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Anxiety in Early Adolescents During the Covid-19 Pandemic

The Role of Intolerance of Uncertainty and Cognitive Emotion Regulation

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Abstract: *Introduction:* Anxiety is one of the most common psychological problems in children, with an increasing trend during the COVID-19 pandemic. This study examines the mediating role of intolerance of uncertainty and cognitive emotion-regulation strategies in the relationship between stress and anxiety symptoms of children and early adolescents during the COVID-19 pandemic. *Methods:* We conducted the study with 234 elementary school students (128 females) aged 11 to 15 years. The students completed the COVID-19 Stress Scale, Revised Child Anxiety and Depression Scale, Intolerance of Uncertainty Scale for Children, and the Cognitive Emotion Regulation Questionnaire. To determine whether stress affects anxiety symptoms both directly and indirectly through intolerance of uncertainty and cognitive emotion-regulation strategies, we performed a mediation analysis with gender as a covariate. *Results:* Our results confirmed cognitive emotion regulation and intolerance of uncertainty as important cognitive vulnerability factors for anxiety in children and adolescents. A stressful experience contributes directly to anxiety and indirectly through higher intolerance of uncertainty and less adaptive strategies. The results serve to further improve prevention and intervention programs for children and adolescents which focus on correcting maladaptive cognitive emotion-regulation strategies and increasing tolerance of uncertainty.

Keywords: children, adolescents, anxiety, cognitive emotion regulation, intolerance of uncertainty

Introduction

The confirmed negative effects of the pandemic on the mental health of children and adolescents (e.g., Benke et al., 2020; Meherali et al., 2021) created additional questions about the role of specific psychological factors in the development of anxiety symptoms. During the pandemic, children and adolescents had to deal with multiple changes in their lives, including online schooling, fears of spreading the virus to family members, limited interactions with peers, and spending most of their time indoors. In the cognitive model, one of the most widely used models to explain the development, maintenance, and treatment of anxiety in adults as well as in children and adolescents, cognitive emotion regulation and intolerance of uncertainty are recognized as important cognitive vulnerability factors (Caballero et al., 2023; Saraff et al., 2023). Because the COVID-19 pandemic is associated with increased stress and considerable uncertainty (Rettie & Daniels, 2021), intolerance of uncertainty and cognitive emotion regulation may be particularly important in understanding anxiety symptoms in children and adolescents during the pandemic (Korte et al., 2022).

Anxiety

Anxiety is one of the most common psychological problems in children and adolescents (Polanczyk et al., 2015), with a typical median age of onset between 13 and 19 years (Rapee et al., 2019) and with long-term effects later in life (Mohler-Kuo et al., 2021). The development and maintenance of anxiety in adolescents may be related to genetics, socioeconomic status, negative life events, and cognitive factors (Rapee et al., 2009). For example, children with anxiety disorders are more likely to have a parent with an anxiety disorder (Lieb et al., 2000) or overprotective parents (Wood et al., 2003). In addition, anxiety in children and adolescents correlates with a greater number of negative life events (Rapee & Szollos, 2002) and low family socioeconomic status (Cronk et al., 2004). Furthermore, studies suggest a link between childhood anxiety disorders and information-processing biases central to the maintenance of anxiety (Hadwin et al., 2006). Vulnerability to developing anxiety and other internalized disorders in adolescence could be explained by developmental changes, such as physical and chemical changes in their brains, with increased emotional reactivity in response to stressors and low emotion regulation (Bailen et al., 2019;

Rapee et al., 2019). Children and adolescents are more vulnerable to environmental stress than adults because of their cognitive and emotional immaturity and difficulties understanding stressful situations, with fewer strategies for coping with sudden changes (Nguyen et al., 2022). Environmental stressors are a significant risk factor for internalizing and externalizing disorders in youth (e.g., Cicchetti & Toth, 1997; Grant et al., 2006), and anxiety is one of the most common child reactions to stress (Mohler-Kuo et al., 2021).

