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## Daily hassles, cognitive emotion regulation and anxiety in children

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### ABSTRACT

Evidence has suggested that some cognitive emotion regulation strategies people adopt when they encounter stress may exacerbate anxiety, whereas some may help to buffer the impeding effects of stress. However, studies were conducted mainly with adolescents and adults and research done with children is limited. The present study tested how childhood anxiety was related to cognitive emotion regulation strategies and daily hassles, including whether regulation strategies mediate the relation between daily hassles and anxiety. Data were collected from 999 Hong Kong-Chinese children (56.6% boys), aged between 9 and 12 (mean age = 9.90). Results showed that stress was a strong positive predictor of anxiety. Furthermore, rumination (reiterating negative events and emotions) and catastrophizing (envisaging the worst results of a negative event) coping strategies were vulnerability factors for childhood anxiety, whereas positive reappraisal served a protective function. Results also revealed that rumination and catastrophizing partially mediated the effects of stress on anxiety. It is suggested that mental health education should be provided to help children to understand the impeding effects of maladaptive cognitive strategies and to practice the use of adaptive cognitive strategies. Suggestions for future research are discussed.

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Child anxiety; cognitive coping; stress; CERQ; Chinese

Anxiety is a future-oriented apprehension aroused by the anticipation of negative events (Barlow, 2000). It is a common emotion that can be strong at times, and failure to regulate it appropriately may result in anxiety disorders (Vasey & Dadds, 2001). Anxiety disorders in children and adolescents are associated with concurrent adjustment problems such as low academic achievement (van Ameringen, Mancini, & Farvolden, 2003) and poor social functioning (Ialongo, Edelsohn, Werthamer-Larsson, Crockett, & Kellam, 1995), and they predict later mental health problems (Bittner et al., 2007; Pine, Cohen, Gurley, Brook, & Ma, 1998). Not only are child and adolescent anxiety disorders associated with impairment and negative consequences but also the prevalence of anxiety disorders is reported to be high. The World Health Organization reported that in 17 countries in Africa, Asia, the Americas, Europe and

the Middle East, anxiety disorders were the most prevalent mental health disorders among adults in 10 countries (Kessler et al., 2007). Using Diagnostic and Statistical Manual of Mental Disorders (DSM)-III through DSM-IV-R as reference, the 12-month prevalence rate of any kind of anxiety disorder in children and adolescents has been estimated to range from 8.6% to 20.9% (Costello, Egger, & Angold, 2005). A study conducted with Hong Kong adolescents reported that 28% of the sample displayed a high level of anxiety symptoms deserving professional concern (Chan, Chan, & Kwok, 2015).

In light of the potential harmful effects on development and the high prevalence, the early onset age of anxiety disorders is also important, especially when designing prevention. The median onset age of anxiety disorders is 11, much earlier than that of other kinds of mental disorders (Kessler, Berglund, Demler, Jin, & Walters, 2005). These findings indicate that learning how to regulate anxiety is an important task for children, and examining risk factors for anxiety is essential to ameliorate the impending consequences.

Emotion regulation refers to regulating emotions elicited by stressors (Compas, Orosan, & Grant, 1993). Although the process involves both regulating behavioral responses and managing the related cognitive processes, Garnefski, Kraaij, and Spinhoven (2001) assert that it is difficult to change the behavior without changing the cognition because cognitive processes usually precede actions. Studies also report that anxiety is related to negative cognitions. For example, rumination and catastrophizing have been shown to be associated with adolescent anxiety symptoms (Chan et al., 2015; Martin & Dahlen, 2005) and catastrophizing and personalization have been shown to predict manifest anxiety (Weems, Berman, Silverman, & Saavedra, 2001). Some studies on cognitive emotion coping and anxiety have been conducted with adolescents and adults but research done with children is limited. To fill the research gap, the present study tested how anxiety is related to cognitive emotion coping and stress in children. It was expected that the study would contribute translational findings to help the prevention and intervention of childhood anxiety problems.

