
Commentary: Harnessing the Fragility of Pain Memories to Help Children Forget: A New Avenue for Pediatric Psychology Interventions?

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Children's memories of pain play a powerful role in shaping their responses to future painful events (Noel, Chambers, McGrath, Klein, & Stewart, 2012). Pain memories are incredibly fragile. Children may remember pain accurately, or in a negatively or positively estimated way, with negatively estimated pain memories linked to greater distress at subsequent painful procedures (Chen, Zeltzer, Craske, & Katz, 2000). Pain memory development is dynamic across child development. Young children's memories are particularly susceptible to distortion and parental influences (Noel, Palermo, Chambers, Taddio, & Hermann, 2015a). For pediatric psychologists, the malleability of children's pain memories opens up exciting avenues for intervention. Given that pain cuts across nearly every pediatric population, pain memory-reframing interventions have broad appeal. Nevertheless, these interventions have been oft ignored and understudied, despite their potential for improving children's health.

In this issue, Marche, Briere, and von Baeyer (2015) introduce a novel and fascinating line of inquiry with great relevance to the field of pediatric psychology. Instead of examining children's ability to remember pain, they investigated children's ability to *forget* negative aspects of past painful events. Using a narrative elaboration technique to enhance recall, 86 children (7–15 years) recruited from the community were asked to recall two of their most physically painful experiences. One week later, children completed a retrieval-induced forgetting (RIF) task whereby they repeatedly practiced recalling positive details from their first pain memory. Children then completed an experimental pain task to examine the influence of

forgetting on pain coping. Several child and parent factors thought to influence memory and forgetting were examined to determine whether they could account for individual differences in children's ability to forget. By experimentally testing whether children's pain memories could be modified, Marche and colleagues (2015) offer important data to our field. The clinical implications are particularly promising, given that our current psychological interventions for reducing children's acute and chronic pain offer room for improvement.

Findings showed that the RIF task was effective; children were able to engage in this task and subsequently forget the negative aspects of one of their most salient pain memories. Forgetting influenced pain coping. Children who were better able to forget negative aspects of a past pain experience were less anxious about the pain task. The RIF task is designed to induce explicit, unintentional forgetting because repeatedly retrieving positive details of a memory impedes the ability to subsequently recall other, nonrehearsed information from that memory (Anderson, Bjork, & Bjork, 1994). It is thought that the mechanism underlying this effect is inhibition (Anderson & Bell, 2001), which changes across development (Harnishfeger, 1995). Although age differences in forgetting were not found in this study, little is known about the developmental progression of children's forgetting and memory of pain. Moreover, to date, only researchers have sought to modify children's pain memories (Chen, Zeltzer, Craske, & Katz, 1999; Pickrell et al., 2007). It is unknown whether other individuals in the child's life (e.g., parents, peers, teachers, physicians) are able to elicit the same effects.

Parents may be particularly important potential agents of change in memory reframing interventions. Given the enormous influence of the socio-linguistic environment on children's memory development, examination of parent influences is of paramount importance. Indeed, the way in which parents talk to their children can alter children's memories of past events (Nelson & Fivush, 2004). Furthermore, parents' own memories of child pain may be a particularly fruitful intervention target given their potential role in influencing parent-child interactions about pain, and children's own pain memories, expectancies, and behaviors. It is intriguing to consider whether parents themselves could be taught to forget the negative aspects of their child's pain and whether this forgetting could influence their own pain-related responses. Marche and colleagues (2015) examined whether children's catastrophic thinking about pain influenced forgetting; however, research suggests that *parents'* catastrophic thinking about their child's pain plays a stronger and more direct role in shaping children's pain memories (Noel, Rabbitts, Tai, & Palermo, 2015b). Future research is needed to examine the role of parents in the construction and reconstruction of children's memories (and forgetting) of pain.

This study launches an exciting and novel area of research that I believe holds promise for advancing our field and changing the way that we manage pain in childhood. Nevertheless, this research is preliminary and raises many interesting questions that can be addressed in future research. First, this study used a nonclinical sample of youth undergoing experimental pain in the lab, and the pain memories that children recalled were not related to the cold pressor task. Arguably, helping children to forget the negative details of a painful memory that is more closely tied to the painful event under investigation would be more relevant to their pain coping. Second, in this study, RIF was correlated with children's pain responses and was not used as a pain-management intervention; the RIF task was counterbalanced across children to either precede or follow the experimental pain task. Future research should use experimental designs wherein children are randomly assigned to receive the RIF task, versus an attention control task, before undergoing a painful event. This will elucidate whether RIF can in fact be used as an effective intervention to reduce children's pain. Third, it is unclear whether forgetting of pain memories can be maintained over time, or whether the negative aspects of these pain memories can subsequently be reinstated. Furthermore, some individuals may question the ethical acceptability and appropriateness of these types of memory-reframing interventions and argue that they could be conceived of as a form of deception. Integrating formal assessment of ethical acceptability (including the

perspectives of parents and children) in addition to safeguards (e.g., full debriefing) will be needed, and researchers should report these findings in their published work.

Participants in this study were a community sample of youth; however, 11 children reported experiencing chronic pain, thereby enabling examination of persistent pain as an individual difference variable, albeit in a preliminary way. Although the degree of RIF did not differ between youth with, versus without, persistent pain, the relationship between forgetting and expected anxiety before the pain task was stronger for youth with persistent pain. Although acute experimental pain is not the same as naturally occurring recurrent and chronic pains, and only a small subset of children in this study had chronic pain, this finding highlights the importance of examining memory and forgetting in clinical samples of youth with pain. Indeed, memory for pain has been implicated in the development and maintenance of chronic pain (Flor, 2012). Future research is needed to determine whether pediatric chronic pain is marked by a greater difficulty in forgetting its aversive aspects and how these modifiable cognitive processes can be best targeted in interventions for these youth. Surprisingly, of the relatively large number of individual difference factors examined, only pain-related self-efficacy emerged as a stable predictor of RIF scores. This is consistent with theoretical accounts of anxiety and memory biases (Beck & Clark, 1997), as well as existing memory reframing interventions designed to enhance children's self-efficacy in their coping abilities (Chen et al., 1999). This is also in line with recent research demonstrating that children who perceived themselves as helpless in the face of pain before surgery tended to develop more distressing memories of pain months later (Noel et al., 2015b). This finding also raises the question: Do existing psychological interventions designed to enhance children's self-efficacy, such as CBT-based interventions, invariably lead to alterations in memory and forgetting biases for pain? Finally, it is interesting to consider whether the relationship between forgetting and pain coping is linear across levels of pain and anxiety. Among nonclinical samples of children with mild to moderate pain and anxiety, forgetting may be adaptive; however, among clinical samples, forgetting may be more indicative of maladaptive avoidance. Integrated examinations of RIF and memory biases with clinical samples of treatment-seeking youth with pain and anxiety are needed to disentangle what is likely a complex relationship. It is possible that memory reframing interventions will need to be tailored to suit the unique needs of various treatment groups.

In conclusion, memory by its nature is malleable, and the language we use to talk to children about their

pain memories strongly influences what is remembered and forgotten. Future research is needed to determine whether there is a therapeutic effect of forgetting the negative aspects of pain by enhancing factual, positive aspects of children's pain memories. Such investigations could arm pediatric psychologists with another tool that could be used to alter pain trajectories and potentially improve children's health into adulthood.

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