
Systematic Review: A Systematic Review of the Interrelationships Among Children's Coping Responses, Children's Coping Outcomes, and Parent Cognitive-Affective, Behavioral, and Contextual Variables in the Needle-Related Procedures Context

Lauren Campbell,¹ MA, Miranda DiLorenzo,¹ BSc, Nicole Atkinson,¹ BA, and Rebecca Pillai Riddell,^{1,2,3} PhD

¹York University, ²Hospital for Sick Children, Toronto Canada, and ³University of Toronto

All correspondence concerning this article should be addressed to Rebecca Pillai Riddell, PhD, The Opportunities to Understand Childhood Hurt (OUCH) Laboratory, Department of Psychology, Faculty of Health, York University, Room 038J Atkinson College Building, 4700 Keele Street, Toronto, Ontario M3J 1P3, Canada. E-mail: rpr@yorku.ca

Received August 11, 2016; revisions received February 1, 2017; accepted February 10, 2017

Abstract

Objective To conduct a systematic review of the interrelationships between children's coping responses, children's coping outcomes, and parent variables during needle-related procedures.

Methods A systematic literature search was conducted. It was required that the study examined a painful needle-related procedure in children from 3 to 12 years of age, and included a children's coping response, a children's coping outcome, and a parent variable. In all, 6,081 articles were retrieved to review against inclusion criteria. Twenty studies were included. **Results** Parent coping-promoting behaviors and distress-promoting behaviors enacted in combination are the most consistent predictors of optimal children's coping responses, and less optimal children's coping outcomes, respectively. Additional key findings are presented. **Conclusions** Children's coping with needle-related procedures is a complex process involving a variety of different dimensions that interact in unison. Parents play an important role in this process. Future researchers are encouraged to disentangle coping responses from coping outcomes when exploring this dynamic process.

Key words: children; coping; pain; parents; systematic review.

Several systematic reviews have examined parent-related variables and pediatric needle pain, including nonpharmacological (Pillai Riddell et al., 2015) and procedural and physical pain management techniques (Taddio et al., 2015), as well as child and parent variables related to children's anticipatory distress (Racine et al., 2016). To our knowledge, the construct of children's coping in relation to the parent in this context has yet to be examined in a systematic review.

Lazarus (1993) defines coping as a goal-directed process in which thoughts and behaviors are oriented toward the goals of resolving the course of stress as well as regulating one's response to stress. Coping is considered a complex and dynamic process in which one's thoughts and behaviors are continuously changing in response to specific demands appraised as stressful (Lazarus & Folkman, 1984; Pearlin & Schooler, 1978).

Despite the importance of studying children's coping with painful needle-related procedures, the question of

how to define coping in this context has presented itself as a major issue in the field of pediatric psychology, with researchers exhibiting discrepant views on what behaviors constitute this construct (Manne, Bakeman, Jacobsen, & Redd, 1993). In the literature, the term “coping” has been used to not only reflect behaviors that reduce distress but also to reflect the actual reduction of distress. For example, in discussing this “knotty conceptual issue,” Blount et al. (1997) defined children’s pain coping as specific behaviors that are inconsistent with distress. On the other hand, other researchers have conceptualized children’s pain coping using measures of distress, or lack thereof, as indicators of coping (Taylor, Sellick & Greenwood 2011).

In response to the inconsistencies in the pediatric pain and coping literature, Rudolph, Dennig, & Weisz (1995) published a conceptual review and argued that, for the field to move forward, a clear differentiation be made between “coping responses” and “coping outcomes.” The former was defined as intentional physical or mental actions initiated in response to a perceived stressor (e.g., distraction, deep breathing) and the latter was defined as the specific consequences of the coping responses (e.g., crying or screaming). This differentiation is in line with the broader coping literature (Lazarus & Folkman, 1984). Despite this initiation to move the field forward, an empirical lag in the field of pediatric pain remains, with few studies to date explicitly acknowledging this differentiation. From an implication perspective, it follows logically that findings from the pediatric pain and coping literature may be limited, as different aspects of this complex construct have not been clearly and consistently operationalized.