Based on the literature and research findings, Garnefski et al. (2001) identified nine cognitive emotion regulation strategies categorized as maladaptive or adaptive according to whether the strategy exacerbates or alleviates negative emotions such as anxiety. These cognitive strategies focus on what people think, not what they do when they encounter stressful events. The model includes four maladaptive regulation strategies, namely self-blaming, other-blaming, rumination and catastrophizing and five maladaptive cognitive coping strategies, namely acceptance, positive planning, positive refocusing, positive reappraisal, and putting into perspective. The definitions of the nine strategies are listed in Table 1.

Garnefski et al. assert that adolescents are more vulnerable to developing psychopathological problems if they are inclined to respond with maladaptive cognitive coping strategies when they face negative events. By contrast, adaptive cognitive coping strategies are thought to serve protective functions against negative emotions. Garnefski and her research team have done a series of studies on the model and the findings are supportive (Garnefski et al., 2001; Garnefski & Kraaij, 2006; Garnefski, Kraaij, & van Etten, 2005; Garnefski, Legerstee, Kraaij, van den Kommer, & Teerds, 2002; Garnefski, Rieffe, Jellesma, Terwogt, & Kraaij, 2007; Garnefski, Teerds, Kraaij,

**Table 1.** Cognitive emotion regulation strategies.

Maladaptive cognitive emotion regulation strategies	
Self-blaming	Attributing the causes of negative events to oneself
Other blaming	Attributing the causes of negative events to other people
Rumination	Focusing on or reiterating the negative event and the associated negative emotions
Catastrophizing	Envisaging the worst or most disastrous results of a negative event
Adaptive cognitive emotion regulation strategies	
Acceptance	Accepting and resigning oneself to the negative event
Positive planning	Planning how to solve the problem or handle the negative event
Positive refocusing	Thinking about other positive or joyful events instead of focusing on the negative event
Positive reappraisal	Attaching positive meaning in terms of personal growth to the negative event
Putting into perspective	Deemphasizing the negative outcomes of the negative event by comparing it to other negative events

Legerstee, & van den Kommer, 2004). In studies on adolescents, catastrophizing predicted depressive symptoms, and rumination and self-blaming were associated with depression and anxiety symptoms in adolescents (Garnefski et al., 2005, 2002). A study conducted with college students reported that both anxiety and stress were predicted by low positive reappraisal (Martin & Dahlen, 2005).

This research suggests that in general there is an association between cognitive coping strategies and mental health in adolescents and adults. Interestingly, two studies have also reported differences in the impact of cognitive coping strategies depending on age-group, whether adolescences, adults or the elderly. For example, in one study on cognitive coping and depressive symptoms (Garnefski & Kraaij, 2006), results showed that the association between depressive symptoms and self-blaming coping was strongest among early adolescents, followed by late adolescents, and then adults; however, an opposite pattern was reported with other-blaming coping with the strongest association found in adults. Furthermore, neither coping strategy had significant effects in the elderly group. Regarding adaptive coping strategies, a positive planning strategy predicted fewer depressive symptoms in both early and late adolescent groups but had nonsignificant effects in the adult and elderly groups. A positive reappraisal strategy was associated positively with depression in early adolescents but negatively in the adult and elderly groups.

The results of research conducted by Garnefski et al. (2002) also indicated that age differences may exist in the effects of cognitive coping on anxiety. Among adults, catastrophizing and positive reappraisal (inversely) were found to be strong predictors of anxiety. Acceptance and positive refocusing also had significant and positive effects, but they were small. However, these four cognitive coping strategies had nonsignificant predictive power in relation to adolescent anxiety. In contrast, the predictive power of rumination over anxiety was triple that found in adults. Rumination was also a strong vulnerability factor in adolescent anxiety in other studies (Chan et al., 2015; Garnefski et al., 2001).

