

RESEARCH ARTICLE

'I Was Just Screeching!': Comparing Child and Parent Derived Measures of Distress

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Abstract

Two studies explored relationships between children's (2–13 years old) descriptions of how much they had cried and two other ways of assessing children's distress during injuries and subsequent hospital treatment, one parent-generated and the other child-generated. In the first study, 201 2- to 13-year-old children's descriptions of crying were compared with parental ratings of child distress, and in the second, these two measures plus a Faces Pain Scale were compared for 71 2- to 6-year-olds. Children's self-descriptions of crying were highly similar to parental ratings at all ages, but the Faces Pain Scale had less similarity to other measures, especially for younger preschoolers. Findings suggest that children's self-descriptions of emotional reactions may be a useful tool for assessing children's distress for real-world events with no adult witnesses. Copyright © 2011 John Wiley & Sons, Ltd.

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The purpose of this report is to compare different measures of assessing children's distress about real-world, naturally occurring stressful events. One is a novel way of assessing event distress that uses children's own descriptions of how much they cried at the time of the event. Thus, it assesses the possibility that young children can effectively report on their own distress-related behaviours. Children's self-descriptions of crying are compared with two other measures of distress, one of which is traditional and frequently used, namely parental ratings of child distress. Study 1 addresses the question of how much children's self-reports converge with parental ratings. This is the first time child self-descriptions of crying have been compared with parent ratings. In a second study, these self-descriptions are also compared with a measure that asks young children to rate the quality of their internal experience of distress, namely a Faces Pain Scale. If a scale based on children's reports on their own distress-related behaviours is found to be effective, it could be a useful measure for those who are trying to assess distress or pain in young children who may not fully understand existing self-report measures of pain intensity. It could also potentially be used in situations where observing adults are not present or cooperative, such as unexpected injuries or even abuse.

There are many reasons for measuring distress in children. High levels of child distress can potentially moderate a number of outcomes, including cognitive and emotional factors (e.g. memory, fear) and psychological well-being (e.g. depression, anxiety). Certainly, adults who are highly distressed show compromised recall of target events (Deffenbacher, Bornstein, Penrod, & McGorty, 2004), and in forensic settings, this negative relationship between distress and memory is often considered in terms of evaluating the quality of witness reports to police, judges and juries. However, the degree to which distress compromises children's recall is yet unclear (Peterson, 2010; Wallin, Quas, & Yim, 2009), in part, because it is affected by the types of memory measures that are used, the nature of the events being recalled and individual difference variables. Different investigators have shown distress to be associated with poorer memory in children, better memory or even having no impact on memory among children (Peterson, 2010). Children's reports of distress can even be manipulated (Bruck, Ceci, Francoeur, & Barr, 1995). Nevertheless, child distress is often considered by interviewers when judging the quality of children's reports. Thus, it can have important implications in both forensic and clinical contexts (e.g. O'Kearney, Speyer, & Kenardy, 2007; Payne et al.,

2006; see chapters in Quas & Fivush, 2009 for discussions about the impact of child emotion on a number of outcomes). Furthermore, both experiencing stressful events and the later appraisal of life events as being stressful are related to children's long-term psychological functioning and well-being (e.g. Krackow & Rudolph, 2008; Sales, Fivush, Parker, & Bahrick, 2005; Shaw, Applegate, & Schorr, 1996). Thus, how distressed children were when they experienced various events and their later appraisal of those events seem to have potentially far-reaching effects. These diverse relationships between child distress and other outcomes underscore the importance of being able to assess child distress, even for those situations in which the child is the only individual able to report on it.

Recently, a substantial body of research has appeared in which investigators have attempted to understand exactly how child distress influences a range of outcomes (e.g. see Quas & Fivush, 2009 for a number of reviews). However, research has been hampered by the following: (1) being able to study events that are highly stressful and (2) having an effective way of measuring child distress. In terms of the first issue, researchers have been limited in the degree of child distress that can be experimentally investigated because of ethical considerations. Consequently, some researchers have studied naturally occurring stressful events such as painful medical procedures (e.g. Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1994, 1997), natural disasters (Fivush, Sales, Goldberg, Bahrick, & Parker, 2004) or medical emergencies (e.g. Peterson & Whalen, 2001) as analogues for other stressful events experienced by children, such as abuse (Steward et al., 1996). The current research uses the latter, namely injuries serious enough to require medical emergency room treatment. A second issue is how one measures children's distress. A major difficulty is that because highly distressing events are often naturally occurring, they are unplanned. An even more serious limitation is that often such distressing events occur when there is no adult present to observe and rate children's distress level, or else a parent/observer may be unwilling or unable to do so. Thus, it would be useful to have a reliable way of assessing child distress that does not require an external observer. This need is the impetus for the present study. We propose that children's discourse about distressing events may provide a means of assessment.

