

This is a pre print version of the following article:

Cognitive Performance in the Aftermath of a Natural Disaster: The Role of Coping Strategies, Theory of Mind and Peer Social Support / Cadamuro, A.; Versari, A.; Vezzali, L.; Giovannini, D.; Trifiletti, E.. - In: CHILD & YOUTH CARE FORUM. - ISSN 1053-1890. - STAMPA. - 44:1(2015), pp. 93-113. [10.1007/s10566-014-9272-z]

*Terms of use:*

The terms and conditions for the reuse of this version of the manuscript are specified in the publishing policy. For all terms of use and more information see the publisher's website.

17/12/2025 21:02

**Recovering After a Natural Disaster:  
The Role of Coping Strategies, Mentalization Abilities and Peer Social Support in  
Shaping Cognitive Performance Among Elementary School Children**

**Recovering After a Natural Disaster:  
The Role of Coping Strategies and Mentalization Abilities in Shaping Cognitive  
Performance Among Elementary School Children**

Abstract

In May 2012, Northern Italy was struck by a tremendous series of earthquakes, which had devastating consequences and persisted for several months. We conducted a study to examine whether coping strategies used by elementary school children who were victims of the earthquakes were helpful in recovering from the consequences of these earthquakes by positively affecting their cognitive performance. Results from a sample of 517 children revealed that active coping strategies were associated with greater mentalizing abilities that, in turn, led to better cognitive performance. In contrast, negative coping strategies negatively affected cognitive performance by worsening the ability to mentalize others' mental states. Avoidance coping strategies were associated with better cognitive performance both directly and via greater mentalizing abilities (in the latter case, the effect was present only among those perceiving stronger social support from their peers). The theoretical and practical implications of the findings are discussed.

Keywords: coping strategies, Theory of Mind (ToM), mentalization, natural disaster, cognitive performance.

## COPING AFTER a NATURAL DISASTER

In May 2012 two earthquakes, measuring respectively 5.9 and 5.8 points on the Richter scale, struck Emilia Romagna, a region located in Northern Italy. These earthquakes caused the death of 27 people, and more than 300 individuals were injured. A high percentage of the houses was severely damaged and about 40,000 people were left homeless. The earthquakes seriously damaged several school buildings, so that alternative temporary buildings had to be arranged for school use. It is likely that children were deeply affected not only by these events, but also by the observation of other people, such as their parents, trying to deal with the consequences of the earthquakes on their homes, work and daily life. In fact, there is evidence that elementary school children from the areas struck by the earthquakes revealed considerable levels of Post Traumatic Stress Disorder (Cadamuro & Versari, 2012), a dangerous health disorder that can severely impair children's psychological functioning (Furr, Corner, Edmunds, & Kendall, 2010). In such cases, it is crucial to identify the factors that help children to cope with the traumatic event in order to counter its detrimental effect on psychological functioning.

The aim of the present research is to test whether coping strategies used to deal with the traumatic event have beneficial effects on the cognitive performance of young children. Specifically, we are interested in examining whether and how specific types of coping strategies are related to improved cognitive performance. In addition, we test the underlying processes, as well as the boundary conditions that limit the effects of coping strategies.

### **Effects of traumatic events on psychological functioning**

Assessing the cognitive effects of a natural disaster among school children is fundamental in order to plan interventions aimed at reducing its negative impact on

psychological functioning and on academic performance (Chen, Wang, Zhang, & Shi, 2012; Kar, 2009; Sprung & Harris, 2010; Uemoto, Asakawa, Takamiya, Asakawa, & Inui, 2012).

Trauma following a disaster has severe psychological consequences on children, who are often unable to fully understand its nature and whose ability to cope with the situation is limited (Furr et al., 2010; Pina et al., 2008). Children who are exposed to disasters typically report psychological distress symptoms, which interfere with their emotional and cognitive functioning (Gurwitch, Kees, & Becker, 2002; Kar & Bastia, 2006; La Greca, Silverman, Lai, & Jaccard, 2010).

With regard to emotional consequences of trauma exposure in school children, symptoms of anxiety and depression are most common: for instance, children can display restricted affect, sadness, separation anxiety, numbing and avoidance of situations (Kar, 2009). Furthermore, similar to adults, children exhibit a spectrum of cognitive consequences following the trauma, including altered attentional processes, deficits in learning processes and inefficient memory systems (Brodman et al., 2011).

Findings from studies conducted with adult samples show that there are systematic biases evident on various measures of attention and memory for threat-related and trauma-related information in traumatized individuals (McNally, 2003; Thrasher & Dalgleish, 1999). However, the picture for children and adolescents is much less clear, also due to the relative lack of data in this area (Smilde-van den Doel, Smit, & Wolleswinkel-van den Bosch, 2006).

In any case, given the extent of detrimental consequences of trauma-related events on children's psychological functioning, it is important to identify protective factors. Previous research list protective factors as coping strategies (Lazarus, 1999),

mentalization (Sharp, Fonagy, & Allen, 2012; Sprung & Harris, 2010) and social support (Pina et al., 2008; Prati & Pietrantonio, 2009; Schaefer & Moos, 1998; Tedeschi & Calhoun, 2004). In the present research we examine how these factors interact in sustaining cognitive performance.

