

Children's selective attention to pain and avoidance behaviour: The role of child and parental catastrophizing about pain

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ABSTRACT

The present study investigated selective attention to pain in children, its implications for child avoidance behaviour, and the moderating role of dimensions comprising child and parental catastrophizing about pain (ie, rumination, magnification, and helplessness). Participants were 59 children (31 boys) aged 10–16 years and one of their parents (41 mothers). Children performed a dot-probe task in which child facial pain displays of varying pain expressiveness were presented. Child avoidance behaviour was indexed by child pain tolerance during a cold-pressor task. Children and parents completed measures of child and parent pain catastrophizing, respectively. Findings indicated that both the nature of child selective attention to pain and the impact of selective attention upon child avoidance behaviour were differentially sensitive to specific dimensions of child and parental catastrophizing. Specifically, findings showed greater tendency to shift attention away from pain faces (ie, attentional avoidance) among children reporting greater pain magnification. A similar pattern was observed in terms of parental characteristics, such that children increasingly shifted attention away from pain with increasing levels of parental rumination and helplessness. Furthermore, child attentional avoidance was associated with greater avoidance behaviour (ie, lower pain tolerance) among children reporting high levels of pain magnification and those whose parents reported greater rumination about pain. The current findings corroborate catastrophizing as a multidimensional construct that may differentially impact outcomes and attest to the importance of assessing both child and parental characteristics in relation to child pain-related attention and avoidance behaviour. Further research directions are discussed.

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1. Introduction

Contemporary cognitive-affective models propose that pain imposes an overriding attentional priority that motivates avoidance behaviour [3,20,61,70], particularly in the context of excessive elaboration/rumination regarding pain, as is the case in high pain catastrophizing [57,60,63]. To date, most studies in this domain have been conducted with adult samples. In contrast to the growing adult literature, only 2 studies have addressed children's selective attention to pain-related information [5,9]. However, neither study assessed the impact of child selective attention on child avoidance behaviour, or the role of catastrophizing. This is surprising given the significant number of children suffering from pain [37], the hypothesized pivotal role of attention and avoidance in

development and maintenance of pain problems [3,20,61,70], and the importance of pain catastrophizing in understanding deleterious pain outcomes (eg, increased pain/disability) among both clinical and nonclinical pediatric samples [15,29,42,67].

While several adult studies find that attentional capture and behavioural avoidance are amplified with greater pain-related catastrophizing [35,60,63], this evidence is not unequivocal. Some studies fail to identify expected relationships between attention, avoidance, and catastrophizing [32,49,62], or find evidence counter to expectations [8,65,66]. The limited pediatric literature is likewise marked by inconclusiveness. Selective attention toward pain (words) was observed among children with functional abdominal pain [5], but the reverse pattern (attentional avoidance) was observed among children with recurrent abdominal pain [9].

The apparent discrepancies in adult and child literatures may owe to methodological and conceptual limitations. A central methodological limitation may be reliance on word stimuli [8,19,36,41,51] (but see [44,50,65]); linguistic stimuli are criticized as having low ecological validity and only indirectly relating to

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pain [16,18]. More ecologically valid stimuli, such as facial pain expressions, may represent a significant advance in the study of attention to pain, particularly when these facial stimuli relate to personally relevant impending pain [16,18].

From a conceptual standpoint, discrepant findings may owe to investigation of catastrophizing as a unidimensional construct. Research has supported a *multidimensional* conceptualization of catastrophizing, comprising elements of rumination, magnification, and helplessness [54,57], which may differentially impact outcomes [47,55,57]. Moreover, while attention to pain is primarily linked to excessive rumination processes [2,20,57], research has yet to examine the specific dimensions of catastrophizing associated with attention to pain.

Accordingly, the objective of the present study was 2-fold. First, child selective attention to visual pain stimuli (faces) and the moderating role of pain catastrophizing were examined using dot-probe methodology. As child responses to pain are likely influenced by parental pain coping [13,23,25,27,39,48], both child and parental catastrophizing about personal pain experience were examined as potential moderators. Second, we examined the impact of children's selective attention to pain and child/parental catastrophizing upon child avoidance behaviour (indexed by cold-pressor pain tolerance). Based upon current cognitive-affective models of attention to pain [3,20,61,70], we hypothesized that 1) children would selectively attend to pain, particularly when child and parental catastrophizing were high, and 2) increased selective attention to pain, particularly in the context of high child and parental catastrophizing, would contribute to greater child avoidance behaviour. Importantly, for each hypothesis, we examined the differential predictive value of the distinct dimensions comprising child and parental catastrophizing (ie, rumination, magnification, and helplessness).