How children's level of distress is measured is contentious. Some recent research has used physiological indicators such as heart rate or cortisol levels (Wallin, Quas, & Yim, 2009), but these are seldom options for naturally occurring and unplanned stressful events. Most commonly, adult observers have been used, such as asking parents or non-parental observers to rate children's degree of distress (e.g. Burgwyn-Bailes, Baker-Ward, Gordon, & Ornstein, 2001; Peterson & Bell, 1996). Adult report, in conjunction with child

self-report and observational measures, is often used to measure child distress during other stressful events such as those involving pain (e.g. medical procedures; Finley & McGrath, 1998). As with any measure of distress, there are shortcomings to each. Behavioural measures often require equipment and some degree of training on their proper use, and there may be political and social reluctance to use these types of measurements (McGrath, 1998). Child self-report measures such as faces scales are frequently used to measure child distress (i.e. pain intensity, fear, unpleasantness, etc.; Champion, Goodenough, von Baeyer, & Thomas, 1998; Kuttner & LePage, 1989; McMurry, Noel, Chambers & McGrath, 2011; McGrath, de Veber, & Hearn, 1985; McGrath, 1990); however, these measures are problematic for use with very young children (less than 3 years of age) because of limitations in their ability to translate and quantify their experiences (Spagrud, Piira, & von Baeyer, 2003). Although parent report is often used, parents are not always accurate in their assessments of their children's pain and distress. In fact, parents sometimes underestimate their children's pain (Chambers, Reid, Craig, McGrath, & Finley, 1998) and have difficulty detecting suppressed pain expressions (Larochette, Chambers, & Craig, 2006). Importantly, stressful and naturally occurring events such as injuries often occur in the absence of parents and other adults. As a result, children are often the only source to provide accounts of their experience. In addition, given the subjective nature of pain and distress, child self-report is arguably the best way to capture children's experience of painful, stressful or traumatic events. Indeed, self-report has been considered to be the 'gold standard' in the context of pain measurement (McGrath et al., 1996; McGrath, Unruh, & Finley, 1995).

The method of assessing distress explored here is how children themselves describe their experience using language. A child who describes his or her emotional reaction during an unexpected stressful event by saying 'I was just screeching!' or 'I was very very crying' is communicating considerable information about his or her emotional state at the time of event occurrence. Such ability to communicate about emotional reactions to events has been repeatedly documented in young children (e.g. Bretherton & Beeghly, 1982; Harley & Reese, 1999). Although children's verbal descriptions have long been used clinically to assess their degree of pain (e.g. Melzack, 1975; Wilkie et al., 1990), to our knowledge no one has yet used such descriptions to assess children's emotional distress.

Children's crying behaviour has often been used as a measure of pain among infants (e.g. Fuller, 1991; Johnston, Stevens, Craig, & Grunau, 1993), and there is considerable literature on the analysis of cry for purposes other than pain (Wasz-Hockert, Michelsson, & Lind, 1987). Although children's cry has often been used as a measure of pain, it is more generally a measure of distress as opposed to a signal of pain

(McGrath, 1998). Indeed, children's crying is a core behaviour that comprises many validated behavioural measures of child distress and pain (e.g. Child Adult Medical Procedure Interaction Scale, Blount et al., 1989; Children's Hospital of Eastern Ontario Pain Scale, McGrath, Johnson, et al., 1985; Face, Legs, Arms, Cry, Consolability measure, Merkel, Voepel-Lewis, Shayevitz, & Malviya, 1997). In this way, distress is broadly conceived of as a multidimensional construct, which reflects several internal processes including pain, fear and anxiety (Blount & Loiselle, 2009; Katz, Kellerman, & Siegel, 1980). Therefore, crying as an indicator of distress is also intended to reflect any and/or all of these internal processes. Although crying is a behavioural manifestation of children's distress and reflects the extent to which a child experiences distress, it can be indicative of other internal states (e.g. frustration, hunger, discomfort, poor affect regulation), particularly among young children who demonstrate higher overall rates of distress than older children (Jay, Ozolins, Elliott, & Caldwell, 1983; Katz et al., 1980; Negayama, 1999). Furthermore, despite its utility as a behavioural measure of child distress, to our knowledge children's crying has not been utilized as a *self-report* measure.