### **The function of coping strategies**

Coping can be defined as the thoughts and behaviors an individual uses to manage internal and external demands of situations which are appraised as stressful (Folkman & Moskowitz, 2004). It is a product of the person-environment relationship, a complex multidimensional process sensitive to the demands and resources present in the environment, to personality dispositions that influence the appraisal of the stressors, and to the appraisal of the individual's available resources (Aldwin, 1994; Folkman & Lazarus, 1991).

Importantly, people may use qualitative different types of coping strategies, which are likely to have differential effects on psychological functioning. Schaefer and Moos (1998) distinguished between approach (active) and avoidance coping strategies. According to these authors, approach coping strategies are directed toward the stressor itself or on one's reaction toward it, whereas avoidance strategies are focused on avoiding the stressor or one's reaction toward it. Approach coping strategies include positive reappraisal and are related to seeking emotional support, planning to resolve the stressor, and seeking information about the stressor. They can be considered as adaptive, as they generally help individuals to effectively cope with the stressful situation, resulting in positive outcomes. On the other hand, avoidance strategies may be considered maladaptive. They are related to behavioral and mental disengagement,

denial of the traumatic event, wishful thinking, emotional discharge, and seeking rewards from other activities (Prati, Pietrantonio, & Cicognani, 2011).

The role of avoidance coping after trauma exposure has been an issue of some debate in the adult trauma literature. Most etiological models of trauma-related symptoms conceptualize avoidant coping responses as reflecting incomplete cognitive processing of the event (Foa & Riggs, 1993; Foa, Steketee, & Rothbaum 1989). However, there is also evidence that avoidance coping may reduce anxiety from the traumatic event, by permitting information processing. It seems to be a defensive strategy which allows the victim to contain the distress generated by re-experiencing the disaster (Asarnow et al., 1999; Gaylord-Harden, Cunningham, Holmbeck, & Grant, 2010; McFarlane & Papay, 1992). Research has shown that avoidance coping is associated with more positive adaptation in the short-run, whereas active coping has stronger long-term effects (Rantanen, Mauno, Kinnunen, & Rantanen, 2011; Suls & Fletcher, 1985; Taylor & Stanton, 2007). Specifically, avoidance provides immediate relief from stress, whereas increased active coping uncovers information that facilitates long-term adaptation (Holmes & Stevenson, 1990).

There is also a third type of coping strategy, which can be considered as maladaptive. Spirito, Stark and Williams (1988) identified “negative strategies,” related to reactions like self-criticism and blaming others. In response to major life events, reporting more hostile reactions, escapist fantasies, self-blame and wishful thinking prevents an effective cognitive and emotional processing of the event, with the result that individuals are less able to deal with stress (Bolger, 1990; Garralda & Rangel, 2004; O’Brien & DeLongis, 1996).

### **Mentalization processes and social support**

People who are especially able to manage emotions are thought to be better equipped to deal with stressful events. Recent studies suggest that disrupted psychological functioning following a traumatic event may be a function of a deficit in the ability to understand others' mental states and to understand and share emotions with others (Lanius et. al., 2010; Mazza et al., 2012; Nietlisbach, Maercker, Rössler, & Haker, 2010). These deficits signal a lack of key competences typical of mentalization processes and the related construct of Theory of Mind (ToM; Premack & Woodruff, 1978). ToM is concerned with the ability to attribute mental states (e.g., beliefs, desires, intentions and emotions) to others and to use these attributions for predicting and explaining their behavior (Baron-Cohen, 1995). It was found that persons who mentalize in the face of trauma are less vulnerable to psychiatric disorders (Allen, Fonagy, & Bateman, 2008). Indeed, the capacity to understand others' mental states allows individuals to interpret, anticipate and influence others' behavior and consequently to cope positively with stress. Conversely, impaired theory of mind processes prevents individuals from effectively making use of current attachment relationships or social support structures in order to dampen the negative impact of the trauma.

ToM has been shown to influence cognitive processes in a variety of domains including academic achievement (Kloo & Perner, 2008) and ability to understand learning processes (Davis-Unger & Carlson, 2008). The relationship between ToM and children's academic achievement was also demonstrated by longitudinal studies, tapping into the causal impact of the ability to understand others' mental states on school performance (e.g., Blair & Razza, 2007; Garner & Waajid, 2008; Izard et al., 2001). Similarly, interventions aimed at promoting emotional understanding provided



strong causal foundation for the role of ToM processes in improving literacy (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Greenberg, Kusche, Cook, & Quamma, 1995). Other studies also found significant relationships between individual differences in preschool ToM and children's self-monitoring ability in cognitive activities (Meichenbaum & Biemiller, 1998), scientific thinking (Kuhn & Pearsall, 2000), and narrative understanding (Pelletier & Astington, 2004). It is therefore critical to identify the factors that allow individuals to develop mentalization abilities and coping strategies, in order to reduce the negative impact of traumatic events such as natural disasters on cognitive abilities (Moskowitz, 2005; Sharp et al., 2012).