Studies confirm the immediate and delayed effects of the COVID-19 pandemic on child and adolescent mental health (Meherali et al., 2021; Racine et al., 2021). The pandemic posed particular challenges for children and young people: Social contacts were curtailed (Ravens-Sieberer et al., 2021), classes were held online, and there were insufficient opportunities to engage in usual leisure activities (Hawes et al., 2022). These changes, occurring at an important turning point in their development, were potential triggers for psychological distress and mental health problems in young people (Golberstein et al., 2020; Loades et al., 2020). The uncertainty, disruptions of daily routines, and concern for family health and well-being during the COVID-19 pandemic led to increases in generalized anxiety among youth (Courtney et al., 2020). A meta-analysis of the global prevalence of anxiety symptoms among children and adolescents during the pandemic estimated that it likely doubled from prepandemic levels, in other words, that one in five adolescents had clinically elevated anxiety symptoms (Racine et al., 2021).

Girls are more likely than boys to respond to stressors with internalizing symptoms (McMahon et al., 2003). Between the ages of 11 and 16, girls are more prone to anxiety than boys, who report decreasing anxiety levels. This difference remains stable in adulthood (Copeland et al., 2014; Merikangas et al., 2010; Raknes et al., 2017).

Cognitive Emotion Regulation

Emotion regulation refers to a style of responding to threatening or stressful life events as well as the way of regulating emotions triggered by stressors (Compas et al., 1993). Emotion-regulation strategies modulate the emotional reaction to a particular situation by affecting changes in the intensity, duration, and/or quality of emotional experience and expression (Gross, 2015). Emotion-regulation processes are critical in reducing or increasing negative emotions and distress (Aldao & Nolen-Hoeksema, 2010). Although this process includes both behavioral responses and associated cognitive processes, according to the cognitive model, cognitive processes usually precede actions. Garnefski et al. (2001) define cognitive emotion regulation as the cognitive way of managing the intake of emotionally

arousing information. The focus is on what people *think* after such an experience rather than what they *do*. Garnefski et al. (2001) distinguish between adaptive and less adaptive/maladaptive cognitive emotion-regulation strategies. Adaptive strategies include positive refocusing, positive reappraisal, acceptance, planning, and putting into perspective. Less adaptive strategies include self-blame, other-blame, rumination, and catastrophizing.

Less adaptive cognitive emotion-regulation strategies have been associated with various psychological problems, particularly anxiety (Aldao & Nolen-Hoeksema, 2010; Garnefski et al., 2001), but research (e.g., Garnefski et al., 2002) suggests possible age differences in the effects of cognitive coping on anxiety. These authors found that catastrophizing and positive reappraisal were strong predictors of anxiety in adults but not in adolescents. Other studies have found rumination to be a strong vulnerability factor for adolescent anxiety (Chan et al., 2015, 2016; Garnefski et al., 2001). Rumination, self-blame, and catastrophizing are related to adolescent anxiety (Garnefski et al., 2005), while less adaptive strategies – except for blaming others – are significant predictors of anxiety in children (Garnefski et al., 2007). Positive reappraisal acts as a stress buffer (Chan et al., 2016). In a study of college students, low positive reappraisal predicted both anxiety and stress (Martin & Dahlen, 2005). Chan et al. (2016) suggested that differences in the effect of cognitive coping strategies among children, adolescents, and adults may be related to differences in cognitive development and life experiences. For children who are still in a concrete stage or transition to the formal stage of cognitive development and have less social experience, the effect of the cognitive strategies used may not be comparable to that of adolescents and adults. Adaptive cognitive coping strategies may not have the same protective effect in children as in adults because they require higher-order cognitive functioning (Chan et al., 2016). Regardless of the inconsistent data, it appears that the effects of rumination and catastrophizing as vulnerability factors – and positive appraisal as a stress buffer – are most consistent in studies of anxiety in children, adolescents, and adults (Garnefski et al., 2001). Results also showed that maladaptive cognitive emotion-regulation strategies partially mediate the relationship between stress and anxiety in children (Chan et al., 2016).

Although studies found gender differences in cognitive emotion-regulation strategies, the results were inconsistent across studies and varied depending on age and specific cognitive emotion-regulation strategy. Duarte et al. (2015) found that girls aged 13 to 15 tended to use more maladaptive cognitive emotion-regulation strategies (rumination and self-blame) than boys. Similarly, female adolescents reported ruminating more often than male adolescents (Öngen, 2010). In contrast, when they analyzed gender

differences in cognitive emotion regulation in 9- to 12-year-old children, Chan et al. (2016) found that girls were more likely than boys to report positive refocusing (as an adaptive strategy) – and vice versa when it came to blaming others (as a maladaptive strategy). However, Öngen's (2010) findings suggest that boys tend to use adaptive cognitive emotion-regulation strategies more often than girls.