If children's self-descriptions of how much they cried are a potentially useful way of assessing child distress, then they could be used to relate child distress during naturally occurring events to various outcomes such as memory or psychological functioning. But first, one needs to understand how such self-descriptions are related to other methods of assessing child distress. This is the purpose of the present investigation: to compare children's descriptions of their emotional reactions, specifically their degree of crying, with other ways of assessing child distress. A large corpus of prospectively collected data was obtained over several years on a heterogeneous sample of children ages 2 to 13 years for purposes of other research (children's memory for stressful events: Peterson, 1999; Peterson & Bell, 1996; Peterson, Sales, Rees, & Fivush, 2007; Peterson & Whalen, 2001; Tizzard-Drover & Peterson, 2004) and provides an invaluable data set that was used in the present research. In the first of two studies, children were interviewed about injuries that had been serious enough to require treatment in a hospital emergency room. Interview transcripts were then searched for how the children explicitly described their degree of crying, and these descriptions were compared with parental ratings of distress. If these two measures are shown to be highly related, children's descriptions of their emotional reactions to events may be a potentially new way of assessing children's degree of distress during real-world highly distressing events and could be used for events in which no adult observers were present. In the second study, a group of children were asked to fill out a version of the Faces Pain Scale (Bieri et al., 1990), specifically the four-face version that was used by Steward et al. (1996). Their ratings on this scale

were compared with their verbal descriptions of crying when describing their injury and subsequent emergency room treatment, as well as with their parents' ratings of child distress.

This is an exploratory investigation because there is little prior research comparing children's self-descriptions of how much they had cried when interviewed about a stressful event with parental ratings of child distress. Nor have they been compared with children's ratings on a Faces Pain Scale.

Study 1

Method

Participants

Children were recruited from the emergency room of a children's hospital, the only facility treating children in that community. Because medical care is free in Canada, the sample was a cross section of the community. All children had an injury that was defined by hospital staff as a trauma injury, mostly bone fractures or lacerations requiring suturing. A total of 201 children were recruited as participants for four prior studies (Peterson, 1999; Peterson & Bell, 1996; Peterson & Whalen, 2001; Tizzard-Drover & Peterson, 2004): 21 2-year-olds (16 girls, mean age 2;6), 26 3-year-olds (10 girls, mean age 3;5), 37 4-year-olds (17 girls, mean age 4;4), 49 5-year-olds (22 girls, mean age 5;5), 19 6-year-olds (7 girls, mean age 6;0.5), 21 8- to 9-year-olds (11 girls, mean age 8;11) and 24 12- to 13-year-olds (9 girls, mean age 12;10). Variation in socioeconomic status and racial composition of the sample was not deemed a significant problem since according to Statistics Canada's 2001 census information provided by the area from which the sample was chosen, approximately 97% of the population is Caucasian of European descent. Additionally, the hospital is the only tertiary level care facility in the province and is publicly funded such that all children go there.

Procedure

Children and their parents were individually interviewed in their homes a few days (mean delay = 6.2 days, range = 2–14 days) after injury by using a standardized interview that began with free recall about both injury and hospital treatment, followed by an extensive list of mostly wh-questions. (A detailed list of interview questions is found elsewhere; see Peterson, 1999; Peterson & Bell, 1996; or Peterson & Whalen, 2001). For most child interviews, the parent was not present in the room. However, occasionally a child was not comfortable unless a parent was there. If so, parents were asked to refrain from speaking so as to not affect children's recall. As well, unless the child or parent spontaneously described children's crying in detail, the interviewer always asked 'Did (you/name of

child) cry?' when asking about both the details of the injury and of hospital treatment; this question was always followed by a prompt for elaboration, i.e. how much the child had cried. Parents were also asked to rate their children's degree of distress at the time of injury and during hospital treatment. Because data collection spanned several years and data were collected for other studies, the number of categories on the rating scale varied somewhat between studies (see the following sections). When families from the emergency room were recruited, no instructions were given to parents to refrain from discussing the target events prior to our visit since such instructions would have likely been universally ignored. The injuries were significant events that of course would have been widely reported to relatives and friends, and indeed parents reported that such conversations had occurred. However, lack of control of all variables is an unavoidable limitation associated with ecologically valid research investigating real-world phenomena. All aspects of the study had been approved by the University's Human Investigation Committee for ethical treatment of human participants.

