were below 10. This means that the assumption of multicollinearity was met. The data points in the scatterplot of the standardized residual and the standardized predicted value did not follow a clear or cone-shaped pattern, which indicates that the assumption of homoscedasticity is met. In this same scatterplot, the data points seem to roughly follow a straight line. Although it would be weak, it can be assumed that the relationship between the residuals and the predicted value is linear. The data points in the scatterplot did not seem to have a rectangular shape, which suggests a violation of the assumption of independence of the residuals might have been present. As most assumptions for the main analysis were met, it was decided to proceed with the analysis. However, results

should be interpreted with caution given the deviation from normality in the distribution of the variables.

Correlations were calculated for the main variables LES, CTQ, AS, PC, and SCARED scores. The correlations are included in Table 3.

**Table 3**

*Correlations between the main variables*

	<i>N</i>	<i>M</i>	<i>SD</i>	LES <sup>a</sup>	CTQ <sup>a</sup>	AS <sup>b</sup>	PC <sup>b</sup>
LES <sup>a</sup>	205	29.06	5.76				
CTQ <sup>a</sup>	204	15.73	5.56	.43**			
AS <sup>b</sup>	205	6.48	1.57	-.03	-.09		
PC <sup>b</sup>	205	2.51	1.17	.09	.14*	-.59**	
SCARED <sup>a</sup>	205	19.41	13.12	.54**	.34**	-.12	.08

<sup>a</sup> indicates total scores

<sup>b</sup> indicates mean scores

\* indicates  $p < .05$

\*\* indicates  $p < .01$

Some variables were found to be significantly correlated. Significant correlations were found between scores for the LES and the CTQ-SF, and the LES and the SCARED. Furthermore, significant correlations were found between scores on the CTQ-SF and scores for psychological control, and the CTQ-SF and the SCARED. Lastly, significant correlations were found between scores for autonomy support and psychological control.

### Main Analyses

To test the relation between Stressful Life Events or Childhood emotional maltreatment and anxiety symptoms, and the effect of parental behavior, a hierarchical multiple regression analysis was performed. This analysis controlled for group allocation and parental and child gender. These two variables were added to the first box in the analysis (Model 1). LES scores, CTQ-SF scores, AS scores, and PC scores were added to the second box (Model 2). To create the interaction predictor variables, the LES, CTQ-SF, AS, and PC scores were standardized, and new variables were computed for the interactions between the variables. These interaction predictor variables were added to the third box (Model 3). The Model summary is presented in Table 4. The coefficients of the moderation analysis are summarized in Table 5.

**Table 4**

*Model Summary*

Model	$R^2$	$\Delta R^2$	$\Delta F$	$df_1$	$df_2$	$p$
1	.68	.68	141.04	3	200	<.001
2	.71	.04	6.27	4	196	<.001
3	.73	.02	2.90	4	192	.023

The  $R^2$  value for the first model (containing group allocation and parental and child gender) is .68, which means that 68% of the variance in SCARED scores is explained by these variables. The  $\Delta F$  for these variables was significant ( $F(3, 200) = 141.04, p < .001$ ). The  $\Delta R^2$  value for the second model (after including the variables of interest: LES scores, CTQ-SF scores, AS scores, and PC scores) was .04, which implies that these variables accounted for 4% of the variance in SCARED scores. The variables added in this box significantly improved the prediction of the model ( $F(4, 196) = 6.27, p < .001$ ). The  $\Delta R^2$  value for the third model (after adding the interaction variables) was .02, which implies that the interaction effects accounted for 2% of the variance in SCARED scores. The interaction variables added likewise improved the model prediction ( $F(4, 192) = 2.90, p = .023$ ).

**Table 5**

*Moderation Analysis: Multiple Hierarchical Regression*

Model		Unstandardized coefficients		Standardized Coefficient	
		$B$	$SE$	$B$	$p$
1	Parental	.83	1.05	.03	.434
	gender				
	Gender	5.88	1.14	.21	<.001
	Condition	22.10	1.16	.77	<.001
2	LES (total)	.48	.11	.21	<.001
	CTQ (total)	-.02	.10	-.01	.828
	AS (mean)	-.74	.39	-.09	.062
	PC (mean)	-.544	.53	-.05	.308
3	LES*AS	-1.52	.61	-.12	.014
	LES*PC	-.96	.70	-.07	.169
	CTQ*AS	-.23	.82	-.02	.776
	CTQ*PC	-.89	.63	-.09	.155

Firstly, the coefficients of the variables that were controlled for were examined (group allocation and parental and child gender). Group allocation had a significant effect on SCARED scores ( $\beta = .77, p < .001$ ). This effect was expected, as no participants of the healthy controls group were supposed to have anxiety symptoms of a clinical level, in accordance with exclusion criteria. Child gender was also found to have a significant effect on SCARED scores ( $\beta = .21, p < .001$ ). This means that gender played a role in the presence of anxiety symptoms. In this case, the relation was positive which would indicate that girls were more likely than boys to have more anxiety symptoms (as gender was coded 1 for male and 2 for female). Parental gender was found to not be significantly related to SCARED scores ( $\beta = .03, p = .434$ ). This means that the gender of the participating parents was not of significant influence on the levels of the SCARED scores.