In addition to the need to differentiate between coping responses and coping outcomes, coping must also be viewed as a relational process, in which the individual and his/her environment participate in a dynamic, mutually influential relationship (Folkman, 1984). Arguably, one of the most important environmental factors to consider in the context of children’s coping is that of the parent (Compas, 1987), which, in the pediatric pain literature, has been put forth as paramount (Pillai Riddell, Racine, Craig, & Campbell, 2013). A helpful theoretical framework for considering the role of the parent in this context is the Proximal Distal Model of Coping and Distress, which posits that parent cognitive-affective and behavioral variables (e.g., negative affectivity, coping style, behaviors during the procedure) influence children’s coping responses and outcomes (i.e., distress) during acute medical procedures (Blount, Bunke, & Zaff, 1999).

Current Review

The overarching goal of the present study was to organize and synthesize the coping with pain from

needle-related-procedure literature in the context of parental factors. Thus, our aim was to conceptually organize previous literature according to the specific relationships examined between children’s coping responses, children’s coping outcomes, and parent cognitive-affective, behavioral, and contextual variables. Accordingly, before synthesis, coping variables were clearly categorized (Supplemental Table S1) as either an outcome or a response. In addition, whenever possible, in-text descriptions were included to indicate whether a coping response was discrete (i.e., one response) or a composite (i.e., multiple responses). The same was done for behavioral parent variables. The literature did not substantiate categorizing children’s coping outcomes in a similar manner. Based on the literature, children’s coping outcomes were classified as self-report, other-report, behavioral, or physiological.

Methods

Search Strategy

The OVIDSP platform was used to run the search strategy in MEDLINE and EMBASE; ProQuest was used for PsycINFO; EBSCOHost was used for CINAHL. Articles indexed from inception to January 12, 2015 were included in the initial search, and the search was updated in January 2016. There were no limitations in terms of publication dates. Search terms related to coping, procedural pain, and children were systematically paired (Supplementary Appendix S1). Search terms used to identify studies for inclusion were determined by the authors based on their content expertise in this area and in consultation with a librarian from a tertiary hospital that has specialized training in conducting systematic reviews. Additional studies were identified from references lists of included studies. The present review adhered to an *a priori* protocol according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009). The review protocol was registered on the international prospective register of systematic reviews PROSPERO Web site before data extraction (registration number CRD42016035673).

Inclusion/Exclusion Criteria and Study Selection

To be included, it was required that the study examined a painful needle-related procedure in children from 3 to 12 years of age, included measures of a children’s coping response (e.g., distraction, information-seeking, catastrophizing), a children’s coping outcome (e.g., self-reported pain-related distress, parent report of anxiety, cortisol levels), and a parent cognitive-affective, behavioral, or contextual variable analyzed in relation to one or both of the aforementioned two children’s coping variables. Parent behavioral variables could include those from experimental studies

attempting to modify parent behaviors through training. This was deemed appropriate, as excluding these studies would have resulted in the omission of important studies relevant to the goals of this study. Exclusion criteria for studies were not a needle-related procedure, incorrect age (i.e., not children 3–12 years), and published in a non-English language. Conference abstracts, editorials, newsletters, dissertations, and qualitative studies were also excluded. Given the substantially different pain experience arising from postoperative and chronic pain, these studies were excluded. Observational studies and controlled trials were considered eligible for the review. [Supplementary Figure S1](#) presents the included study flow chart following the PRISMA guidelines. Two reviewers (L.C., N.A.) screened the results from initial searches and worked with the senior author (R.P.R.) to hone the search strategy and outcome focus. Twenty percent of studies were double coded for reliability purposes. Percentage agreement between the reviewers was 99.6%. Any disagreements between reviewers were resolved through consensus.

Data Extraction

Two reviewers (L.C., M.D.) conducted data extraction independently for all included studies using a structured form ($n = 20$). One hundred percent of the studies were extracted by both reviewers given that every coping variable had to be classified as either a response or an outcome. Discrepancies were minimal and resolved through consensus.