Intolerance of Uncertainty

Intolerance of uncertainty is considered a key transdiagnostic dimension and treatment target for emotional disorders (Morriss et al., 2023). It refers to a negative dispositional orientation toward uncertainty and its consequences associated with a tendency to respond negatively at emotional, cognitive, and behavioral levels to uncertain and unpredictable situations (Dugas et al., 2004). Fear of the unknown lies at the core of intolerance of uncertainty (Carleton, 2016). It manifests as worry, emotional distress, and maladaptive cognitive and behavioral reactions, and is associated with internalizing problems in children and adolescents and remains relatively stable in adults (Boelen et al., 2010; Carleton, 2016; Dugas et al., 2012). Intolerance of uncertainty can be considered both a vulnerability factor for anxiety and a maintaining factor, i.e., by reducing adaptive cognitive strategies and enhancing maladaptive strategies (Carleton, 2016; Korte et al., 2022; Zhao et al., 2021).

Intolerance of uncertainty moderates the relationship between negative life events and anxiety in children (Osmanağaoğlu et al., 2018). Although children may be aware of uncertainty and able to respond to uncertainty from a young age, many cognitive processes related to uncertainty continue to develop in middle childhood and adolescence (Osmanağaoğlu et al., 2018). As cognitive skills necessary for reasoning about uncertainty develop, the nature of intolerance of uncertainty and the association between intolerance of uncertainty and anxiety may change. Still, in their meta-analysis, the authors found no significant moderating effects of age and gender in the relationship between intolerance of uncertainty and anxiety in children and adolescents.

Stress, Intolerance of Uncertainty, Emotion-Regulation Strategies, and Anxiety

If we want to understand the psychological consequences associated with the pandemic as well as approaches to mitigate these consequences, we need to develop new models (Korte et al., 2022). Intolerance of uncertainty, characterized by fear of the unknown and reduced ability to cope

with it (Carleton, 2016), may be one of the important variables for understanding the psychological symptoms of children and adolescents during the pandemic. In new, uncertain, or ambiguous situations, children are particularly sensitive to developing maladaptive reactions to stress (Korte et al., 2022). The COVID-19 pandemic is associated with considerable uncertainties (Rettie & Daniels, 2021). Research supports the expectation that people disturbed by the pandemic also experience more pronounced uncertainty because of the pandemic. For example, Mertens et al. (2020) found a positive association between fear of COVID-19 and intolerance of uncertainty. In addition, Gullo et al. (2022) found that intolerance of uncertainty partially mediates the effect of fear of COVID-19 on adult anxiety.

Research on the effects of COVID-19 on mental health and the increase in anxiety symptoms in adults and adolescents (Benke et al., 2020; Meherali et al., 2021) rarely analyzes the combined effect of intolerance of uncertainty and emotional dysregulation (Akbari et al., 2021; Gullo et al., 2022). The results confirm the mediation effect of intolerance of uncertainty and some emotion-regulation strategies in the relationship between fear of COVID-19 and anxiety in a sample of adults (Gullo et al., 2022). Still, the nature of the relationship between these constructs in a sample of children and adolescents remains open.

Goals and Hypotheses

This study examined the mediating role of intolerance of uncertainty and cognitive emotion-regulation strategies in the relationship between stress and anxiety symptoms of children and early adolescents during the COVID-19 pandemic. We hypothesized that stress would directly and indirectly affect anxiety symptoms (Chan et al., 2016; Korte et al., 2022) through intolerance of uncertainty and cognitive emotion-regulation strategies (Chan et al., 2016; Gullo et al., 2022; Zhao et al., 2021). Because gender differences in stress, anxiety, and cognitive emotion-regulation strategies have been documented (Comer et al., 2009; Duarte et al., 2015; Ellis et al., 2020; Garnefski et al., 2004; Raknes et al., 2017), we considered gender as a covariate.

Method

Participants and Procedure

We conducted the study on a convenience sample of students from 5th to 8th grade from an elementary school. Of the 344 5th- to 8th-grade students who attended the school where the study was conducted, 234 students

(128 females and 106 males) aged 11 to 15 years (M age = 12.37, SD = 1.16) agreed to participate in the study. The students had various experiences with the pandemic: All of them had experienced online classes from time to time, 72.2% had experienced self-isolation, 13.7% of them had contracted COVID-19, while 27.8% of them had had a family member come down with COVID-19. The students, supervised by a school psychologist, completed the questionnaires online on tablets during regular school hours from March to April 2021. At that time, the school was regularly on-site. Approval for the study was obtained from the faculty Ethics Committee, and informed consent was obtained from the children and their parents.