There is evidence that coping strategies are associated with mentalization processes. For instance, some studies have demonstrated a positive relationship between emotional competence (a concept conceptually linked to ToM; Blair, 2002) and the development of adaptive coping strategies (Austin, Saklofske, & Mastoras, 2010; Saklofske, Austin, Mastoras, Beaton, & Osborne, 2012). Based on the evidence presented above, we expect an association between coping strategies and mentalization processes. In fact, being able to effectively cope with the stressful situation should help children to recover from their mentalization abilities, presumably dampened by the psychological consequences of the natural disaster (Cadamuro & Versari, 2012; Hogan et al., 2010). Specifically, we expect that active coping strategies will be associated with increased ability to understand others' mental states (i.e., ToM), whereas negative coping strategies should have opposite effects. As for avoidance coping strategies, although they are generally considered maladaptive and should generally produce negative consequences (Foa & Riggs, 1993), we expect that they will be positively associated with ToM. Our study was conducted some months after the first earthquake,

but only a short time after the earthquakes (weaker, but not less feared by adults and children) ended. Since avoidance strategies have been shown to have beneficial effects in the short-run (Rantanen et al., 2011; Suls & Fletcher, 1985; Taylor & Stanton, 2007), we think it is likely that they will be positively (instead of negatively) associated with ToM. In turn, higher ToM should be associated with better cognitive performance (Meichenbaum & Biemiller, 1998).

Importantly, we acknowledge the possibility that the association between coping strategies and mentalization processes will be moderated by perceptions of social support. Research has shown that ToM skills are transformed by interpersonal social and family relationships (Fiasse & Nader-Grosbois, 2012): being supported by others who are present in the social environment may promote the comprehension of one's own and others' emotional states, which in turn may have implications for his/her responses to stress (Cohen & Williamson, 1991). The role of social support should be especially evident when individuals face the threat posed by the stressful event by trying to escape (i.e., when they use avoidant coping strategies). In the aftermath of a natural disaster, social support should become critical in order to help people trying to react by escaping the reality to remain in touch with the social environment, allowing them to understand others' mental states (i.e., ToM) and, as a consequence, to face the stressful event more effectively. In other words, we expect a moderated mediation effect, such that avoidance coping strategies should be associated with increased ToM only among those perceiving more social support; in turn, increased ToM should be associated with improved cognitive performance. We will also test the moderation effect for the other two types of coping strategies (i.e., active and negative), since we cannot exclude that their effects also depend on perceived social support.

### **Method**

#### *Participants and Procedure*

Participants were 517 elementary school children (254 males, 263 females) from five primary schools in the province of Modena. Mean age was 9 years 6 months. Approximately six months after the two powerful earthquakes of May 2012, participants were administered a series of measures during classes, presented in randomized order: cognitive performance, coping strategies, peer social support (all administered collectively), second-order false beliefs tests (administered individually).

#### *Instruments*

*Coping strategies.* To assess coping strategies, we used the kidcope scale (Spirito et al., 1988), which consists of a checklist designed to assess cognitive, emotional and social coping strategies among children and adolescents. The scale is composed of 15 items, each assessing a specific strategy, tackling the use of the following coping strategies: distraction, social withdrawal, wishful thinking, self-criticism, blaming others, problem solving, emotional regulation, cognitive restructuring, social support and resignation. These strategies can be grouped into: active coping strategies (6 items capturing strategies of problem solving, cognitive restructuring, emotional regulation, social support); avoidant coping strategies (7 items, strategies of distraction, social withdrawal, wishful thinking, resignation) and negative coping strategies (2 items, assessing self-criticism and blaming others strategies). Participants were asked to indicate, for each strategy, whether or not they used it in order to deal with the earthquake. Each strategy checked by the child received the score of 1; in case the child did not use the strategy, the score was 0. Higher scores reflect a

## COPING AFTER a NATURAL DISASTER

greater use of active (scores from 0 to 6), avoidant (scores from 0 to 7), or negative (scores from 0 to 2) strategies, respectively.

*Mentalizing abilities.* In order to investigate the capacity to understand not only a person's perception of a social situation (first-order reasoning), but also different individuals' concern about the others' mental states (second-order reasoning), we used two Second-Order False Belief Tasks: the "Birthday Puppy" (Sullivan, Zaitchik, & Tager-Flusberg, 1994) and the "Double Bluff" Story (Happé, 1994). Birthday Puppy is a story about a mother who deliberately misinforms her son about what he will receive for his birthday, because she wants to surprise him. Unbeknownst to his mother, the child actually discovers the true birthday present. Later, when speaking to the child's grandmother, the mother is asked whether the child knows what he is getting for his birthday (second-order ignorance), and then what the child thinks he is getting (second-order belief). Each participant had to answer six questions, and was assigned 1 point for each correct answer. The final possible score ranges from 0 to 6, with higher scores reflecting greater mentalizing abilities. The Double Bluff Story is based on the vignettes from the "Strange Stories", consisting of simple account of events, which concern the different motivations that can lie behind everyday utterances that are not literally true. The story tells about a prisoner, member of the Blue army, captured by the Red army. The prisoner wants to save his army and the child is asked what the prisoner has to say to deceive the Red army. The child had to answer three questions; scores in this case range from 0 to 3, with higher scores associated with higher mentalizing abilities. We calculated the sum of the two tests in order to obtain a single index of mentalizing abilities. Since the range of scores for the two tests was different, scores were transformed in z-points before being summed.