The age differences in the impact of cognitive coping are likely due to differences in cognitive development and life experiences. First, although adolescents should be capable of abstract thinking, role taking and hypothetical reasoning as seen in adults and the elderly (Boyd & Bee, 2012), they may not be able to apply these cognitive strategies as well as adults and the elderly can, because of their comparatively limited life experiences. Children studying in upper elementary school are likely to be in the

concrete operational stage or are transiting to the formal operational stage (Piaget, 1972). Their abstract thinking abilities are less well developed as compared to adolescents and adults (Boyd & Bee, 2012). Second, their social circle is much smaller and their life experiences are narrower as compared to other age-groups. This denotes that the impact of the cognitive strategies used by children may not be comparable to those found in adolescents and adults. In particular, adaptive cognitive coping strategies may not serve the protective functions as hypothesized by Garnefski et al. (2001) because they demand higher order cognitive functioning.

Only two studies have been conducted to test whether Garnefski et al.'s model (2001) can be applied to children. Both studies were conducted with children in the Netherlands. In one study, Garnefski et al. (2007) reported that all four maladaptive cognitive coping strategies, except other-blaming, predicted higher anxiety in children. Among adaptive cognitive coping strategies, only positive refocusing and positive reappraisal predicted less anxiety, and acceptance, contrary to what the model suggests, predicted higher anxiety in children. In the other study, Legerstee, Garnefski, Jellesma, Verhulst, and Utens (2010) found that anxiety disordered children used more rumination and catastrophizing but less positive planning and positive reappraisal when compared with the nonanxious sample. Although the limited findings suggest impeding effects of some maladaptive strategies and the protective function of some adaptive strategies among children, the results cannot be considered as conclusive before more studies are conducted.

The current study was designed in part to provide further understanding of the link between cognitive emotion coping strategies and childhood anxiety. It was also designed to test the role of stress in the association between these strategies and children's anxiety. Cognitive emotion regulation strategies are postulated to be cognitive reactions to stress and in some studies on Garnefski et al.'s model (2001), stress did play a role in predicting mental health problems including anxiety (Garnefski et al., 2004; Zlomke & Hahn, 2010). It then follows that cognitive strategies may mediate the effects of stress on mental health.

One category of stressors that affect psychological health is daily hassles (Schneiderman, Ironson, & Segal, 2005). Hassles are minor daily events that bother and distress people (Cheng & Li, 2010). Studies show that day to day concerns affect psychological functioning in adolescents (Carter, Garber, Ciesla, & Cole, 2006; Cooper, Guthrie, Brown, & Metzger, 2011). Among adolescents in Hong Kong, Mainland China and Taiwan, daily hassles related to academic performance, school work and relationships with parents, teachers and peers were associated with anxiety (Chan et al., 2015; Hesketh, Ding, & Jenkins, 2002; Li & Zhang, 2008; Yang, 2005). In view of these previous findings and the recurrent nature of daily hassles, stress related to daily hassles experienced by children was one construct of interest in the present study. It has been reported that rumination and catastrophizing mediated the effects of daily hassles on adolescent anxiety (Chan et al., 2015). Therefore, it was expected that cognitive coping strategies would act as mediators in the link between stress and childhood anxiety in the current sample of children.

## **Hypotheses**

Since gender and age are a risk factor of anxiety disorders (American Psychiatric Association [APA], 2013), they were controlled in all regression analyses. It was

hypothesized that, after controlling for the effects of gender and age, (1) stress and maladaptive cognitive coping strategies would predict child anxiety in the positive direction; (2) adaptive cognitive coping strategies would predict child anxiety in the negative direction and (3) the effects of stress on child anxiety would be mediated by maladaptive cognitive responses.

## Methods

### *Procedure*

The study was conducted by a research team consisting of the authors and three social workers and a clinical psychologist (working in the Hong Kong Baptist Oi Kwan Social Service). The study was approved by the Ethics Approval Committee (at the Education University of Hong Kong). Invitation letters were sent to 12 schools to which (the Hong Kong Baptist Oi Kwan Social Service) provides counseling services. All 12 schools agreed to participate. Information sheets and consent forms were sent to the parents of 1,843 students studying in primary four to six in the 12 schools. Written consent was obtained from 1,029 children and their parents. Two research team members distributed and collected questionnaires in the classroom. Data were collected between January and May 2015. Altogether 1,027 questionnaires were collected, among which 999 were valid. The sample included 560 boys (56.60%) and 430 girls and information on the gender of nine children was missing. Most of the children were born in Hong Kong (89.3%) and the rest were born in Mainland China (9.8%) or other places (0.9%). Most of the participants lived with their parents (98.1%) and only 1.9% of them lived with their grandparents. The age range of the participants was 9–12 ( $M = 9.90$ ,  $SD = 0.89$ ).