Measures

The Demographic Data Questionnaire

The demographic data questionnaire included information on age, gender, grade (5th to 8th grade), and whether the students were in self-isolation, had contracted COVID-19, or had had a family member who contracted COVID-19.

Revised Child Anxiety and Depression Scale

To measure anxiety, we used the Revised Child Anxiety and Depression Scale (Chorpita, 2015). This questionnaire consists of 47 items divided into 6 subscales: Separation Anxiety (7 items), Social Phobia (9 items), Generalized Anxiety Disorder (6 items), Panic Disorder (9 items), Obsessive-Compulsive Disorder (6 items), and Major Depressive Disorder (10 items). Response options ranged from 1 (*never*) to 4 (*always*). We used the original factor structure (Chorpita, 2015). We used only the anxiety score, which is the sum of the scores of the Separation Anxiety, Social Phobia, Generalized Anxiety Disorder, Panic Disorder, and Obsessive-Compulsive Disorder subscales (37 items; e.g., “I worry about things,” “I feel scared if I have to sleep on my own”), with higher scores indicating higher anxiety. Internal reliability was high (α = .95).

Intolerance of Uncertainty Scale for Children

The Intolerance of Uncertainty Scale for Children – Short Form (IUS 12, Cornacchio et al., 2017) is a 12-item questionnaire with two subscales: Prospective Anxiety (7 items) and Inhibitory Anxiety (5 items). The questionnaire measures a person’s reactions to uncertain, ambiguous situations and the future (e.g., “I don’t like being taken by surprise,” “The smallest doubt can stop me from doing things”). Responses are given on a 5-point scale (1 – *not at all* to 5 – *completely*). A total score for the entire questionnaire can be calculated by summing the scores for the items or the scores for the subscales. We used a total score; a higher score indicates a higher level of intolerance of uncertainty. The alpha coefficient in this sample was high (α = .90).

Cognitive Emotion Regulation Questionnaire

The Cognitive Emotion Regulation Questionnaire – Short Form (Garnefski & Kraaij, 2006) measures participants’ specific cognitive emotion-regulation strategies in response to threatening or stressful life events. It can be administered to individuals aged 12 years of age and older. It consists of 18 items and 9 subscales: Positive Refocusing (“I think of something nice instead of what has happened”), Positive Reappraisal (“I think I can learn something from the situation”), Acceptance (“I think that I have to accept the situation”), Refocus on Planning (“I think about how to change the situation”), Putting into Perspective (“I tell myself that there are worse things in life”), Self-Blame (“I think that I am the one to blame for it”), Other-Blame (“I feel that others are responsible for what has happened”), Rumination (“I am preoccupied with what I think and feel about what I have experienced”), and Catastrophizing (“I continually think how horrible the situation has been”). A higher-order factor analysis of CERQ distinguished two superordinate factors: Adaptive and Less Adaptive Strategies (Garnefski et al., 2001; Jermann et al., 2006). Adaptive Strategies include positive refocusing, positive reappraisal, acceptance, refocus on planning, and putting into perspective; Less Adaptive Strategies include self-blame, other-blame, rumination, and catastrophizing. The CERQ-Short Form has already been administered to Croatian samples (Mišetić & Bubić, 2016), and confirmatory factor analysis confirmed the proposed 9-factor model and two higher-order factor models. Responses are given on a 5-point Likert scale (1 – *almost never* to 5 – *almost always*). The higher the score, the more frequently a particular cognitive strategy is used. In this study, we used a two-dimension structure. In the present sample, the internal reliability for each dimension was satisfactory (alpha coefficients were .86 and .84, respectively).

COVID-19 Related Stress Scale

This scale was constructed specially for this study. It consists of 9 items on which participants rate how much different things bothered them during this semester, and most of the items refer to stressors related to the coronavirus. Examples of items in this questionnaire are: “Fear of getting a coronavirus,” “Inability of hanging on with friends,” “Strained family relations,” “Concentration and memory difficulties,” etc. The answers are given on a 5-point Likert scale (1 – *not at all* to 5 – *very strongly*). We conducted a principal component analysis (PCA) with oblimin rotation. Although the initial results indicated a three-factor solution (eigenvalues 2.69, 1.48, and 1.19), because we obtained no pure factor structure and one factor contained only two items, we chose a single-factor solution that explained 29.87% of the variance.