Data coding

Distress categories of children derived from self-reports of crying

Children were classified as being highly distressed, moderately distressed or not distressed on the basis of their descriptions of how much they cried. Children who said they did not cry were classified as low distress; those who said they had cried but provided little further elaboration (or minimized the degree of crying) were classified as moderately distressed; and those who said they cried much ('I was very very crying'), screeched or screamed ('I never cried—I just screamed') were classified as highly distressed. Distress scores were derived separately for injury and hospital treatment. For reliability, 15% of transcripts were coded by two coders, and agreement (Cohen's kappa) = 0.82.

Distress ratings by parents

Parents were asked to rate their child's distress as low, moderate or high during parental interviews. This was carried out separately for injury and treatment events. One hundred and thirty parents had used a six-level scale describing their child's degree of distress that ranged from 'not upset' to 'extremely upset'. However, because the data had been collected for other studies, there had not been consistency in the number of stress levels used by parents. Specifically, the remaining 71 parents had a three-level scale that was composed of 'low distress/upset', 'moderately upset' and 'extremely upset.' In order to maximize the number of participants by combining samples, the lowest two levels on the six-level distress scale were combined, as were the middle two and highest two categories,

creating a three-level scale of distress. All statistical analyses were performed with the two samples separated as well as combined, and there were no significant differences.

Results

Classification of children's degree of distress according to self-descriptions of crying is shown in Table I. To simplify the table, data are combined for younger children (2- to 6-year-olds) and older children (8- to 13-year-olds). The younger children were preschool-aged (including kindergartners), and the older children were school-aged (i.e. in elementary or junior high school). Research on various aspects of cognitive development has found substantial differences between preschoolers and older children who are immersed in the school system (Bjorklund, 2005), and the studies from which the sample was derived showed that children of all ages in the school-aged sample had extensive and accurate memories for their injuries and subsequent emergency room treatment, while the recall of preschool-aged children was shorter and less accurate. Classification according to the children's self-descriptions of crying is presented vertically, while classification according to parental ratings is presented horizontally. Instances in which both child and parent ratings agreed are indicated in bold on the diagonal. It is apparent that there was considerable variation in distress ratings between children.

In addition, Pearson r correlations were computed between age and both parental ratings and child self-descriptions of distress. For the injury event, age was significantly correlated with both parent and child measures ($r = -0.217$, $p = 0.002$ and $r = -0.260$, $p < 0.001$, respectively). For the hospital event, age was significantly correlated with children's descriptions of crying ($r = -0.149$, $p < 0.05$). Older children cried less and were rated as less distressed by their parents.

Table I. Study 1: number of children at each stress level according to both children's self-descriptions and parent ratings of distress

Parent rating	2- to 6-year-olds' rating				8- to 13-year-olds' rating			
	Low	Med.	High	Total	Low	Med.	High	Total
Injury								
Low	6	7	2	15	6	5	1	12
Med.	1	39	12	52	6	12	2	20
High	4	16	67	87	0	4	11	15
Total	11	62	81	154	12	21	14	47
Hospital								
Low	53	3	3	59	19	1	0	20
Med.	9	21	9	39	2	9	2	13
High	3	20	33	56	3	4	7	14
Total	65	44	45	154	24	14	9	47

Note: Numbers in bold type indicate agreement in ratings by children and parents.

Injury event

When the younger, preschool-aged children talked about their injury, 52.6% described themselves as crying much, whereas only 7.1% said they did not cry. In comparison, parents of 56.5% of the younger children rated them as highly distressed, whereas only 9.7% rated their children as experiencing low distress. For the older, school-aged children describing their injury, 29.8% said they cried much, whereas 25.5% said that they did not cry. In comparison, parents rated 31.9% as highly distressed and 25.5% as experiencing little distress. Thus, there was considerable similarity in the proportions of children who were classified as experiencing high or low distress at the time of injury, regardless of whether child descriptions of crying or parent ratings were used.