Quality Assessment

Because a gold-standard measure is not available for assessing the methodological quality of observational studies ([Sanderson, Tatt, & Higgins, 2007](#)), a modification of the checklists used by [Downs and Black \(1998\)](#) and [Crombie \(1997\)](#) was used ([Supplementary Appendix S2](#)). This modified checklist has been previously used in a systematic review on observational studies ([Macfarlane, Glenny, & Wothington, 2001](#)) that examined the prevalence and associated risk factors for orofacial pain. Percentage agreement between the two principal evaluators was 94.3%. Disagreements were discussed via consensus. Twenty items pertaining to methodological criteria were scored as “yes” (1), “no” (0), or “unable to determine.” Positively scored criteria were summed to obtain a total quality score (max = 20) for each study. Examples of items include the following: “Is the design of the study described?”; “was the sample size justified?”

Data Synthesis

Owing to the range of different outcome measures, participant ages, types of needle-related procedures, and types of study designs (i.e., experimental vs.

observational), a meta-analytic approach was not appropriate for this review. Instead, a narrative synthesis framework ([Popay et al., 2005](#)) was used. Data of included studies were classified in three different ways and subsequently synthesized.

First, variables were classified as a children’s coping response, a children’s coping outcome, or a parent cognitive-affective, behavioral, or contextual variable. These classifications were mutually exclusive. Children’s coping responses were operationalized as any cognitive and/or behavioral efforts to manage the distress associated with the procedure and were further subclassified as behavioral or cognitive. Children’s coping outcomes were operationalized as distress-related variables (e.g., pain, fear) obtained before, during, or after the painful procedures and subclassified as self-report, other-report, behavioral, or physiological. Parent cognitive-affective, behavioral, or contextual variables were operationalized as any variables fitting within these categories that were analyzed in relation to children’s coping responses and/or coping outcomes and were subclassified as cognitive-affective, behavioral, or contextual.

Based on the available literature, studies were organized according to three relationship clusters (Children’s Coping Responses with Children’s Coping Outcomes; Parent Cognitive-Affective, Behavioral, and Contextual Variables with Children’s Coping Responses; Parent Cognitive-Affective, Behavioral, and Contextual Variables with Children’s Coping Outcomes) and then synthesized according to their primary analytic technique (i.e., bivariate correlations, sequential analyses, regression analyses, and/or between group analyses). In the case of “Parent Cognitive-Affective, Behavioral, and Contextual Variables with Children’s Coping Outcomes,” the studies were further synthesized according to how the children’s outcome was measured: self-report, other-report, behavioral, or physiological. For each of the three relationship clusters, age, health status of the sample, sample size, and quality score for each study were examined to add further insight to the synthesized results. This was done by examining the findings within a given relationship cluster ([Supplemental Tables S1–S9](#)), in conjunction with [Table I](#), which provides the data on age, health status of the sample, etc. Articles were differentiated according to each of these factors (i.e., as high vs. low quality, clinical vs. healthy samples) and reexamined to determine whether the synthesis differed according to these divisions. In the face of conflicting results, conclusions were made based on what the majority of studies found.

Results

Studies Included

After removal of duplicates, 6,081 articles were identified. Two reviewers screened the titles and abstracts