### *Materials*

The data were collected with a self-report questionnaire completed by the children. The questionnaire consisted of five items on demographic data and measures of anxiety level, cognitive emotion regulation strategies and daily hassles.

### *Child anxiety*

The Screen for Child Anxiety Related Emotional Disorder (SCARED) is designed for screening child anxiety disorders as stipulated in the DSM-IV and is intended to be used in both clinical and community settings (Birmaher et al., 1997, 1999). In the present study, the SCARED was used to assess children's anxiety level. The scale consists of 41 items. The respondents were asked to rate from 0 (never) to 2 (always) how often they experienced the anxiety symptoms described in each item in the past 3 months. A sample item is 'I have nightmares about something bad happening to my parents'. The Chinese version of the SCARED has been demonstrated to have good reliability when used with adolescents in Hong Kong and

Mainland China (Chan et al., 2015; Su, Wang, Fan, Su, & Gao, 2008). The Chinese version of the SCARED was adopted in the present study (University of Pittsburgh, n.d.). The Cronbach alpha reliability coefficient was .93.

### ***Cognitive emotion regulation strategies***

Cognitive coping strategies were assessed using the 'kids' version of the Cognitive Emotion Regulation Questionnaire (CERQ-k) developed by Garenfski et al. (2007) for measuring the four maladaptive and five adaptive cognitive emotion regulation strategies suggested by Garnefski et al. (2001). The CERQ-k consists of 36 items, four for measuring each strategy. Children were asked to rate from 1 (almost never) to 5 (almost always) how often they react in the way described in each item when they experienced something stressful or unhappy. Sample items 'Again and again, I think of how I feel about it' for rumination, 'I think that I can learn from it' and 'I think that I am to blame' for self-blaming. The mean of the four maladaptive coping strategies was calculated and was used as a measure of children's maladaptive coping style, and the mean of the five adaptive coping strategies was used as a measure of children's adaptive cognitive coping style.

The CERQ-k was translated into Chinese by the clinical psychologist and a social worker in the research team and back-translated into English by the first author. Discrepancies were discussed and resolved among the research team members. The Chinese version of the CERQ-k was then administered to six primary school students studying in primary four to six to determine basic comprehension, and wordings that the children found confusing were revised. For example, 'it' was revised as 'this unhappy event'. These six children were not included as participants of the present study. In the current sample, the Cronbach alphas for the overall scales, namely maladaptive and adaptive coping, were .91 and .92, respectively. For the nine subscales used in the analyses, the Cronbach alpha reliability coefficients of the subscales ranged from .73 to .79 (see Table 1).

### ***Stress related to daily hassles***

Twelve items were developed to assess participants' daily hassles. The 12 daily hassles were related to four domains, namely studying (poor academic performance, too much homework, concern about high school placement), interpersonal relationships in school (conflicts with teachers, conflicts with peers), family life (reprimand and punishment from parents, negative mood of parents, parents' quarrels, too little time spent with parents, conflicts with siblings) and after school activities (too many remedial classes, too many interest classes and too little free time). Participants were asked to rate from 1 (never) to 4 (all the time) how often they felt stress because of the hassle described in each item. The mean of the 12 items was used as a measure of children's stress level.



## Statistical analyses

T-tests were used to examine gender differences in anxiety level, stress level and the nine cognitive strategies. The mediation models were tested using the regression analysis method recommended by Baron and Kenny (1986) and Sobel tests. Following the suggestions of Baron and Kenny, age and gender were entered to control their effects in Step 1 of the regression analyses. The predictor (stress level related to daily hassles) was entered in Step 2 and the mediators (the nine cognitive strategies) were added in Step 3. For the mediation model to be supported, the predictive power of the predictor has to become nonsignificant or be reduced substantially after the mediators are added in Step 3. If this condition is satisfied, another set of regression analyses is conducted to test whether stress is a significant predictor of the mediators. Should the results indicate that some cognitive strategies mediate the effects of stress on anxiety, the Sobel test would be conducted to test the significance of the mediation effects.