Three approaches were taken in order to assess the relationship between child and parent distress ratings. First, Cohen's kappa was calculated on the agreement between raters, and overall, the classifications according to children and parents agreed 72.7% of the time for the preschool-aged children's injury event (Cohen's kappa = 0.513, $p < 0.001$) and 61.7% of the time for the school-aged children (Cohen's kappa = 0.410, $p < 0.001$). Next, correlations were calculated for the relation between child and parental ratings, and Pearson's r for the injury event was $r = 0.58$ ($p < 0.001$). Re-calculations of correlations for the different age groups separately were also computed to see if these substantial relations between parent ratings and child self-descriptions were consistent across all ages (Table II), and the correlations were highly significant for every age group. Finally, to explore whether the ratings provided by children and parents about children's distress at the time of injury interacted with children's age or gender, a repeated measures analysis of variance was calculated, with age of the child (seven levels) and gender (two levels) as the between-subjects factors and rater (child or parent) as the repeated measure. Importantly, the identity of the rater was not significant, $F(1, 187) = 0.73$, $p = 0.39$; that is, there was no significant difference between the distress

ratings of children and parents when describing children's emotional reaction to their injury. Nor were there any interactions between rater identity and either age or gender [$F(6, 187) = 0.74$, $p = 0.62$ and $F(1, 187) = 0.45$, $p = 0.50$ for age and gender, respectively]. Thus, similarities between children's descriptions of crying and parental ratings of child distress did not differ as a function of either child age or gender. Although age or gender differences in distress ratings were not our focus, consistent with prior research we found that younger children were classified as more distressed than older children [$F(6, 187) = 4.07$, $p = 0.001$, $\eta = 0.115$], and there was a tendency for girls to be classified as more distressed than boys [$F(1, 187) = 2.94$, $p = 0.088$].

Hospital event

Overall, the classifications according to children and parents agreed 69.5% of the time for the preschoolers' hospital event (Cohen's kappa = 0.537, $p < 0.001$) and 74.5% of the time for school-aged children (Cohen's kappa = 0.603, $p < 0.001$). Correlations were calculated for the relation between child and parental ratings, and all were highly significant: Pearson's r for hospital treatment was $r = 0.72$ ($p < 0.001$). Re-calculations of correlations for the different age groups separately are shown in Table II, and they were highly significant for every age group. Finally, a repeated measures analysis of variance was calculated, with age of the child (seven levels) and gender (two levels) as the between-subjects factors and rater (child or parent) as the repeated measure. Rater identity, age and gender were all non-significant, $F(1, 187) = 1.30$, $p = 0.260$, $F(6, 187) = 1.64$, $p = 0.137$ and $F(1, 187) = 0.23$, $p = 0.635$, respectively. There were no significant interactions.

In summary, there is considerable similarity between parents' ratings of child distress at the time of child injury and how children themselves describe their degree of crying. This is true at all ages and for both genders, as well as true whether children and parents were describing child distress at the time of their injury or at the time of hospital treatment.

Discussion of Study 1

This study explored whether children's self-descriptions of crying could be a useful measure of their emotional reaction. All of the children were able to provide appropriate descriptions of their reactions; this is not surprising since prior research has established children's ability to communicate about emotional states from a young age (e.g. Harley & Reese, 1999). Importantly, these self-descriptions of crying were highly related to parental ratings of children's responses. That is, these two measures were highly correlated and agreement was substantial. An equally important finding is that these correlations were equivalently high across a wide age range including children from 2 to 13 years of age. The equivalently strong correlations between parent and child reports are even more remarkable because

Table II. Study 1: correlations between parental ratings of child distress and children's self-descriptions of how much they cried for each age separately

Age	Event	
	Injury	Hospital
2 years	0.67 ***	0.73 ***
3/4 years	0.48 ***	0.70 ***
5/6 years	0.61 ***	0.74 ***
8/9 years	0.66 ***	0.70 ***
12/13 years	0.54 ***	0.686 ***
All children	0.58 ***	0.72 ***

*** $p < 0.001$.

there would have been a greater memory load for younger children because of the delay of several days between event occurrence and interview. Thus, this measure had utility for even very young children. Consistent with past research in the context of medical procedures, preschool-aged children exhibited more behavioural indications of distress and were rated by parents as being more distressed than were school-aged children (Jay et al., 1983; Katz, Kellerman, & Siegel, 1980; Negayama, 1999), and girls tended to have higher ratings on both measures of distress than did boys (e.g. LaMontagne, Wells, Hepworth, Johnson, & Manes, 1999). Indeed, developmental changes in the expression and communication of distress, including pain-related distress, are well established (von Baeyer & Spagrud, 2003). As children mature, so too does their ability to control their observable expressions of distress and pain, such as crying. They also of course are better at remembering prior experiences.