*Cognitive performance.* Each participant was administered a test of logical-formal reasoning (set of figures to be completed), consisting of 15 items for the third- and fourth-grade and 20 items for the fifth-grade. Items were extracted from the Comprehensive Test of Nonverbal Intelligence (Hammill, Pearson, & Wiederholt, 1996), designed to measure those intellectual abilities that exist independently of language. Each item correctly responded to received a score of 1; items incorrectly responded to were assigned a score of 0. In order to use the measure of cognitive performance as dependent variable, since the range of possible scores of third- and fourth-grade (ranging from 0 to 15) differed from that of fifth-grade (ranging from 0 to 20), all scores were transformed in z-points.

*Peer social support.* The following item was used: “Did your friend help you to recover from the earthquake?”. The 4-step response scale ranged from 1 (*absolutely not*) to 4 (*absolutely yes*).

### Results

Means and standard deviations for the various measures are presented in Table 1 (untransformed scores are provided for cognitive performance in third- and fourth-grade and for cognitive performance in fifth grade. Moreover, untransformed scores are provided for the two false belief tests). Correlations are shown in Table 2. As can be noted, participants made larger use of active and avoidance coping strategies, whereas they relied much less on negative coping strategies. Children’s performance on false belief tests was much higher for the Birthday Puppy Story than for the Double Bluff Story. Average cognitive performance was acceptable for participants independently from their school grade. Finally, children perceived to have been moderately supported by their peers in facing the consequences of the earthquake.

---

Table 1

---

---

Table 2

---

As shown in Table 2, active coping was positively associated with both avoidance and negative coping, suggesting that participants trying to cope with the traumatic event more actively were also those using to a greater extent the other coping strategies. In line with expectations, all types of coping strategies were related to mentalizing ability. Specifically, active and avoidance coping strategies were positively associated with mentalizing abilities, whereas the relation between negative coping strategies and mentalizing abilities was negative (marginal effect). Finally, as expected, mentalizing abilities were positively associated with better cognitive performance.

To test our hypotheses, hierarchical regression was applied. First, we tested whether coping strategies affected mentalizing abilities, and whether this effect was moderated by peer social support. In the first step we entered the three (centered) types of coping strategies (active, avoidance, negative) and peer social support (centered). In the second step, we added the two-way interactions between each type of coping strategy and peer social support. In all analyses, age and sex were controlled for. Mentalizing ability served as dependent variable. The analysis revealed a main effect of active coping strategies, which were positively associated with mentalizing abilities,  $\beta = .13, p = .01$ , and a main effect of negative coping strategies, which were negatively

associated with mentalizing abilities,  $\beta = -.10, p < .05$ . Moreover, the expected interaction between avoidance coping strategies and peer social support was significant,  $\beta = .12, p < .05$ . Simple slope analysis showed that avoidance coping strategies were positively associated with mentalization abilities when participants experienced high social support from their peers (+1 *SD*),  $b = .10, t = 2.13, p < .05$ , whereas the relation between avoidance coping strategies and mentalization abilities was nonsignificant for low levels of perceived social support (-1 *SD*),  $b = -.03, t < 1$ .

In order to examine whether mentalizing abilities were associated with cognitive performance over and above the effects of coping strategies, we conducted a regression identical to that used above. In this case, however, mentalizing ability was included as a further predictor. Cognitive performance was the dependent variable. Results showed a main effect of avoidance coping, which was positively associated with cognitive performance,  $\beta = .14, p < .01$ . Also the effect of gender was significant, indicating that females had better cognitive performances than males,  $\beta = .08, p < .07$  (marginal effect). More relevant to our hypotheses, the association between mentalizing abilities and cognitive performance was statistically reliable,  $\beta = .27, p < .001$ .

To test whether the indirect effect was significant, bootstrapping analyses were conducted by using the SPSS macros provided by Preacher and Hayes (2008). With bootstrapping procedures, a 95% confidence interval is computed around the path from the predictor to the criterion variable through the mediator. An indirect effect is significant when 0 is excluded from the 95% confidence interval,  $p < .05$ . Results showed that, when considering active coping strategy as the predictor, the confidence interval was comprised between .006 and .051, indicating that the indirect effect was significant,  $p < .05$ .

Similarly, when the interaction between avoidance coping strategies and peer social support was used as the predictor, the confidence interval ranged from .006 to .044. Thus, the expected moderated mediation effect was significant,  $p < .05$  (for a similar procedure for testing moderated mediation, see, e.g., Abrams et al., 2008; Johnson, Ashbun-Nardo, Spicer, & Dovidio, 2008).

Finally, when using negative coping strategies as the predictor, the fact that 0 was not included in the confidence interval (ranging from -.095 to -.009) indicates that the indirect effect of negative coping strategies on cognitive performance via mentalizing abilities was significant,  $p < .05$ .<sup>1</sup>

### Discussion

We conducted a study with the aim of testing whether coping strategies are an effective means of facing an earthquake by promoting better cognitive performance among elementary school children. Specifically, we were interested in assessing the differential effects played by different types of coping strategies, the processes underlying their effects and their limits of application (i.e., moderation effects). Hypotheses were tested on a sample of 517 elementary school children in Northern Italy in the aftermath of a tremendous series of earthquakes that struck the Emilia-Romagna region in 2012.