## Results

The means and standard deviations of the SCARED total score, stress and the nine cognitive emotion regulation strategies are presented in Table 2.

*t*-Test results (see Table 2) revealed that gender differences were generally small, with only 3 of 13 comparisons being statistically significant. Boys reported a similar level of anxiety as girls but a significantly higher level of stress. Regarding cognitive coping, girls reported using positive refocusing significantly more often than boys and vice versa for other-blaming.

Regression analysis results indicated that stress created by daily hassles was a significant predictor of SCARED (see Table 3). It alone explained 26% of the variance of SCARED.

After controlling for the effects of gender, age and stress, the nine cognitive emotion regulation strategies altogether explained an additional 24.5% of the variance in the SCARED total scores but only three strategies were significant predictors. Regarding

**Table 2.** Means, standard deviations of SCARED, stress and cognitive emotion regulation strategies and gender differences.

	Cronbach alphas	Means (SD)			<i>t</i> -Values
		Whole group	Boys	Girls	
SCARED	.93	21.43 (13.56)	20.88 (13.72)	22.09 (13.45)	-1.29
Stress	.83	1.12 (0.61)	1.17 (0.61)	1.07 (0.59)	2.44*
Self-blaming	.79	2.32 (1.01)	2.32 (1.04)	2.33 (0.98)	-0.12
Other-blaming	.79	2.00 (0.96)	2.08 (0.97)	1.89 (0.93)	2.95**
Rumination	.77	2.48 (1.01)	2.45 (1.03)	2.52 (1.00)	-0.98
Catastrophizing	.79	2.21 (1.06)	2.20 (1.04)	2.22 (1.08)	-0.29
Acceptance	.73	2.51 (1.02)	2.55 (1.06)	2.45 (0.97)	1.61
Positive refocusing	.78	2.87 (1.17)	2.79 (1.14)	2.97 (1.20)	-2.34*
Planning	.76	2.87 (1.04)	2.82 (1.07)	2.92 (1.02)	-1.43
Reappraisal	.79	2.68 (1.05)	2.67 (1.05)	2.70 (1.05)	-0.42
Putting into perspective	.73	2.51 (1.00)	2.52 (0.99)	2.50 (1.02)	-0.29
Maladaptive coping	.91	2.23 (0.84)	2.25 (0.85)	2.21 (0.81)	0.67
Adaptive coping	.92	2.67 (0.85)	2.65 (0.88)	2.68 (0.82)	-0.49

\* $P < .05$ ; \*\* $P < .01$ .



**Table 3.** Regression analyses predicting SCARED from child cognitive emotional regulation strategies.

	Boys			Girls		
	B	Std. error	$\beta$	B	Std. error	B
Model 1		$\Delta R^2 = .025^{**}$			$\Delta R^2 = .004$	
Age	-2.30	.75	-.16***	-.92	.88	-.06
Model 2		$\Delta R^2 = .25^{***}$			$\Delta R^2 = .32^{***}$	
Age	-1.75	.65	-.12**	-1.19	.73	-.08
Stress	12.21	1.10	.50***	13.17	1.09	.57***
Model 3		$\Delta R^2 = .23^{***}$			$\Delta R^2 = .28^{***}$	
Age	-.96	.55	-.07	-1.03	.58	-.07
Stress	6.38	1.07	.26***	6.36	1.01	.27***
Self-blaming	.83	.87	.06	.76	.85	.05
Other-blaming	.90	.76	.06	.80	.78	.05
Rumination	4.01	.94	.29***	2.56	.83	.19**
Catastrophizing	2.98	.88	.22**	5.14	.88	.39***
Acceptance	.77	.80	.06	.29	.86	.02
Positive refocusing	1.18	.73	.10	.77	.72	.06
Planning	-2.07	.90	-.16*	1.05	.94	.08
Reappraisal	-2.17	.93	-.16*	-1.78	.87	-.14*
Putting into perspective	.60	.83	.04	-1.24	.80	-.09

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ .

maladaptive strategies, rumination and catastrophizing predicted higher anxiety. Among the five adaptive strategies, only positive reappraisal significantly predicted lower anxiety.