Secondly, the coefficients of box 2 were examined. A direct effect was found between LES scores and SCARED scores ( $\beta = .21, p = <.001$ ), which indicates a positive relation between these two variables. This means that within this study more stressful life events (higher LES scores) are related to more anxiety symptoms (higher SCARED scores). No significant effect of CTQ-SF scores on SCARED scores was found ( $\beta = -.01, p = .828$ ). This means that no relation between childhood emotional maltreatment and anxiety symptoms was found. Likewise, no significant effects of AS scores ( $\beta = -.09, p = .062$ ) and PC scores ( $\beta = -.05, p = .308$ ) were found. This means that within this study no direct relation was found between the parental behaviors of interest and anxiety symptoms in adolescents.

When examining the coefficients in the third and final model, only the interaction effect between LES scores and AS scores was found to be significantly related to SCARED scores ( $\beta = -.12, p = .014$ ). The relation found is negative, which indicates that the relation between stressful life events and anxiety symptoms becomes less strong when more parental autonomy supportive behavior is present. The interaction effect of LES scores and PC scores was found not to be significant ( $\beta = -.07, p = .169$ ). Additionally, the interaction effects of CTQ-SF scores and AS scores ( $\beta = -.02, p = .776$ ) and of CTQ-SF scores and PC scores ( $\beta = -.09, p = .155$ ) were not significant.

## Discussion

This study aimed to investigate the relation between stressful life events in general, and childhood emotional maltreatment specifically, on the development of anxiety symptoms in adolescents. Further, this study intended to explore whether parental autonomy supportive and

psychologically controlling behavior could serve as moderators (i.e., protective, or cumulative risk factors) for this relation. It was hypothesized that both stressful life events in general and childhood emotional maltreatment in specific would be related to the development of anxiety symptoms. The main analysis has demonstrated that only an effect of stressful life events in general was found on anxiety symptoms, within this study. Therefore, only the first of these two hypotheses was met. Further, it was hypothesized that the relations between stressful life events and childhood emotional maltreatment, and anxiety symptoms would be moderated by parental autonomy support and psychological control. It was theorized that low levels of autonomy support could serve as a protective factor for the development of anxiety symptoms after stressful life events, and that the presence of psychological control could serve as a cumulative risk factor for the development of anxiety symptoms after stressful life events. The main analysis has revealed that only autonomy support served as a moderator in this study, and only for the relation between stressful life events in general and anxiety symptoms. This would mean that the absence of parental autonomy support acts as a cumulative risk factor, and the presence of parental autonomy support serves as a protective factor for the development of anxiety symptoms after the occurrence of stressful life events. The hypothesis that parental psychological control would serve as a moderator for the relation between stressful life events and anxiety symptoms was not confirmed.

As aforementioned, the first hypothesis which stated that stressful life events would be related to anxiety symptoms was met. This is in line with previous research mentioned in the introduction, which found that stressful life events and anxiety symptoms are related (Young & Dietrich, 2015). This study found that this is the case in this sample as well, even after controlling for group status. This suggests that stressful life events were related to more anxiety symptoms regardless of whether participants were part of the depressed group or healthy control group. This finding implies that interventions might be advised after the occurrence of stressful life events, as a measure for prevention of the development of anxiety symptoms in adolescents.