Table I. Study Characteristics

Study	Country	N	Age	Location	Needle-related procedure	Type of study	Health status of sample	If clinical, condition	Quality score
Blount (1989)	USA	23	5–13	Hospital	BMA/LP	Observational	Clinical	ALL	11
Blount (1990)	USA	22	5–13	Hospital	BMA/LP	Observational	Clinical	ALL	12
Blount (1991)	USA	22	5–13	Hospital	BMA/LP	Observational	Clinical	ALL	12
Blount (1992)	USA	60	3–7	Primary health care clinic	Immunization	Experimental	Healthy		14
Blount (1997)	USA	77	4–7	Primary health care clinic	Immunization	Observational	Healthy		12
Blount (2001)	USA	60	3–7	Primary health care clinic	Immunization	Observational	Healthy		16
Cohen (1997)	USA	92	4–6	Primary health care clinic	Immunization	Experimental	Healthy		15
Cohen (2000)	USA	55	4–6	Primary health care clinic	Immunization	Observational	Healthy		16
Cohen (2002)	USA	61	3–7	Primary health care clinic	Immunization	Experimental	Healthy		16
Cohen (2015)	USA	90	4–6	Primary health care clinic	Immunization	Experimental	Healthy		14
Frank (1995)	USA	77	4–7	Primary health care clinic	Immunization	Observational	Healthy		15
Gonzalez (1989)	USA	47	1–8	Primary health care clinic	Immunization	Experimental	Healthy		15
Gonzalez (1993)	USA	42	3–7	Primary health care clinic	Immunization	Experimental	Healthy		15
Manimala (2000)	USA	82	4–6	Primary health care clinic	Immunization	Experimental	Healthy		15
Manne (1992)	USA	43	3–9	Hospital	Venipuncture	Observational	Clinical	Cancer	15
Manne (1994)	USA	35	3–9	Hospital	Venipuncture	Observational	Clinical	Cancer	10
McCarthy (2010)	USA	542	4–10	Hospital	IV insertion	Observational	Healthy		16
Spagrud (2008)	Canada	55	3–18	Hospital	Venipuncture	Observational	Clinical	Cancer	16
Taylor (2011)	Australia	66	3–12	Hospital	Venipuncture	Observational	Clinical	Acute illness	15
Vervoort (2011)	Belgium	44	8–15	Hospital	Finger prick	Observational	Clinical	Type I diabetes	14

Note. BMA/LP = Bone marrow aspiration/lumbar puncture; ALL = Acute lymphocytic leukemia.

according to the inclusion/exclusion criteria. Seventy-eight full-text articles were reviewed of which 19 studies fulfilled the inclusion criteria. As aforementioned, the systematic search was rerun in January 2016 to update the review. This search yielded 801 new articles, one of which ended up meeting criteria for inclusion. Thus, 20 studies in total ($n = 1,595$ participants) were included in this review.

Study Characteristics

Demographics

A comprehensive overview of the included studies is presented in Table I. Information regarding the study's country of origin, sample size, age range, location, type of needle-related procedure, type of study, and health status of the sample is presented. For studies where the health status of the sample was clinical, the specific clinical condition is listed. Of note, a small number of studies ($n = 5$) had age ranges that went beyond 12 years of age (i.e., 3–18 years, 8–15 years). These studies were still included because the authors did not want to miss relevant data pertaining to

children in the sample whose ages fell within the target age range.

In summary, the vast majority of studies (85%) were from the United States. The majority of studies were observational (70%) as opposed to experimental (30%). About half the studies encompassed a wide developmental age range (i.e., age differences spanning from 6 to 15 years), and about half of the studies were focused on the preschool/early elementary age range (i.e., 3–7 years). Sixty percent of the studies were composed of healthy samples undergoing routine procedures (predominantly immunizations) and 40% of the studies consisted of clinical samples undergoing a wider range of procedures. All studies were cross-sectional in design. Only three studies (Blount et al., 1990; Gonzalez et al., 1989; Manne et al., 1992; Manne et al., 1994) took the phase of the needle-related procedure into account for analytic purposes.

Quality of Studies

The final column in Table I presents the quality assessment scores for each study. Scores ranged from 10/20

to 16/20. The mean, median, and mode were 14.2, 15, and 15, respectively. The authors who previously used this measure (Macfarlane, Glenny, & Wothington, 2001) used the median score as their cutoff point for “high” versus “low” quality but cautioned that this cutoff point was arbitrary. In line with recommendations from the Cochrane Handbook for Systematic Reviews of Interventions (Higgins & Green, 2008), the present authors used their judgment to critically examine the items endorsed on the checklist for each study, followed by a conceptual discussion. This resulted in the decision that studies with quality scores ≥ 15 be considered “higher” in quality and those with scores ≤ 15 be considered relatively “lower,” as the former group tended to only include endorsements of items that were not considered as methodologically concerning as others (e.g., points were lost because authors did not state that the sample was representative of the populations; did not describe participant follow-up).