Although parental ratings of children's distress are commonly used to evaluate the distress experienced by children, other measures are often used as well. In Study 2, children are asked to rate the quality of their internal experience of distress.

Study 2

The goal of this study was to compare children's ratings of distress on a Faces Pain Scale with both their verbal descriptions of crying and with parents' distress ratings. Although some researchers question whether preschoolers can accurately and reliably use rating scales given their limited cognitive abilities required for this task as well as response biases (Shields, Palermo, Powers, Grewe, & Smith, 2003; Chambers & Johnston, 2002; von Baeyer, Forsyth, Stanford, Watson, & Chambers, 2009), faces scales are frequently used to assess child distress (i.e. pain intensity, fear, unpleasantness, etc.; Champion et al., 1998; Kuttner & LePage, 1989; McGrath, 1990; McGrath, de Veber, & Hearn, 1985; McMurry, Noel, Chambers & McGrath, 2011). Consequently, it is important to compare children's choices on this type of scale with self-descriptions of crying. A comparison with parental distress ratings is also useful. Such comparison is the purpose of Study 2.

The children were 2 to 6 years old and had been recruited for another study (Peterson et al., 2007). We focus on this age for two reasons. First, there are many occasions in which professionals would like to know about children's distress levels. For example, children as young as 2 or 3 years of age are now being interviewed by police during investigations, and preschool-aged children even testify in court (Goodman, 2006). A child's distress at the time of events that engage the forensic system is often of considerable interest to police officers, judges and juries. Likewise, medical and clinical practitioners are often interested in children's distress at the time of particular target events because it can be used

to guide appropriate treatment. However, less is known about the ability of children this young to communicate about emotionally distressing events, partly because of limitations in vocabulary, cognition and narrative skills (Nelson & Fivush, 2004).¹ Thus, it is particularly important to compare a verbal measure such as used here (descriptions of crying) with different measures. Furthermore, Study 1 showed that younger children exhibited more behavioural distress (crying) and were rated by their parents as being more distressed than were older children by the injury events explored here, which is consistent with research examining children during medical procedures (e.g. Jay et al., 1983; Negayama, 1999).

Method

Participants

A total of 71 children were recruited for this study from the same emergency room as in Study 1. These included 11 2/3-year-olds (7 girls, mean age 3;3), 27 4-year-olds (10 girls, mean age 4;4), 21 5-year-olds (10 girls, mean age 5;4) and 11 6-year-olds (5 girls, mean age 6;5).

Procedure

Recruitment and home interviews were identical with those described previously, except that children were also administered a version of the Faces Pain Scale (Bieri et al., 1990), specifically the four-face version (the first, third, fifth, and seventh faces) used by Steward et al. (1996). (The faces are depicted in Appendix A.) After talking about what each face represented, children were asked to indicate which face represented how upset they had been both at injury and hospital treatment. The Faces Pain Scale was always administered after the children's interviews and thus always after being questioned about how much they had cried. Parents also rated their child's distress on a five-point scale. For present purposes, the last two categories were combined so that parental stress ratings had four levels in analyses, comparable with the number of categories in the modified Faces Pain Scale. Scoring of children's descriptions of crying was identical to Study 1.

Results

Correlations were calculated between children's ratings of distress using the modified version of the Faces Pain

¹Children's language skill, as assessed by the Peabody Picture Vocabulary Test, was unrelated to their Faces Pain Scale scores or the other two measures of distress. Likewise, none of the aspects of temperament measured by the EAS Temperament Survey were related to any of the three measures of distress. Thus, these distress measures seem to be independent of both children's language ability and their temperament. Additional analyses assessing gender also showed no significant relation to any of the distress measures.

Scale, parental ratings of distress and children's self-descriptions of how much they cried. These are shown in Table III. For combined data on all children, Faces Pain Scale ratings are significantly related to both parental ratings of distress and their own self-descriptions of crying. However, looking at the different ages separately, none of the correlations were significant for the 2/3-year-olds. For 4-year-olds, they were significantly related to both of the other measures of distress for the injury event only. In contrast, for the 5/6-year-olds, the Faces Pain Scale was significantly correlated with both of the other measures of distress for the hospital event but only for the children's self-descriptions of crying for the injury event (i.e. not parental ratings of distress). Thus, 2/3-year-olds did not seem to be able to use the Faces Pain Scale effectively, and for the older children, it seemed to depend upon which event they were rating. In contrast, the parental ratings of distress and the child self-descriptions of crying continue to be significantly related for both events.