When reviewing the data regarding the second hypothesis, it stands out that no direct effect of childhood emotional maltreatment was found in the main analysis. When reviewing the correlations however, it is found that although the assumption for multicollinearity was not violated, the CTQ-SF and SCARED are correlated. This implies that a main effect between childhood emotional maltreatment and anxiety symptoms might be present but that this effect was not found in the regression analysis, possibly because the other variables were more relevant in the analysis. The presence of a direct relation between childhood emotional

maltreatment and anxiety symptoms is in line with the study by Guo et al. (2021) mentioned in the introduction. What is not entirely consistent however, is that the authors of this study did find a direct effect of childhood emotional maltreatment on anxiety symptoms in the main analysis, even though they likewise investigated the effects of multiple variables on anxiety symptoms. The methodology used in the study by Guo et al. (2021) was similar to the methodology used in this study. For example, recruitment in both studies were not focused on the recruitment of maltreated children specifically, and the study by Guo et al. (2021) likewise used the CTQ-SF to measure childhood maltreatment. Because of these similarities, it is not entirely clear why the study by Guo et al. (2021) did find a direct effect of childhood emotional maltreatment on anxiety symptoms in the main analysis, while the current study did not. A possible reason for this is that despite the fact that the assumption for multicollinearity was met, the LES and the CTQ-SF were found to be correlated, which indicates that these scales might be similar in nature, which might have influenced the results. Another explanation could be that perhaps not many participants in the sample for the current study experienced childhood emotional maltreatment. When reviewing the CTQ-SF scores, only a few participants had exceptionally high scores on this scale. Only 5 out of the 112 participants that filled out the CTQ-SF scored 30 or higher. The maximum score was 40. If it is indeed the case that not many participants experienced substantial amounts of childhood emotional maltreatment, this could explain why no direct result of childhood emotional maltreatment on anxiety symptoms was found in the main analysis. This could imply that lower levels of childhood emotional maltreatment might not have a direct influence on anxiety symptoms while higher levels of childhood emotional maltreatment, as might have been present in the sample used in the study by Guo et al. (2021), might. Further research could be done to confirm this. When examining the dataset, it was found that some higher scores for the CTQ-SF were found in both the depressed group and the healthy control group. The fact that higher scores did occur in both groups, could illustrate that childhood emotional maltreatment might contribute to depression (and anxiety) symptoms for some people but not all. Further research could focus on examining what might make some more resilient to possible effects of childhood emotional maltreatment than others.

Further, it was found that autonomy support did moderate the relation between stressful life events and anxiety symptoms. This finding is in line with the third hypothesis mentioned in the introduction and implies that stressful life events are more likely to lead to anxiety symptoms when low levels of parental autonomy support are present, and less likely to lead to anxiety symptoms when the adolescent's parent is autonomy supporting. Concluding from

this, parental autonomy supportive behavior could be marked as a cumulative risk factor for the development of anxiety symptoms after the occurrence of stressful life events. Thus, parental autonomy supportive behavior could be used as a target for intervention. Future research could aim to establish interventions for parental autonomy supportive behavior after a stressful life event has taken place. One possible way this finding could be used in future interventions, is by raising awareness among parents that a lack of autonomy support could increase the risk for the development of anxiety symptoms in adolescents after stressful life events. Additionally, parental autonomy support could also be seen and described in a more positive light, as a protective factor for the development of anxiety symptoms in adolescents after the occurrence of stressful life events. It is interesting to note that the observational measure of parental behavior was obtained in a lab Reminiscence task, which offers a very specific setting for the observation of behavior. The fact that this effect was found within the context of such a specific task is promising and implies that much could possibly be achieved by targeting autonomy supportive behaviors in specific interactions between parents and adolescents. Aside from research into interventions for autonomy supportive behavior, research could expand on this finding by researching the effects of more varieties of parental behaviors on the relation between stressful life events and anxiety symptoms.

A finding that also stands out is that no direct effect of autonomy support on anxiety was found. This is not in line with the findings of the study by Nelemans et al. (2019) mentioned in the introduction which suggested that low levels of parental autonomy support were related to more social anxiety symptoms. A possible explanation for these differing results is that the study by Nelemans et al. (2019) used questionnaires to assess perceived parental behavior in adolescents, while the current study used observational measures. This differing method of measurement could have influenced the results.

Although autonomy support did moderate the relation between stressful life events and anxiety symptoms, the same effect of autonomy support was not found for the relation between childhood emotional maltreatment and anxiety symptoms. One possible reason for this was mentioned above, namely that CTQ-SF scores were mostly quite average within this sample. Further research could investigate whether autonomy support perhaps does moderate the relation between childhood emotional maltreatment and anxiety symptoms if more problematic levels of childhood emotional maltreatment are present within the sample. Another possible explanation for this finding is that childhood emotional maltreatment could happen at the hand of parental figures. In this study, it is unclear whether this was the case for participants who have experienced childhood emotional maltreatment. If this emotional

maltreatment was inflicted by the parents, desirable parental behavior such as autonomy support would not necessarily be expected. If the maltreatment did occur outside of the home environment, parental autonomy support could potentially have been a buffering factor, but this information regarding the perpetrators of the maltreatment is not known.