Interrelationships Between Children’s Coping Responses, Children’s Coping Outcomes, and Parent Cognitive-Affective, Behavioral, and Contextual Variables

Below is a summary of the interrelationships within the three relationship clusters. [Supplementary Tables S1–S9](#) summarize study findings pertaining to the interrelationships between children’s coping responses, children’s coping outcomes, and parent cognitive-affective, behavioral, and contextual variables. [Supplementary Table S10](#) serves as a detailed catalogue of each study’s operationalization of the aforementioned variables.

Relationship Cluster I: Children’s Coping Responses and Children’s Coping Outcomes

Bivariate Correlations

Broad behavioral composite measures of children’s coping responses (i.e., measures that summed multiple coping responses such as deep breathing, nonprocedural talk, making coping statements, and using humor) were generally related to improved coping outcomes. In two of three studies (Blount et al., 1997; Blount et al., 2001), broad behavioral composite measures of children’s coping responses were related to more optimal coping outcomes, while, in the other study, the same broad behavioral composite measure was not (Frank et al., 1995). Discrete behavioral child coping responses (i.e., distraction, deep breathing, non-procedure-related activity, and blowing into a party blower) had mixed findings within and across the two studies that examined these variables (Manne et al., 1992; Manne et al., 1994), at times relating to more improved coping outcomes, while at other times being unrelated. Findings pertaining to the cognitive

coping response of children’s catastrophizing were mixed based on outcome. Specifically, child pain catastrophizing was related to higher levels of children’s fear, but unrelated to child- and parent-report of pain (Vervoort et al., 2011). Pain catastrophizing is defined as an exaggerated negative orientation instigated by actual or anticipated pain experience, in which the threat value or seriousness of one’s pain sensations is magnified or exaggerated by the individual (Sullivan et al., 2001). [Supplementary Table S1](#) summarizes the aforementioned findings.

Relationship Cluster II: Parent Cognitive-Affective, Behavioral, and Contextual Variables and Children’s Coping Responses

Bivariate Correlations

Broad behavioral composite measures of parent “coping-promoting behaviors” (i.e., measures that summed multiple parent behaviors such as nonprocedural talk, humor, and commands to use coping strategies) were consistently positively related to broad behavioral composite measures of children’s coping responses (Blount et al., 1997; Frank et al., 1995). Broad behavioral composite measures of parent “distress-promoting behaviors” (i.e., measures that summed multiple parent behaviors such as reassuring, criticizing, apologizing, giving control) had mixed findings. Specifically, one study found a negative relationship with broad behavioral composites measures of children’s coping responses (Blount et al., 2001), while another study found no relationship (Frank et al., 1995). Discrete (i.e., unitary) parent coping-promoting behaviors generally related to higher levels of the parallel children’s coping response, that is, parents coaching children to use a party blower related to higher frequencies of children using the party blower, parent non-procedure-related talk related to higher frequencies of children engaging in non-procedure-related talk, etc. (Blount et al., 1990; Manne et al., 1994). Discrete parent behaviors comprising the aforementioned coping-promoting and distress-promoting composites were unrelated to broad behavioral composite measures of children’s coping responses (Cohen et al., 2000). The cognitive-affective parent variables of catastrophizing about their child’s pain and fear during the procedure were unrelated to the discrete children’s coping response of catastrophizing (Vervoort et al., 2011), and the cognitive-affective parent variable of trait anxiety was unrelated to a broad behavioral composite measure of children’s coping responses (Frank et al., 1995). [Supplementary Table S2](#) summarizes the aforementioned findings.

Sequential Analyses

Sequential analyses capture moment-to-moment temporal relations between variables (Manne et al., 1992).