2. Methods

2.1. Participants

The present study is part of a larger investigation consisting of 2 parts. The first part aimed at examining the relationship between child's selective attention to pain and avoidance behaviour and the moderating role of child and parental catastrophizing about personal pain. The second part aimed at examining the relationship between parental attention and parental emotion regulatory processes in response to child pain. The present manuscript reports findings pertaining to the first part of this larger investigation. Except for the questionnaire assessment (see below), additional procedures relevant to the second part of the larger investigation occurred *following* the currently described methodology and are thus not expected to interfere with current results. Participants were recruited from a sample of school children from grades 5 through 11 and their parents ($n = 660$ children) who participated in a questionnaire study that took place approximately 1.5 years prior (see [10]). Only children and parents who had provided informed consent to be re-contacted and who had not already been invited for participation in another study were approached ($n = 164$). Exclusion criteria for this study included: 1) child recurrent or chronic pain, 2) developmental delay, and 3) having insufficient knowledge of the Dutch language. A weighted random sampling procedure was used [30] with an equal proportion of boys and girls. From the total of 164 parent-child dyads, 88 parent-child dyads were randomly selected and contacted. Of those contacted, 95.5% ($n = 84$) met the inclusion criteria and 77.4% ($n = 65$) agreed to participate. The main reason for refusal to participate was lack of time. Two parent-child dyads later withdrew

participation because of child illness ($n = 1$) or other family responsibilities ($n = 1$) (final response rate = 71.6%). One parent-child dyad was further excluded because the child withdrew participation at an early phase of the pain task (ie, refusal to perform the cold-pressor task [CPT]). Additionally, data of 3 participants were excluded since avoidance behaviour, which was strictly operationalized as pain tolerance during CPT performance with water temperature at $10^{\circ}\text{C} \pm 1^{\circ}\text{C}$ and with the hand immersed up to the wrist, was not assessed conform these criteria. Specifically, temperature exceeded the $10^{\circ}\text{C} \pm 1^{\circ}\text{C}$ range for 2 participants, while one participant refused to fully submerge the hand.

The final sample entered in the analyses consisted of 59 children (31 boys) aged 10–16 years ($M = 12.64$ years, $SD = 1.58$) and one of their parents (41 mothers). Approximately 7% of the children were recruited from the 5th grade, 22% from the 6th grade, 22% from the 7th grade, 13.6% from the 8th grade, 23.7% from the 9th grade, 8.5% from the 10th grade, and 3.4% from the 11th grade. Parents ranged in age from 34 to 55 years ($M = 43.59$ years, $SD = 4.55$). Most parents (89.8%) were married or co-habiting. The majority of parents (88.35%) had higher education (beyond the age of 18 years). Parent-child dyads were compensated 25€ for participating in this study. The study was approved by the Ethics Committee of the Faculty of Psychology and Educational Sciences of Ghent University, Belgium.

2.2. Apparatus

A cold-pressor apparatus was used as an experimental technique to induce pain in child participants. Children were instructed to lower their right hand into the cold water up to just above the wrist; children maintained their hand in the cold-pressor box up to child pain tolerance level or an uninformed ceiling of 4 minutes. Temperature of the water was maintained at $10^{\circ}\text{C} (\pm 1^{\circ}\text{C})$ and was circulated continuously by a pump. The cold-pressor apparatus is well suited for use with children, and the pain experienced is considered to provide an analogue for various naturally occurring acute pains [6,71]. A second tank was used where the water was maintained at room temperature ($21^{\circ}\text{C}; \pm 1^{\circ}\text{C}$). To standardize skin temperature prior to cold-pressor immersion, all children first immersed their hand in the room temperature water tank for a total of 2 minutes (see also [6]).

2.3. Child pain tolerance

Children's pain tolerance was defined as total time of immersion in the cold water (in seconds), measured by a stopwatch. Prior to the CPT, children were provided with the following instructions "Hold your hand in the cold water as long as you can endure the pain. When you think/feel 'I cannot endure the pain any longer – I cannot handle more', I want you to say 'STOP' and take your arm out of the cold water box." The maximum duration of exposure to the CPT was 4 minutes. However, the children were not informed of this ceiling so there would be no risk that they mistakenly thought they were expected to leave their arm in the water for this length of time. The child's pain tolerance was taken as an index of child's avoidance behaviour (see, eg, [8]).

2.4. Measures

Parents completed a battery of questionnaires including measures gauging sociodemographic characteristics and parental catastrophic thinking about pain. Children completed measures of child catastrophic thinking about pain and experienced pain intensity during the CPT.

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