For the last hypothesis, it was found that psychological control was not a moderator for any of the relations examined in this study. This means that this hypothesis was also not met. It also stands out that no direct influence of psychological control on anxiety symptoms was found. This does not line up with the findings by Nelemans et al. (2019) and Rogers et al. (2020) mentioned in the introduction. Again, an explanation for this could be that both of these studies measured parental psychological control by means of questionnaires filled out by the adolescents, while the current study used observational measurement methods. This difference in measurement of parental behavior could have affected the outcomes.

As autonomy support did serve as a moderator between stressful life events and anxiety symptoms, it was not immediately clear why this is not the case for psychological control. A reason for this could be that autonomy support and psychological control are very different in nature, and thus their relations to other variables might also differ. Within this sample, autonomy support and psychological control were both not perfectly normally distributed, but more variance was found in autonomy support scores than psychological control scores. A potential explanation for this could be that psychological control might only be seen as problematic when it reaches a certain threshold of intensity. The same can be seen in the CTQ-SF scores. Childhood emotional maltreatment was only seen as problematic in cases of high intensity. Further research might be able to explore whether psychological control might have a negative influence on anxiety symptoms directly and might serve as a moderator between stressful life events or childhood maltreatment and anxiety symptoms, when more problematic levels of psychological control are measured within the research sample.

Both autonomy support and psychological control did not moderate the relation between childhood emotional maltreatment and anxiety symptoms. For autonomy support, a potential reason for this is provided above. One reason why psychological control was found to not moderate the relation between childhood emotional maltreatment and anxiety symptoms could be that, even though the assumption of multicollinearity was not violated, the CTQ-SF and PC scores were correlated. This might imply that these two themes covered by these measures were similar, which might influence the results. Another possible explanation as to why this might be the case, as mentioned above, is that childhood emotional maltreatment is often perpetuated by the child's parents. Therefore, a lack of autonomy supportive behavior or

a presence of psychological control could be expected from the parent when a child is being maltreated. It is also important to note that parental behavior was observed in this study. thus, the adolescents were not asked to report on their perception of parental behavior. It is therefore unknown if the participants perceived the same behaviors as were coded during the interaction task. If the perceptions of parental behavior by adolescents were investigated instead of observed behavior, this might have yielded different results.

This study had several limitations. Primarily, generalizability of the results of this study was compromised by several factors. Firstly, data for this study was derived from a larger project researching depression, not anxiety. Within this larger project, a group of participants with depression was compared to a healthy control group. When reviewing the distribution of the SCARED scores, there are low scores for the healthy control group and average to high scores for the depressed group. This is to be expected, as the healthy control group had no psychopathology at all, and around half of the depressed group met the criteria for an anxiety disorder diagnosis. As this study did not contain a normative sample, this could complicate generalizability. Additionally, the sample size of the depressed group was relatively small. This group contained 34 participants, while the goal was to reach 80 participants. Of these 34 participants only 15 met the criteria for an official anxiety disorder diagnosis. This smaller sample size could have influenced the ability to find results in the analysis and could make it more difficult to generalize the findings to a larger population. Another limitation regarding generalizability is that within this study, CTQ-SF scores were relatively low to moderate. for this reason, the results of the hypotheses regarding childhood emotional maltreatment might not be generalizable to populations of people with higher CTQ-SF scores. An additional limitation is that it is unclear who the perpetrator is for childhood emotional maltreatment in the CTQ-SF. Some items do refer to the home environment, but not all items do. Because this study researched parental behavior as well, it would have been relevant to know whether the childhood emotional maltreatment participants may have experienced was inflicted by one of their parents. A second limitation was that some assumptions for the analysis were not met. It is possible that this influenced the results.

To conclude, this study found that stressful life events, but not childhood emotional maltreatment specifically, are related to the development of anxiety symptoms. Furthermore, parental autonomy support moderates this relation, meaning that the absence of autonomy support can function as a cumulative risk factor, and the presence of autonomy support can function as a protective factor for the development of anxiety symptoms after stressful life events. Implications for future research were suggested. One implication is that further

research could focus on examining what might make one individual more resilient to childhood emotional maltreatment than others. Research could also expand on this study by examining possible interventions for parental autonomy supportive behavior after the occurrence of a stressful life event for adolescents, and by examining the possible effects of a variety of other parental behaviors on the development of anxiety symptoms after the occurrence of stressful life events. Lastly, future research could examine whether childhood emotional maltreatment and psychological control could have different (direct and indirect) effects when these variables take on more problematic levels.

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