As opposed to correlations, sequential analyses provide insight into whether the relationship between two variables is unidirectional or bidirectional (Spagrud et al., 2008). A broad view of the studies that used sequential analysis (Blount et al., 1989; Blount et al., 1991; Manne et al., 1992; Spagrud et al., 2008; Taylor et al., 2011) was taken, as specific synthesis was not possible owing to the multiplicity of different directions and combinations. Overall, a bidirectional relationship between parent behaviors and children's coping responses was suggested across studies. However, children's coping responses were more likely to follow parent behaviors than vice versa. [Supplementary Table S3](#) summarizes the aforementioned findings.

Multiple Regressions/Partial Correlations

In terms of the relationships between parent cognitive-affective, behavioral, and contextual variables and broad behavioral composite measures of children's coping responses, one study found that neither parent coping-promoting nor distress-promoting behavioral composite measures explained unique variance when nurse behaviors were accounted for (Cohen et al., 2002). On the other hand, Frank et al. (1995) found that a parent coping-promoting behavioral composite measure explained unique variance (positive relationship) in a broad behavioral composite measure of children's coping responses when accounting for medical staff behaviors and parent trait anxiety. When controlling for gender, Spagrud et al. (2008) found the same relationship as above, in addition to finding that a parent distress-promoting behavioral composite measure predicted unique negative variance in a broad behavioral composite measure of children's coping responses. In one study that examined the relationship between a parent variable and a discrete behavioral child coping response, parent coaching the child to breathe was related to higher levels of the child breathing when controlling for the age of the child (Manne et al., 1994). [Supplementary Table S4](#) summarizes the aforementioned findings.

T-tests/analyses of variance

In terms of studies that examined a causal relationship between parent variables and discrete measures of children's coping responses using experimental designs, parent behavioral training programs led to greater children's use of a party blower (Blount et al., 1992) and deep breathing (Cohen et al., 2015), but did not lead to changes in levels of child distraction (Cohen et al., 2015), information-seeking (Gonzalez et al., 1989; Manimala et al., 2000), verbal resistance (Gonzalez et al., 1993; Manimala et al., 2000), or requesting emotional support (Gonzalez et al., 1993; Manimala et al., 2000). Findings were split pertaining

to broad behavioral composite measures of children's coping responses, with one study finding that a parent training program did not lead to higher children's coping response composite scores (Cohen et al., 1997) and the other study finding a causal relationship (Manimala et al., 2000). The contextual parent variable of presence versus absence did not have a causal relationship with the discrete child coping responses of information seeking (preprocedure or during the procedure), verbal resistance (preprocedure or during the procedure), or seeking emotional support during the procedure. However, parent absence predicted higher levels of children seeking emotional support before the needle-related procedure (Gonzalez et al., 1989). [Supplementary Table S5](#) summarizes the aforementioned findings.

Relationship Cluster III: Parent Cognitive-Affective, Behavioral, and Contextual Variables and Children's Coping Outcomes

Bivariate Correlations

Three studies examined the bivariate relationships between broad behavioral composite measures of parent "coping-promoting behaviors" and children's coping outcomes. Two of the three studies found no relationship (Blount et al., 1997; Frank et al., 1995) and one of the three obtained mixed findings (Blount et al., 2001), depending on the coping outcome type of measurement. Four studies examined the bivariate relationships between broad behavioral composite measures of parent "distress-promoting behaviors" and children's coping outcomes. Two studies found a positive relationship (i.e., related to less optimal children's coping outcomes) across all coping outcomes (Cohen et al., 2002; Frank et al., 1995) and the two other studies found the same relationship for the vast majority of children's coping outcomes (Blount et al., 1997; Blount et al., 2001). Discrete parent coping-promoting behaviors such as coaching a child to breathe, commanding a child to use a coping strategy, and using non-procedure-related talk were generally unrelated to children's coping outcomes (Cohen et al., 2000; Manne et al., 1994). Discrete parent distress-promoting behaviors such as apologizing, verbal reassurance, criticism, and empathy were generally related to less optimal coping outcomes (Cohen et al., 2000; Manne et al., 1992). Findings pertaining to the cognitive-affective parent variables of catastrophizing about their child's pain and fear during the procedure were mixed. Specifically, both were unrelated to child reports of pain, and related to higher levels of child-reported fear, and parent reports of child pain (Vervoort et al., 2011). [Supplementary Table S6](#) summarizes the aforementioned findings.