Discussion of Study 2

In the second study, the modified Faces Pain Scale seemed to be less useful for the youngest children than their self-descriptions of crying. Although this measure was correlated with child self-descriptions of crying as well as parental ratings of their child's distress when all of the 2- to 6-year-olds were combined, it seemed to be useful only for older children. In other words, preschoolers under 4 years of age do not seem to be able to use it effectively. Additional evidence supporting the view that young children's self-descriptions of crying may be more useful than their responses on the Faces Pain Scale comes from research showing little relationship between children's scores on the Faces Pain Scale and memory (Steward et al., 1996). Interestingly, children under age 4 show a parallel inability to use dolls

to recount events (DeLoache & Marzolf, 1995), so perhaps 2- to 3-year-olds' inability to use face drawings to represent themselves reflects a more generalized cognitive ability (such as symbolic representation) that is still poorly developed. Thus, the Faces Pain Scale may have less utility than the other two measures when studying distress as a mediator for various outcomes.

This finding is not entirely surprising in light of a systematic review examining the psychometric properties and interpretability of self-report pain intensity measures among children (Stinson, Kavanagh, Yamada, Gill, & Stevens, 2006). The authors concluded that faces scales (specifically the Faces Pain Scale-Revised; Hicks, von Baeyer, Spafford, van Korlaar, & Goodenough, 2001) are recommended for use with children between the ages of 4 and 12 years. The use of self-report measures with younger children is challenging because of communication barriers (Champion et al., 1998) and can be influenced by emotional, cognitive and/or situational factors (Chambers and Johnston, 2002). Indeed, the cognitive and social abilities required for valid self-report using faces scales changes dramatically over the course of development from the early preschool to school-aged years (Spagrud et al., 2003). As a result, it is recommended that the use of self-report measures of pain (specifically the Pieces of Hurt Tool; Hester, 1979) with these young children be supplemented by the use of validated observational behavioural measures (Stinson et al., 2006); however, these might be impossible to obtain in a naturally occurring highly distressing context. Furthermore, some have argued that young children should be pre-screened for their ability to reliably and validly use self-report scales prior to applying these measures (Besenki, Forsyth, & von Baeyer, 2007).

Although there is evidence to support children's ability to communicate about emotional states from a young age (e.g. Harley & Reese, 1999), affect regulation (Dahl, 2003) and affect recognition (for a discussion, see Ale, Chorney, Brice & Morris, 2010) continue to develop throughout childhood and are not as well developed in very young children. As such, these factors likely also influence these findings.

Table III. Study 2: correlations between children's faces pain scale ratings, parent ratings of child distress and children's self-descriptions of how much they cried

Scale	Age (in years)	Injury		Hospital	
		Parent rating	Child cry	Parent rating	Child cry
Faces	2/3	0.39	0.07	0.27	0.42
	4	0.55**	0.48*	0.12	0.20
	5/6	0.27	0.34*	0.60***	0.58***
	All	0.42***	0.37**	0.34**	0.43***
Parent	2/3	—	0.55*	—	0.85**
	4	—	0.53**	—	0.56**
	5/6	—	0.42*	—	0.65***
	All	—	0.51***	—	0.60***

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

General discussion

When children are interviewed about an injury they had experienced as well as subsequent treatment at a hospital emergency room, they are able to describe what happened in considerable detail (Peterson, 2011; Peterson et al., 2007; Peterson & Whalen, 2001; Tizzard-Drover, & Peterson, 2004). However, the focus of the present study was the way children described their emotional reactions to these events and specifically their descriptions of how much they cried.

The similarity between child descriptions of their own emotional reactions and parent-generated ratings

of child distress suggests that both may have similar relationships to those outcome measures shown to be related to children's emotional distress, namely memory and psychological functioning. Indeed, children's self-descriptions of how much they cried have been shown to have utility in predicting one cognitive outcome measure, namely memory for personal injury events (Peterson, 2010). These results are parallel to some prior research that found parental ratings of child distress predictive of children's poorer memory of similar events, specifically emergency room treatment events (Peterson & Bell, 1996). To our knowledge, children's self-descriptions of crying have not yet been related to other outcome variables that are potentially influenced by child distress.