Table 1. Descriptive statistics and correlations of the study variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Gender	–						
(2) Age	–.05	–					
(3) Stress	.25***	–.09	–				
(4) Intolerance of uncertainty	.06	–.06	.37***	–			
(5) Adaptive strategies	.06	.13	.01	.26***	–		
(6) Less adaptive strategies	.18**	.03	.39***	.59***	.34***	–	
(7) Anxiety	.32***	–.09	.52***	.74***	.12	.71***	–
<i>M</i>	–	12.37	2.51	2.26	3.03	2.48	1.89
<i>SD</i>	–	1.16	0.81	0.87	0.86	0.85	0.53
α	–	–	.68	.90	.86	.84	.95
Skewness	–	0.29	0.38	0.63	–0.25	0.13	0.57
Kurtosis	–	–1.03	–0.13	–0.44	–0.32	–0.68	–0.10

Note. Gender: 1 = males, 2 = females. * $p < .05$; ** $p < .01$; *** $p < .001$.

To test the one-factor model, we performed a CFA. The model initially had a poor fit. However, after we removed three items (“Fear of infection – for self”, “Fear of infection – for family member”, “Lack of sports and other organized activities”), the model fit statistics were good and allowed residual covariance between two items (“Family relations” and “Family financial difficulties”): $\chi^2(8) = 15.33$, $p > .05$, CFI = 0.97, TLI = 0.94, RMSEA = 0.06, SRMR = 0.04). The Cronbach alpha coefficient for the 6-item scale was .68.

Data Analysis

First, we calculated descriptive statistics (mean, standard deviation, skewness, kurtosis, percentages) and zero-order correlations (Pearson’s coefficient). Second, to determine whether stress affects anxiety symptoms both directly and indirectly through intolerance of uncertainty and cognitive emotion-regulation strategies, we performed mediation analysis with gender as a covariate, using the Process macro 3.5.3 extension for SPSS (Hayes, 2018).

Results

Table 1 shows the descriptive for all variables used in the study and their correlations. Anxiety symptoms were positively correlated with stress, intolerance of uncertainty, and less adaptive strategies. Females report more anxiety symptoms and were more distressed. They also report using more maladaptive cognitive emotion-regulation strategies.

Experiences with COVID-19-Related Stress

Data on COVID-19-related stress showed that children reported boredom, fear of infection for the family member,

Table 2. Percentage of students reporting COVID-related stress

Source of stress	Strong or very strong distress (%)
Fear of infection – for self	4.28
Fear of infection – for family member	37.18
Social isolation from friends	33.34
Family relations	11.11
Difficulties with online classes	35.47
Lack of sports and other organized activities	29.06
Family financial difficulties	8.54
Concentration and memory difficulties	25.64
Boredom	41.09

difficulty with online classes, and social isolation from friends as the strongest sources of stress (Table 2).

Mediation Analysis

To determine whether stress affects anxiety symptoms both directly and indirectly through intolerance of uncertainty and cognitive emotion-regulation strategies, we performed mediation analysis with gender as a covariate. We used the bootstrapping technique with 5,000 subsamples to estimate the confidence interval (95%) and obtained estimates of the indirect effects of multiple mediators, along with standard errors (SE) and confidence intervals (CI). We considered indirect effects statistically significant if the confidence intervals (CI of 95%) did not contain zero (Hayes & Preacher, 2013).