First of all, results revealed that participants made larger use of both active and avoidance rather than of negative coping strategies. These strategies were associated with greater mentalizing abilities that, in turn, promoted a better cognitive performance. Importantly, the indirect effect of avoidance coping strategies crucially depended on peer social support. Specifically, avoidance coping strategies were associated with greater mentalizing abilities, and in turn with improved cognitive performance, only



among children who experienced more social support from their peers. Interestingly, avoidance coping strategies also had a direct effect on improved cognitive performance. Finally, not surprisingly, negative coping strategies worsened cognitive performance by impairing children's mentalizing ability.

On a theoretical level, our findings are in line with previous literature, by showing that qualitatively different types of coping strategies following a highly traumatic event have differential effects on psychological functioning (i.e., mentalization and cognitive performance). In particular, active coping strategies had beneficial effects on cognitive performance, whereas negative coping strategies were detrimental to participants' performance in the cognitive test we employed (Berman, Kurtines, Silverman, & Serafini, 1996; Garralda & Rangel, 2004; Schaefer & Moos, 1998; Spirito et al., 1988). The finding that avoidance strategies had beneficial direct and indirect effects on cognitive performance may be explained by the fact that, being defensive strategies that allow to manage the distress following the traumatic experience, they can have adaptive effects in the short term (e.g., Rantanen et al., 2011). Indeed, although data were collected approximately six months after the first earthquake, the tremors did not stop immediately and persisted, although with much less intensity, until a short time before data collection. Our results thus replicate and extend previous findings, by showing that avoidance strategies following a traumatic event also have beneficial effects in the short-run when child samples are taken into account. However, we acknowledge that, in the long run, avoidance coping strategies may be less relevant for sustaining cognitive performance and may even be detrimental to it (Littleton, Horsley, John, & Nelson, 2007; Snyder & Pulvers, 2001).

Mentalization ability emerged as the key factor allowing better cognitive performance. Previous studies suggested that mentalization in the face of trauma helps us to face psychiatric disorders (Allen et al., 2008) and is related to better cognitive performances such as academic achievement (e.g., Garner & Waajid, 2008). There is also evidence that the ability to mentalize others' mental states may suffer as a consequence of traumatic events (e.g., Mazza et al., 2012; Sharp et al., 2012). Our findings suggest that coping strategies are fundamental in order to restore functional mentalization processes. In particular, active and avoidance coping strategies can help to improve children's mentalizing abilities, which in turn are associated with better cognitive performance. Moreover, our findings help illuminate why negative strategies worsen cognitive functioning. Specifically, negative strategies act in the sense of worsening mentalization abilities, which in turn are responsible for decreased cognitive performance. The present results extend previous research showing that mentalization processes (and constructs related to them) are associated with coping strategies (e.g., Saklofske et al., 2012), by demonstrating that coping strategies influence mentalization processes which, in turn, have a key role in positively affecting cognitive performance. However, since data are correlational, we acknowledge that the relation between coping strategies and mentalization processes could be bi-directional. Future studies are needed in order to better understand the causal relation between the two types of constructs.

Another relevant finding concerns moderation by peer social support. As predicted, a moderated mediation effect emerged, such that avoidance coping strategies were positively associated with mentalization abilities only among those who perceived a stronger social support from their peers. In turn, mentalizing abilities led to improved cognitive performance. Individuals who try to escape the traumatic event (by using

avoidance strategies) are likely to distance themselves from the reality, thus also losing grip with their social environment and, as a consequence, risking deficits in understanding the others (i.e., deficits in mentalization abilities). In such cases, the perception of being supported by peers may be especially beneficial, because individuals may benefit from avoidance coping strategies (which allow them to distance from the distress) by restoring the ability to understand others (who are felt as supportive and close to the self). Thus, it is no surprise that avoidance strategies were related to increased mentalizing abilities only among those who were helped by peers to deal with the earthquake and who as a consequence were psychologically less distant from their social environment. On the other hand, using active coping strategies implies a closer connection with the social environment, so perceived social support should matter less to these individuals. As for negative strategies, they reflect active distancing from others, so it is not relevant whether these others are more or less supportive.

Notably, peer social support did not moderate the effect of avoidance coping strategies on cognitive performance, but only allowed individuals to become more connected to their social environment (by being more able to use mentalization processes). Thus, avoidance coping strategies in the short-run may have beneficial unmediated effects on cognitive performance in the aftermath of a natural disaster.

Our findings have noteworthy practical implications. Practitioners should pay attention to how children deal with a negative event such as an earthquake and to the coping strategies they use. In particular, they should favor the adoption of active and (at least, in the short term) avoidance coping strategies. They should also discourage the use of negative coping strategies, which are likely to impact negatively on mentalizing abilities and on performances at the cognitive level. Moreover, they should monitor

children's mentalizing abilities, trying to reinforce them also by taking advantage of a greater use of active and avoidance coping strategies. In fact, mentalizing abilities are the key factor which allow improved cognitive performance and, presumably, better academic performance.

We acknowledge some limitations. First, data are correlational, so it is not possible to draw causal inferences. Second, for obvious reasons, we could not assess mentalizing abilities and cognitive performance before the traumatic event. Thus, it is not possible to state that the earthquake worsened the ability to mentalize others' mental states or decreased the performance in the cognitive test. However, previous research demonstrated that trauma following a disaster has deeply negative effects on children's psychological cognitive and emotional functioning (e.g., Gurwitch et al., 2002; Kar & Bastia, 2006; La Greca et al., 2010), as well as on mentalizing ability (e.g., Lanius et al., 2010; Mazza et al., 2012; Nietlisbach et al., 2010). Moreover, there are indications that children from the area struck from the earthquake in Northern Italy in May 2012 suffered serious psychological consequences (Cadamuro & Versari, 2012). Thus, it is possible to hypothesize that the earthquakes had similar effects on our child sample, and that coping strategies acted toward restoring (active and avoidance coping strategies) or worsening (negative coping strategies) mentalizing abilities and cognitive performance.