Overall, the fact that parental ratings of child distress and children's self-descriptions of crying were so similar suggests that children's linguistic descriptions of their emotional responses might be a useful measure of their distress in naturally occurring events. This could be particularly valuable when there are no parents or other observers present who could later rate the child's level of distress or when such observers are unable to do so. Children's reactions to distressing naturally occurring events are also likely to share similarities with those elicited by the sorts of events about which they testify in court, including stressful abusive events. (Note: not all children are distressed at the time of maltreatment.) Thus, understanding the effect of distress in these events could potentially help us understand and assist children in terms of therapeutic treatment as well as their ability to serve as forensic witnesses. Since researchers are limited in the amount of distress they can expose children to in the more controlled environment of the laboratory, the present investigation suggests that children themselves may provide a possible linguistic way of assessing their own levels of distress in naturalistic settings.

In the present study, one version of a Faces Pain Scale was used, and for children who were under 4 years of age, their responses were poorly related to either parental distress ratings or their own descriptions of crying. Although the ratings of children who were 4 years or older on the faces scale were correlated with the other two measures, the correlations were smaller. Thus, even for the older children, their self-descriptions of crying seemed to be a more useful measure. However, our findings are limited in that we used only one version of one scale, and more substantial relationships may well have been found if other measures had been used. Nevertheless, given the large age range employed in the present study, multiple self-report pain assessments would have been necessary. The potential need for different assessment instruments for different ages of children lends further support to the utility of self-reported crying behaviours as a unitary measure of children's retrospective accounts of distress. We chose to include very young children (i.e. 2- and 3-year-olds) in order to draw *preliminary* conclusions about the *potential* utility of

self-reported crying behaviour across a wide age span. However, given the limitations inherent in using faces scales such as the one employed in the present study with these young children, caution is needed in extrapolating results to children at this developmental stage. Indeed, future research is needed prior to making firm conclusions about the utility of a self-report measure of crying among very young children.

Limitations

There are a number of limitations of the present study. First, there were a limited number of children, particularly in Study 2, and this limits one's ability to conduct stable and reliable correlations by age group. Importantly, children were only asked about crying, and some children could have expressed distress in different ways. In the context of stressful events such as invasive medical procedures, behavioural distress (such as crying) is understood as a broad concept and one that encompasses both pain and fear/anxiety (Blount & Loisel, 2009; Katz et al., 1980). Although crying is one behavioural manifestation of children's experience of distress, there are many different ways in which children's behaviour can reflect their experience. Second, although children's self-report of distress is a useful and sometimes the only way to assess their experience of distressing events, there are problems associated with this type of measurement. Self-reports are influenced by social and motivational factors (Champion et al., 1998); therefore, it is likely that the context in which children's self-report was obtained influenced children's reported distress. For example, the degree of social support provided by interviewers (Quas, Wallin, Papini, Lench, & Scullin, 2005) and interviewing techniques (Lamb, Orbach, Hershkowitz, Horowitz, & Abbott, 2007) affect children's reports. Furthermore, there could be moderating factors that influence child distress that were not explored here, such as attachment or narrative skills (Laible & Panfile, 2009; Sales, 2009), the quality of children's previous experiences (Dalquist et al., 1986) and adult behaviours during the painful event (Chambers, Craig, & Bennett, 2002). Additionally, differences in self report of crying may reflect not only differences in children's ability to express the extent to which they cried but also their general ability to express their emotions. Although a measure of emotional expression was not included in the present study, this is an interesting area for future research.

Finally, it is important to note that although younger, preschool-aged children often exhibit and report greater distress and crying than older, school-aged children, this may not be indicative of differences in the amount of pain experienced. As seen in this and other studies, overt manifestations of distress, such as crying, are more typically observed in younger children (Jay et al., 1983; Negayama, 1999). As such, self-report

measures of crying may be more sensitive for children within this younger age range. Future research should include other self-report measures of distress for use with older children that capture distress behaviours that are more likely to be seen at later developmental stages.

Conclusion

The relationship between distress and a host of cognitive and socio-emotional outcomes is complex and difficult to empirically examine. Furthermore, it is difficult to measure children's level of distress, particularly for unexpected and naturally occurring events. The current study proposes a new way of measuring child distress (including pain, anxiety and/or fear) that could provide a valuable measurement option, namely children's self-descriptions of their emotional reactions. These findings suggest that children can indeed provide useful information linguistically and that such information about their

emotional responses to stressful events can be used to explore issues such as the impact of distress on memory, cognition and psychological functioning.

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Appendix

Faces used from the Faces Pain Scale of Bieri et al. (1990).