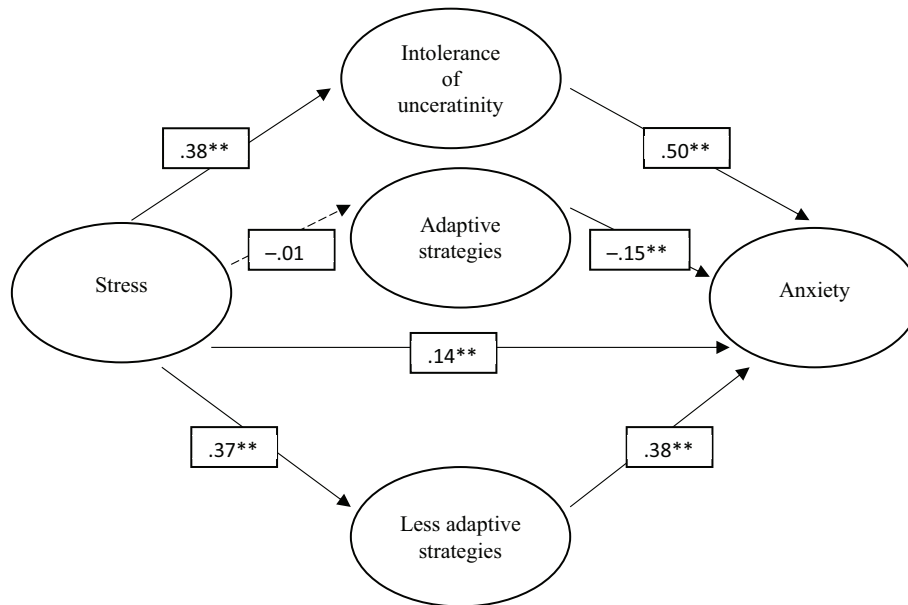
Table 3 shows the direct, indirect, and total effects between stress, intolerance of uncertainty, cognitive emotion-regulation strategies, and anxiety.

The total effect was significant ($\beta = .47$, $p = .00$); we also found a significant direct association between stress and anxiety symptoms ($\beta = .14$, $p = .00$). The results regarding

Table 3. Indirect effects of intolerance of uncertainty and cognitive emotion-regulation strategies between stress and anxiety (gender as a covariate)

		β	SE	95% CI
Stress	Intolerance of uncertainty	.19**	0.04	0.12, 0.26
Stress	Adaptive strategies	.00	0.01	-0.02, 0.02
Stress	Maladaptive strategies	.14**	0.03	0.09, 0.20
Total indirect effect		.33**	0.05	0.23, 0.42

Note. * $p < .05$; ** $p < .01$.

**Figure 1.** Effects of stress, intolerance of uncertainty and cognitive emotion-regulation strategies on anxiety symptoms (gender as a covariate). Standardized path coefficients are shown. * $p < .05$; ** $p < .01$.

the mediating effect of intolerance of uncertainty and adaptive and less adaptive cognitive emotion-regulation strategies on the relationship between stress and anxiety revealed significant paths from stress to anxiety symptoms through intolerance of uncertainty and maladaptive cognitive emotion-regulation strategy. The indirect effect of the adaptive cognitive emotion-regulation strategy on anxiety was insignificant. Figure 1 shows a path model showing the effects of stress, intolerance of uncertainty, cognitive emotion-regulation strategies and anxiety with gender as a covariate. Intolerance of uncertainty and maladaptive strategies have strong and significant path coefficients. The path from stress to adaptive strategies was insignificant for adaptive strategies, but adaptive strategies did have a significant direct effect on anxiety. Children and adolescents who experienced more stress reported more intolerance of uncertainty use more maladaptive strategies and have more anxiety symptoms. The role of adaptive cognitive emotion strategies in anxiety was not related to stress.

Discussion

This study examined the mediating role of intolerance of uncertainty and cognitive emotion-regulation strategies in the relationship between stress and anxiety symptoms of children and early adolescents during the COVID-19 pandemic. The data analysis confirmed that stress affected anxiety symptoms both directly and indirectly through intolerance of uncertainty and less adaptive cognitive emotion-regulation strategies during the COVID-19 pandemic.

Our data show that the context of the pandemic mattered to the children in our sample: All of them experienced online classes, 72.2% of the children experienced self-isolation, and 13.7% had COVID-19, whereas 27.8% of them had a family member with COVID-19. The children in our sample rated moderate levels of COVID-19-related stress; they were more worried about their family members getting sick than about themselves. They were more upset about online classes, lack of activities, and boredom at home than about family relationships and financial problems. Our results

resemble those of Magson et al. (2020), who also found that adolescents' worries about getting sick were relatively low, and of Craig et al. (2022), who found that adolescents were more concerned about the health of family members than about their own health.