After the nine cognitive emotion regulation strategies were added to the formula, the explanatory power of stress remained significant but was reduced by 50.28%, supporting the possibility that the effect of stress on anxiety was partially mediated by the three cognitive strategies that had significant predictive power in relation to child anxiety. To test whether the three strategies played a mediation role on the stress-anxiety link, they were regressed on stress. Results indicated that stress predicted more rumination and catastrophizing but had no predictive power in relation to positive reappraisal (see Table 4). Sobel test results also indicated that rumination,  $z = 4.96$ ,  $P < .0001$  and catastrophizing,  $z = 5.77$ ,  $P < .0001$  mediated the effects of stress on childhood anxiety. In summary, rumination and catastrophizing mediated the stress-anxiety link in children.

## Discussion

Poor emotion regulation is associated with psychopathology and, in particular, anxiety disorders (Bradley, 2000; Suveg & Zeman, 2004). Although studies have reported that cognitive emotion regulation strategies have an impact on the mental wellbeing of adolescents and adults, comparatively speaking, cognitive coping strategies in children have scarcely been studied. The present study, being the first one conducted to investigate the coping strategies in Chinese children, adds to the literature on child emotion regulation and anxiety. Rumination and catastrophizing were vulnerability factors for childhood anxiety and positive reappraisal acted as a stress buffer. The

**Table 4.** Regression analyses predicting rumination, catastrophizing, reappraisal and planning from stress.

	Boys			Girls		
	B	Std. error	$\beta$	B	Std. error	$\beta$
Predicting rumination						
Model 1		$\Delta R^2 = .01$			$\Delta R^2 = .01$	
Age	-.08	.05	-.08	.10	.06	.09
Model 2		$\Delta R^2 = .13^{***}$			$\Delta R^2 = .16^{***}$	
Age	-.05	.05	-.05	.09	.05	.08
Stress	.60	.07	.35 <sup>***</sup>	.67	.08	.40 <sup>***</sup>
Predicting catastrophizing						
Model 1		$\Delta R^2 = .01^*$			$\Delta R^2 = .002$	
Age	-.12	.05	-.11	-.06	.06	-.05
Model 2		$\Delta R^2 = .17^{***}$			$\Delta R^2 = .21^{***}$	
Age	-.08	.04	-.08	-.07	.05	-.06
Stress	.69	.07	.41 <sup>***</sup>	.84	.08	.46 <sup>***</sup>
Predicting reappraisal						
Model 1		$\Delta R^2 = .001$			$\Delta R^2 = .002$	
Age	-.03	.05	-.03	.06	.06	.05
Model 2		$\Delta R^2 = .004$			$\Delta R^2 = .00$	
Age	-.03	.05	-.02	.06	.06	.05
Stress	.11	.08	.06	.01	.09	.01
Predicting planning						
Model 1		$\Delta R^2 = .00$				
Age	-.01	.05	-.01			
Model 2		$\Delta R^2 = .02^{**}$				
Age	-.002	.05	-.002			
Stress	.22	.08	.12 <sup>**</sup>			

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ .

results also suggest that maladaptive cognitive emotion regulation strategies may mediate the association between stress and children's anxiety.

In the present study, stress related to daily hassles was a strong predictor of childhood anxiety. Its explanatory power in relation to anxiety was comparable to the total effects of the nine cognitive coping strategies tested in the model. The daily hassles included in the present study were children's daily experiences such as too much homework, too little free time, being punished by parents and too little time spent with parents. Adults may regard these things as trivial or as a part of life that children have to learn to live with. However, they can be stressors to elementary school children because children's social circle is restricted mostly to their home and school, and their problem solving abilities and resources are limited. In addition, the pressure is likely to be exacerbated by the recurrent nature of these daily hassles.

