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Parents - To Help or Hinder Pain Memories in Children

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Pain Memories

Memory is defined as “the store of things learned and retained from an organism's activity or experience as evidenced by modification of structure or behavior or by recall and recognition” [1] and reflects the formation of neuronal assemblies of previously experienced stimuli [7]. Pain memories relate to somatosensory events experienced by an individual either at the time of the painful event or as a consequence of ongoing pain. As such, contextual influences can contribute considerably to the process of encoding and retrieval. While the neurobiology of pain memories is not well-defined, the hippocampus, well known to be involved in memory, is significantly involved in chronic pain conditions (e.g., migraine [9]) and in the transition to the chronic pain state [10]. Moreover, memory for pain is susceptible to distortion over time [20] with maladaptive memory traces implicated in the development and maintenance of pain [17]. Emerging research has focused on identifying specific vulnerabilities that result in these negative outcomes. In this volume of PAIN, Noel and colleagues present an interesting data set related to this issue in their paper: Remembering pain after surgery: A longitudinal examination of the role of pain catastrophizing in children's and parents' recall.

A View on the Development of Pain Memories in Children

Noel and colleagues have implemented exciting work in the realm of pain memory development in children. They previously reported that healthy children who had negatively estimated pain memories expected greater pain in subsequent experimental pain tasks and actually experienced higher levels of pain while engaged in the subsequent task [12] and a recent topical review in PAIN highlights many of the cognitive and social developmental factors driving the formation and expression of pain memories in childhood [13]. Dr. Noel and her colleagues asserted that examining caregivers' own pain memories and expectancies is necessary and likely influential. The results from the current study support this claim.

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The paper examines the development of pain memories in children and parents after major pediatric surgery (e.g., spinal fusion). In this longitudinal study, a sample of 49 youth ages 10-18 completed measures of pain catastrophizing one week before surgery. In the acute recovery period, children and parents completed measures of child pain intensity and pain-related distress. Two to four months after surgery, parent and child memories for child pain intensity and distress were assessed. They found that parent catastrophizing (magnification, rumination) exerted a direct influence on child affective and parent sensory memories of child post-surgical pain, controlling for initial pain reports. Additionally, parent rumination about child pain influenced greater child pain intensity in the acute recovery period, which in turn led to children developing more distressing pain memories. Child catastrophizing did **not** have a direct influence on pain memory formation for the child or parent. Child helplessness did exert an indirect influence through child pain-related emotional distress 2-weeks post-surgery on child memories for pain-related distress and intensity and parent memories for child emotional distress. Altogether this study puts forth two key findings: 1) caregiver expectations/cognitions can significantly influence child memory formation and 2) pain catastrophizing appears to be a driver of negative memory biases.

To that end, the particular parent cognitions and expectations proven to be problematic that fall under the term pain catastrophizing reflected parent anxious preoccupation with pain (rumination) and parent amplification of the significance of pain (magnification) [19]. Parent helplessness did not emerge as a significant predictor, although this may have been due to limited power with the sample size (n=49). Although most prior studies examining parent catastrophizing have focused on the construct as a whole with strong evidence for its negative impact [2; 3] [6; 8; 21], this study in conjunction with prior work by Vervoort and colleagues {Vervoort, 2013 #22} and our recent evaluation of the Pain Catastrophizing Scale for Parents (PCS-P) [15] suggests potentially taking a more granular approach to understanding the influence of these sets of negative cognitions on outcomes, including the development of pain memories.

Future Implications

Using a surgical model to examine the development of pain memories in children is not only innovative; it is timely. The development of chronic pain after surgery in children is not simply a rare occurrence, but rather observed in 13%-15% of patients up to five years later [5; 18], thus it is essential to elucidate the complex mechanisms that contribute to this persistent pain state. Studies have examined factors that contribute to child pain in the immediate post-operative [4], the acute (2-week) post-surgical [16], and long-term (up to 12 months later) [14] period. In each instance, among other factors, parental factors emerged as an important influence on outcomes. Combining assessment of pain level with pain memories has tremendous implications for how we intervene, as many nonpharmacological treatments target pain memory traces versus the pain itself [11]. It may be possible to potentially inhibit or diminish the development of maladaptive pain memories by targeting caregiver cognitions and expectations prior to a child's major surgery. Currently efforts to prepare children for surgery focus on the child with interventions tailored to help the child cope prior to and in the immediate post operative period and although important, this is likely insufficient.

With these intriguing findings in hand, we are left with many new questions. How do child and parent pain memories relate to concurrent pain levels at long-term follow-up? As pain memories are susceptible to distortion, can they be modified to be more positive long after surgery? Are parents the key to modifying those existing memories (e.g., through positive narratives of the surgical experience)? Do maladaptive pain memories potentially lead to greater vulnerability for the development of chronic pain after surgery?

Altogether the present work is an important step toward informing the development of parent and family-based interventions to positively impact pre-surgical preparation and postsurgical care; all in an effort to prevent the development of persistent pain.

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