Although the average anxiety level was not high, girls reported more anxiety symptoms. It is already well established that gender is a risk factor for anxiety disorders (e.g., Copeland et al., 2014; Raknes et al., 2017). Our results also showed that adolescent girls were more likely than adolescent boys to be upset during the COVID-19 pandemic. These findings are consistent with previous studies in which adolescent girls reported higher levels of distress (Nguyen et al., 2022; Pizarro-Ruiz & Ordóñez-Cambor, 2021; Smirni et al., 2020).

The children and adolescents in our sample were more likely to use adaptive cognitive emotion-regulation strategies than less adaptive strategies. Previous research (Garnefski & Kraaij, 2006; Garnefski et al., 2007) showed that children most frequently reported the adaptive cognitive strategies of putting into perspective and positive refocusing, whereas they reported using the maladaptive strategies of self-blame, other-blame, and catastrophizing less frequently. Although adaptive and less adaptive strategies were positively associated with each other, suggesting that stress in children and adolescents may simultaneously activate different coping methods, our results suggested there is no direct effect between stress exposure and adaptive strategies. Similar results regarding the connection between adaptive and less adaptive strategies were obtained in the general population of children (Garnefski et al., 2007) and in the adult population (Garnefski & Kraaij, 2006).

In addition, girls in our sample reported using maladaptive cognitive emotion-regulation strategies more often when coping with negative life events. Previous research found gender differences in cognitive emotion-regulation strategies, although these differences were not consistent across studies (Chan et al., 2016; Öngen, 2010).

As expected, our results showed that COVID-19-related stress, intolerance of uncertainty, and cognitive emotion-regulation strategies significantly affected anxiety. Environmental stressors are a significant risk factor for internalizing and externalizing disorders in children and adolescents (e.g., Cicchetti & Toth, 1997; Grant et al., 2006), with anxiety being one of the most common responses to stress (Mohler-Kuo et al., 2021). Our results show that this is also the case in the situation related to COVID-19. Because of the pandemic, children and adolescents have lost structure and a daily routine concerning school and usual activities as well as the opportunity to interact with peers, leading to more anxiety symptoms. Difficulty adapting to new constraints in social activities

and school has been reflected in changes in mental health (Magson et al., 2020).

Our results suggested that intolerance of uncertainty had a significant effect in explaining anxiety. Because the COVID-19 pandemic itself is associated with considerable uncertainty (Rettie & Daniels, 2021), intolerance of uncertainty, characterized by fear of the unknown and diminished ability to cope with that fear (Carleton, 2016), may be one of the salient factors in understanding anxiety symptoms in children and adolescents during the pandemic (Korte et al., 2022). The role of intolerance of uncertainty in psychological symptoms could be attributed to increasing worry (e.g., Korte et al., 2022). Similar to our findings, other studies found a significant association between intolerance of uncertainty and worry, rumination, and catastrophizing (Osmanağaoğlu et al., 2018; Read et al., 2013; Satici et al., 2022). A high correlation between intolerance of uncertainty and less adaptive strategies could be explained by the possible tendency of children and adolescents with more pronounced intolerance of uncertainty to use these strategies when dealing with stressful situations, which, together with intolerance of uncertainty, contribute to the development of anxiety. Given the correlational nature of our study, we can only assume a causal relationship between intolerance of uncertainty and cognitive emotion strategies.

Previous research (e.g., Garnefski & Kraaij, 2006; Garnefski et al., 2007) also found that, with the exception of blaming others, less adaptive strategies are significant predictors of anxiety in children. Children and adolescents who think they are to blame for something, who are preoccupied with what they think and feel about what they have experienced, and who catastrophize by continually thinking about how horrible the situation was, have more anxiety symptoms. As a result of the ongoing pandemic, children and adolescents may become more alert to threats, feel helpless, and spend more time isolated from peers, all of which lead to opportunities for rumination as a less adaptive strategy (Fredrick et al., 2022).

According to our results, adaptive cognitive emotion-regulation strategies did not correlate with anxiety symptoms, though, when we considered all variables together, they had a small but significant direct effect on anxiety. Chan et al. (2016) also found that, although children reported using adaptive cognitive strategies more often than less adaptive strategies, the predictive power of the less adaptive strategies was much stronger. In stressful situations, children and adolescents tend to ruminate on the negative feelings associated with the situation exaggerate its negative consequences, or fail to positively reappraise the stressful event, contributing to more anxiety symptoms. A possible explanation for why adaptive cognitive coping strategies do not play a protective role is that they require

higher levels of cognitive functioning and abstract thinking characteristic of older adolescents and adults (Garnefski et al., 2001).