Among the nine cognitive regulation strategies proposed by Garnefski et al. (2001), results on the effects of rumination, catastrophizing and positive appraisal are most consistent in studies on child, adolescent and adult anxiety. The former two act as vulnerability factors, whereas as the latter one acts as a stress buffer (e.g. Chan et al., 2015; Garnefski et al., 2002; Garnefski et al., 2007; Legerstee et al., 2010; Zhu et al., 2008). However, the protective functions of positive planning and positive refocusing reported in the Netherland samples were not found in the present study. Nevertheless, it cannot be concluded that these two strategies serve no protective functions in

children because studies conducted on children's use of cognitive emotion regulation strategies are limited in number.

One important contribution of the current study is that the results provide evidence of the mediation role played by cognitive emotion regulation strategies in the link between stress and anxiety. Garnefski et al. (2001) proposed that cognitive regulatory strategies are the strategies people adopt when they encounter negative experiences, but they have never examined the mediating functions of the nine strategies in the link between stress and psychological well-being. In some studies, the effects of stress were controlled when examining the effects of the cognitive strategies (e.g. Legerstee et al. (2010). The current study went one step further. The results show that upon facing a negative experience, some children tended to ruminate on the negative feelings related to an unhappy event or to exaggerate the event's negative consequences, and these children reported a higher level of anxiety.

There are two other related noteworthy results. One is that although children reported that they used adaptive cognitive strategies more often than maladaptive cognitive strategies, the predictive power of the latter was much stronger than that of the former. This implies that the impeding effects of maladaptive strategies were much stronger than the protective power of adaptive strategies. Furthermore, although the children in the present study reported using adaptive cognitive strategies more often than maladaptive ones, stress had strong predictive power in relation to rumination and catastrophizing but not positive reappraisal. This means that whereas the children reported using adaptive cognitive strategies more often, upon encountering negative experiences, they ruminated and catastrophized rather than reappraised the stressful event to create positive meaning from it.

According to Piaget's theory of cognitive development, it was likely that the participants in the present study were in the concrete operation stage (Boyd & Bee, 2012), meaning that their hypothetical thinking, metacognitive thinking and role-taking abilities have not yet fully developed. Thus their abilities to plan ahead, to appreciate future consequences, and to look at the situation from an alternative view point are limited (Garnefski et al., 2002). In other words, the participants were not yet adroit at using the adaptive cognitive strategies such as positive planning, putting into perspective. In contrast, maladaptive cognitive strategies such as self-blaming, rumination or catastrophizing do not require higher order thinking. This may explain the finding that when facing negative experiences, children tended to respond with rumination and catastrophizing more readily. The limited ability in higher order thinking may also explain why four of the adaptive cognitive emotion regulation strategies had no predictive power in relation to anxiety.

The results of the study should be useful for researchers and for professionals in designing programs for enhancing mental health in children. The findings suggest that rumination and catastrophizing mediate partially the impeding effects of stress on child anxiety and that children do not readily use adaptive cognitive strategies upon encountering stressful events or situations. Based on these findings, it is suggested that mental health education programs should also be provided for primary school children to educate them about the harmful effects of maladaptive cognitive strategies. In addition, the programs should also include practicum sessions in which children can practice how to apply the adaptive cognitive strategies with concrete examples or daily life

scenarios. The results that some cognitive strategies played important roles in emotion regulation also suggest that professionals may consider adopting a cognitive approach in designing early intervention programs for children.

### Suggestions for future research

One limitation of the present study is that scarce research has been conducted on the validation of the CERQ-k. Although the items in the CERQ-k were specifically designed to match children's cognitive abilities, the nine cognitive strategies are adopted from studies with adolescents and adults. The meaning of the strategies may be different to children because of their limited life experiences. For example, the item 'I think that I can't do anything about it' (acceptance) may convey the sense of helplessness to children. It is suggested that interviews should be conducted to collect qualitative data on children's conceptions of the cognitive emotion regulation strategies and how they use the strategies. The data should be able to help further examine the validity of the CERQ-k and the effects of the cognitive strategies used by children.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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