In conclusion, our study suggests that coping strategies are crucial in order to recover from the negative effect of a natural disaster such as an earthquake, and that mentalizing processes play a key role in allowing these effects. These findings can be of capital use to theorists and practitioners interested in how young children face a trauma following exposure to a devastating earthquake.

Footnotes

1. Additional analyses revealed that results did not change depending on school of belonging.

References

- Abrams, D., Crisp, R. J., Marques, S., Fagg, E., Bedford, L., & Provias, D. (2008). Threat inoculation: Experienced and imagined intergenerational contact prevents stereotype threat effects on older people's math performance. *Psychology and Aging, 23*, 934-939.
- Aldwin, C. (1994). *Stress, coping, and development: An integrative approach*. New York, NY: Guilford Press.
- Allen, J., Fonagy, P., & Bateman, A. W. (2008). *Mentalizing in clinical practice*. Washington, DC: American Psychiatric Publishing.
- Asarnow, J., Glyn, S., Pynoo, R. S., Nahum, J., Guthrie, D., Cantwell, D. P., & Franklin, B. (1999). When the Earth stops shaking: Earthquake sequelae among children diagnosed for pre-earthquake psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*, 1016-1023.
- Austin, E., Saklofske, D. H., & Mastoras, S. M. (2010). Emotional intelligence, coping and exam-related stress in Canadian undergraduate students. *Australian Journal of Psychology, 62*, 42-50.
- Baron-Cohen S. (1995). *Mindblindness: An essay on autism and theory of mind*. London. MIT Press.
- Berman, S. L., Kurtines, W.M., Silverman, W.K., & Serafini, L.T. (1996). The impact of exposure to crime and violence on urban youth. *American Journal of Orthopsychiatry, 66*, 329-336.
- Bierman, K. L., Nix, R. L., Greenberg, M. T., Blair, C., & Domitrovich, C. E. (2008). Executive functions and school readiness intervention: Impact, moderation, and

- mediation in the Head Start REDI program. *Development and Psychopathology*, 20, 821-843.
- Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *American Psychologist*, 57, 111-127.
- Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development*, 78, 647-663.
- Bolger, N. (1990). Coping as a personality process: A prospective study. *Journal of Personality and Social Psychology*, 59, 525-537.
- Brodman, D. M., Clark, C. T., Murrough, J. W., Mathew, S. J., & Harvey, P. D. (2011). The implications of neurocognitive deficits in posttraumatic stress disorder. *Psychiatric Annals*, 41, 408-412
- Cadamuro, A., & Versari, A. (2012). *Children's Post Traumatic Stress Disorder and psychological functioning in the aftermath of the earthquakes which struck Emilia Romagna in 2012*. Unpublished manuscript.
- Chen, W., Wang, L., Zhang, X. L., Shi, J. N. (2012). Understanding the impact of trauma exposure on posttraumatic stress symptomatology: A structural equation modeling approach. *Journal of Loss & Trauma*, 17, 98-110.
- Cohen, S., & Williamson, G. M. (1991). Stress and infectious disease in humans. *Psychological Bulletin*, 109, 5-24.
- Davis-Unger, A. C., & Carlson, S. M. (2008). Children's teaching skills: The role of theory of mind and executive function. *Mind, Brain and Education*, 2, 128-135.

- Fiasse, C., & Nader-Grosbois, N. (2012). Perceived social acceptance, theory of mind and social adjustment in children with intellectual disabilities. *Research in Developmental Disabilities, 33*, 6, 1871-1880.
- Foa, E. B., & Riggs, D. S. (1993). Post-traumatic stress disorder in rape victims. In J. Oldham, M. B. Riba, & A. Tasman (Eds.), *American psychiatric press review of psychiatry* (Vol. 12, pp. 273-303). Washington, DC: American Psychiatric Press.
- Foa, E. B., Steketee, G., & Rothbaum, B. O. (1989). Behavioral/cognitive conceptualization of PTSD. *Behavior Therapy, 20*, 155-176.
- Folkman, S., & Lazarus, R. S. (1991). Coping and emotion. In A. Monat & R. S. Lazarus (Eds.), *Stress and coping: An anthology* (pp. 207-227). New York, NY: Columbia University Press.
- Folkman, S., & Moskowitz, J. (2004). Coping: Pitfalls and promise. *Annual Review of Psychology, 55*, 745-774.
- Furr, J. M., Corner, J. S., Edmunds, J. M., & Kendall, P. C. (2010). Disasters and youth: A meta-analytic examination of posttraumatic stress. *Journal of Consulting and Clinical Psychology, 78*, 765-780.
- Garner, P. W. & Waajid, B. (2008). The associations of emotion knowledge and teacher-child relationships to preschool children's school-related developmental competence. *Journal of Applied Developmental Psychology, 29*, 89-100.
- Garralda, M. E., & Rangel, L. (2004). Impairment and coping in children and adolescents with chronic fatigue syndrome: A comparative study with other paediatric disorders. *Journal of Child Psychology and Psychiatry, 45*, 543-552.