Our results confirmed cognitive emotion regulation and intolerance of uncertainty as important cognitive vulnerability factors for anxiety in children and adolescents. A stressful situation contributes directly to anxiety but also indirectly through intolerance of uncertainty and less adaptive strategies. The nature of the pandemic as a stressful uncertain or ambiguous situation can induce worrying and rumination and create catastrophic predictions, especially during the pandemic, portrayed in the media as a significant global threat.

Implications

Because anxiety disorders are among the most frequent mental health problems in children and adolescents, with a potentially major impact on current and future adjustment, it is vital to work on effective prevention and intervention strategies. As Racine et al. (2021) suggested, similar anxiety rates could result from different underlying mechanisms. According to our results, intolerance of uncertainty and less adaptive cognitive strategies were vulnerability factors for childhood anxiety. We can use these findings to further improve prevention and intervention programs for children and adolescents, including work on cognitive emotion-regulation strategies and intolerance of uncertainty. Cognitive-behavioral interventions are the best empirically supported with evidence for long-lasting change and positive outcomes in broader domains (Creswell et al., 2021) and have also been successful in changing individual tolerance of uncertainty (e.g., Bottesi et al., 2019; Lapsa et al., 2022). Because cognitive evaluation processes, which often occur unconsciously, form the basis for behavior, effective interventions teach children and adolescents to plan their behavior and then act thoughtfully and consciously rather than just learning desirable behavior without accompanying cognitions. In addition to psychoeducation, cognitive restructuring and exposure experiments are possible treatment options (Korte et al., 2022). Using emotional strategies that allow individuals to remain in a critical situation without having to control it can help reduce negative cognitive, emotional, and behavioral responses to anxiety. Gradually exposing children to uncertainty may help them develop a sense of safety even in an unpredictable situation. Some preliminary evidence suggests that even brief, computer-assisted intolerance of uncertainty treatment may effectively reduce fears of uncertainty (Shapiro et al., 2022).

Although adaptive and maladaptive emotion-regulation strategies are positively correlated, they do not have the same mediating role in the relationship between stress

and anxiety. While the use of “negative” strategies is related to reports of higher levels of anxiety symptoms, the use of “positive” strategies is not uniquely related to reports of lower levels of anxiety symptoms. Thus, it is not sufficient to teach children and adolescents adaptive emotion-regulation strategies to help them successfully cope with stress and alleviate anxiety. Rather, correcting the maladaptive strategies (self-blame, rumination, catastrophizing) they already use, especially in girls and during stressful situations, seems more important.

Limitations and Recommendations for Further Research

One of the limitations of the current study is the relatively small sample. We used only the children’s self-reports rather than combined child and parent reports, which might have been more informative. In addition, the cognitive limitations of the younger children in our sample may have limited their understanding of the cognitive emotion-regulation strategies, and they may have misunderstood some of the descriptions. Using self-report questionnaires means assessing only the conscious cognitive strategies, while possible unconscious cognitive strategies remain unrecognized (Garnefski et al., 2007). We used a normative sample of children and adolescents with low to moderate average levels of anxiety symptoms. It might be useful to further investigate the role of the same variables in explaining anxiety symptoms in children and adolescents with different anxiety disorders. In addition, it may be helpful to examine the role of cognitive emotion-regulation strategies in older adolescents (15 to 18 years), as they may have different effects because of differences in cognitive development and life experiences across age groups (Chan et al. 2016). Longitudinal and experimental designs could be pertinent to examining the causal role of intolerance of uncertainty and emotion-regulation strategies in anxiety in children and adolescents. The role of parental emotion-regulation strategies could also be an important contributor to the development of emotion-regulation strategies in children and consequently to child anxiety, which should be further explored.

Conclusions

Our results suggest the mediating role of intolerance of uncertainty and maladaptive cognitive emotion-regulation strategies in the relationship between stress and anxiety symptoms of children and early adolescents during the COVID-19 pandemic.

This study addresses the knowledge gap regarding the combined effect of intolerance of uncertainty and cognitive emotion regulation, which may benefit our understanding of child and adolescent mental health during the pandemic.

In addition, this study may encourage the development and application of prevention and intervention programs in work with children and adolescents tailored to the specific underlying mechanisms of anxiety.

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