- Gaylord-Harden, N. K., Cunningham, J. A., Holmbeck, G. N., & Grant, K.E. (2010).  
Suppressor effects in coping research with African American adolescents from low-income communities. *Journal of Consulting and Clinical Psychology*, 78, pp. 843-855.
- Greenberg, M. T., Kusche, C. A., Cook, E. T., & Quamma, J. P. (1995). Promoting emotional competence in school-aged children: The effects of the PATHS curriculum. *Development and Psychopathology*, 7, 117-136.
- Gurwitsch, R. H., Kees, M., & Becker, S. M. (2002). In the face of tragedy: Placing children's reactions to trauma in a new context. *Cognitive and Behavioral Practice*, 9, 286-295.
- Hammill, D. D., Pearson, N. A. & Wiederholt, J. L. (1996). *Comprehensive test of nonverbal intelligence (CTONI)*. Austin, TX: PRO-ED.
- Happe, F. G. E. (1994). An advanced test of theory of mind: Understanding of story characters' thoughts and feelings by able autistic, mentally handicapped and normal children and adults. *Journal of Autism and Developmental Disorders*, 24, 1-24.
- Hogan, M. J., Parker, J. D. A., Wiener, J., Watters, C., Wood, L. M., & Oke, A. (2010). Academic success in adolescence: Relationships among verbal IQ, social support and emotional intelligence. *Australian Journal of Psychology*, 62, 30-41.
- Holmes, J. A., & Stevenson, C. A. (1990). Differential effects of avoidant and attentional coping strategies on adaptation to chronic and recent-onset pain. *Health Psychology*, 9, 577-584.
- Izard, C. E., Fine, S., Schultz, D., Mostow, A., Ackerman, B., & Youngstrom, E. (2001). Emotions knowledge as a predictor of social behavior and academic competence in children at risk. *Psychological Science*, 12, 18-23.

## COPING AFTER a NATURAL DISASTER

- Johnson, J. D., Ashbun-Nardo, L., Spicer, C. V., & Dovidio, J. F. (2008). The role of Blacks' discriminatory expectations in their prosocial orientations toward whites and blacks. *Journal of Experimental Social Psychology, 44*, 1498-1505.
- Kar, N. (2009). Natural disasters in developing countries: Mental health issues. *Indian Journal of Medical Sciences, 63*, 327-329.
- Kar, N., & Bastia, B. K. (2006). Post traumatic stress disorder, depression and generalised anxiety disorder in adolescent after a natural disaster: A study of comorbidity. *Clinical Practice and Epidemiology in Mental Health, 2*, 17.
- Kloo, D., & Perner, J. (2008). Training theory of mind and executive control: A tool for improving school achievement? *Mind, Brain, and Education, 2*, 122-127.
- Kuhn, D., & Pearsall, S. (2000). Developmental origins of scientific thinking. *Journal of Cognition and Development, 1*, 113-129.
- La Greca, A. M., Silverman, W. K., Lai, B., & Jaccard, J. (2010). Hurricane-related exposure experiences and stressors, other life events, and social support: Concurrent and prospective impact on children's persistent posttraumatic stress symptoms. *Journal of Consulting and Clinical Psychology, 78*, 794-805.
- Lanius, R. A., Vermetten, E., Loewenstein, R. J., Brand, B., Christian Schmahl, C., Bremner, J. D., & Spiegel, D. (2010). Emotion modulation in PTSD: Clinical and neurobiological evidence for a dissociative subtype. *American Journal of Psychiatry, 167*, 640-647.
- Lazarus, R. (1999). *Stress and emotion*. New York, NY: Springer Publishing Company, Inc.
- Littleton, H., Horsley, S., John, S., & Nelson, D. V. (2007). Trauma coping strategies and psychological distress: A meta-analysis. *Journal of Traumatic Stress, 20*, 977-988.

- Mazza, M., Giusti, L., Albanese, A., Mariano, M., Pino, M. C., & Roncone, R. (2012). Social cognition disorders in military police officers affected by posttraumatic stress disorder after the attack of An-Nasiriyah in Iraq 2006. *Psychiatry Research*, 198, 248-252.
- McFarlane, A. C., & Papay, P. (1992). Multiple diagnoses in posttraumatic stress disorder. *Journal of Nervous and Mental Disease*, 180, 498-504.
- McNally, R. J. (2003). Remembering trauma revisited. *Nature Medicine*, 9, 1251-1252.
- Meichenbaum, D., & Biemiller, A. (1998). *Nurturing independent learners: Helping students take charge of their learning*. Cambridge, MA: Brookline Books
- Moskowitz, G. B. (2005). *Social cognition: Understanding self and others*. New York, NY: Guilford Press.
- Nietlisbach, G., Maercker, A., Rössler, W., & Haker, H. (2010). Are empathic abilities impaired in posttraumatic stress disorder? *Psychological Reports*, 3, 832-844.
- O'Brien, T. B., & DeLongis, A. (1996). The interactional context of problem-, emotion-, and relationship-focused coping: The role of the big five personality factors. *Journal of Personality*, 64, 775-813.
- Pelletier, J., & Astington, J. W. (2004). Action, consciousness and theory of mind: Children's ability to coordinate story characters' actions and thoughts. *Early Education and Development*, 15, 5-22.
- Pina, A. A., Villalta, I. K., Ortiz, C. D., Gottschall, A. C., Costa, N. M., & Weems, C. F. (2008). Social support, discrimination, and coping as predictors of posttraumatic stress reactions in youth survivors of Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology*, 37, 564-574 .

- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, 4, 515-526.
- Prati, G., & Pietrantonio, L. (2009). Optimism, social support, and coping strategies as factors contributing to posttraumatic growth. *Journal of Loss and Trauma*, 14, 364-388.
- Prati, G., Pietrantonio, L., & Cicognani, E. (2011). Coping strategies and collective efficacy as mediators between stress appraisal and quality of life among rescue workers. *International Journal of Stress Management*, 18, 181-195.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879-891.
- Rantanen, M., Mauno, S., Kinnunen, U., & Rantanen, J. (2011). Do individual coping strategies help or harm in the work-family conflict situation? Examining coping as a moderator between work-family conflict and well-being. *International Journal of Stress Management*, 18, 24-48.
- Saklofske, D. H., Austin, E., Mastoras, S., Beaton, L., & Osborne, S. (2012). Relationships of personality, affect, emotional intelligence and coping with student stress and academic success: Different patterns of association for stress and success. *Learning and Individual Differences*, 22, 251-257.
- Schaefer, J. A., & Moos, R. H. (1998). The context for personal growth: Life crises, individual and social resources, and coping. In R. Tedeschi, C. Park, & L. Calhoun (Eds.), *Posttraumatic growth: Positive change in the aftermath of crisis*. Mahawah NJ: Erlbaum.
- Sharp, C., Fonagy, P., & Allen, J. G. (2012). Posttraumatic stress disorder: A social-cognitive perspective. *Clinical Psychology – Science and Practice*, 19, 229-240.

- Smilde-van den Doel, D. A., Smit, C., & Wolleswinkel-van den Bosch, J. H. (2006). School performance and social-emotional behavior of primary school children before and after a disaster. *Pediatrics*, *118*, 1311–1320.
- Snyder, C. R., & Pulvers, K. (2001). Dr. Seuss, the coping machine, and “Oh, the places you will go.” In C. R. Snyder (Ed.), *Coping with stress: Effective people and processes* (pp. 3-19). New York, NY: Oxford University Press.
- Spirito, A., Stark, L., & Williams, C. (1988). Development of a brief coping checklist for use with pediatric populations. *Journal of Pediatric Psychology*, *13*, 555-574.
- Sprung, M., & Harris, P. L. (2010). Intrusive thoughts and young children’s knowledge about thinking following a natural disaster. *Journal of Child Psychology and Psychiatry*, *51*, 1115-1124.
- Sullivan, K., Zaitchik, D., & Tager-Flusberg, H. (1994). Preschoolers can attribute second order beliefs. *Developmental Psychology*, *30*, 395-402.
- Suls, J., & Fletcher, B. (1985). The relative efficacy of avoidant and nonavoidant coping strategies: A meta-analysis. *Health psychology: Official journal of the Division of Health Psychology, American Psychological Association*, *4*, 249-288.
- Taylor, S. E., & Stanton, A. L. (2007). Coping resources, coping processes, and mental health. *Annual Review of Clinical Psychology*, *3*, 377-401.
- Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, *15*, 1-18.
- Thrasher, S., & Dalgleish, T. (1999). Information processing research in PTSD. In W. Yule (Ed.), *Post traumatic stress disorders: Concepts and therapy*. Chichester, UK: Wiley.

Uemoto, M., Asakawa, A., Takamiya, S., Asakawa, K., & Inui, A. (2012). Kobe earthquake and post-traumatic stress in school-aged children. *International Journal of Behavioral Medicine*, 19, 243-251.

## COPING AFTER a NATURAL DISASTER

### Tables

*Table 1.* Means and standard deviations.

Measure	<i>M</i>	<i>SD</i>
Active coping (scale 0-6)	4.35	1.22
Avoidance coping (scale 0-7)	5.03	1.33
Negative coping (scale 0-2)	0.32	0.54
Birthday Puppy Story (scale 0-6)	3.11	1.19
Double Bluff Story (scale 0-3)	0.62	0.89
Peer social support (scale 1-4)	3.06	0.95
Cognitive performance (third- and fourth-grade) (scale 0-15)	10.56	3.26
Cognitive performance (fifth-grade) (scale 0-20)	13.49	3.92

*Note.* Untransformed scores were provided for false belief tests (separately for Birthday Puppy Story and for Double Bluff Story) and for cognitive performance (separately for third- and fourth-grade, and for fifth-grade).

## COPING AFTER a NATURAL DISASTER

Table 2. Correlations among variables.

	1	2	3	4	5	6
1. Active coping	-					
2. Avoidance coping	.42***	-				
3. Negative coping	.15***	.02	-			
4. Mentalizing abilities	.13**	.10*	-.07 <sup>†</sup>	-		
5. Peer social support	.15***	.11*	.03	.04	-	
6. Cognitive performance	.05	.14***	-.05	.28***	-.03	-

<sup>†</sup> $p \leq .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p \leq .001$ .