Sequential Analyses

For the same rationale as aforementioned, a broad synthesis is provided. In summary, a bidirectional relationship between parent behaviors and children's coping outcomes was indicated. Verbal reassurance emerged as the most likely parent behavior to both follow and precede less optimal child coping outcomes (Blount et al., 1989; Blount et al., 1991; Manne et al., 1992; Taylor et al., 2011). [Supplementary Table S7](#) summarizes the aforementioned findings.

Multiple Regressions/Partial Correlations

Owing to the large number of analyses conducted pertaining to this relationship (i.e., most studies conducted several regressions), findings reported below have been organized according to the type of children's outcome variable used as an outcome measure (i.e., self-report, other-report, behavioral, or physiological). [Supplementary Table S8](#) summarizes the findings below.

Children's Coping Outcome: Self-Report. Broad behavioral composite measures of parent coping-promoting behaviors were consistently unrelated to child self-report of coping outcomes such as fear of future procedures and pain (Cohen et al., 2002; Spagrud et al., 2008). Broad behavioral composite measures of parent distress-promoting behaviors were consistently related in a less optimal manner to these variables (Cohen et al., 2002; Spagrud et al., 2008). The discrete parent coping-promoting behavior of distraction was unrelated to child self-report of pain (McCarthy et al., 2010). In terms of cognitive-affective parent variables, parents catastrophizing about their child's pain had varied findings, as it was related to higher levels of child self-report of fear but not pain (Vervoort et al., 2011). Moreover, parent expectation of child distress was related to higher levels of child self-report of pain (McCarthy et al., 2010).

Children's Coping Outcome: Other-Report. All studies used parent report of child pain. Broad behavioral composite measures of parent coping-promoting behaviors suggested a positive relationship with parent report of child pain (Cohen et al., 2002) as well as no relationship (Spagrud et al., 2008). Broad behavioral composite measures of parent distress-promoting behaviors were also both related (Spagrud et al., 2008) and unrelated to parent report of child pain (Cohen et al., 2002). In the case of Spagrud et al. (2008), higher levels of parent distress-promoting behaviors related to higher parent report of children's pain. The cognitive-affective parent variable of catastrophizing about their child's pain was related to higher parent report of children's pain (Vervoort et al., 2011).

Children's Coping Outcome: Behavioral. Broad behavioral composite measures of parent coping-promoting behaviors were unrelated to behavioral

distress in two studies (Frank et al., 1995; Spagrud et al., 2008) and related to higher levels of behavioral distress in one study (Cohen et al., 2002). Broad behavioral composite measures of parent distress-promoting behaviors were consistently related to higher levels of behavioral distress (Cohen et al., 2002; Frank et al., 1995; Spagrud et al., 2008). The discrete parent coping-promoting behavior of distraction was unrelated. In terms of cognitive-affective parent variables, parent trait anxiety was unrelated (Frank et al., 1995), whereas parent expectation of child distress was both unrelated (Spagrud et al., 2008) and positively related to children's behavioral distress (McCarthy et al., 2010).

Children's Coping Outcome: Physiological. One large study examined physiological measures. The discrete parent coping-promoting behavior of distraction was unrelated to child cortisol levels (McCarthy et al., 2010). The cognitive-affective parent variable of perception of child distress the morning of the procedure was related to higher levels of child cortisol. The authors used child cortisol levels to operationalize biological distress.

T-tests/analyses of variance

A number of studies used an experimental design to examine a causal relationship between parent behavioral variables and children's coping outcomes. As a whole, parent training on coaching children to cope did not consistently predict more optimal children's coping outcomes within and across studies, spanning across self-report, other-report, and physiological domains (Blount et al., 1992; Cohen et al., 1997, 2015; Gonzalez et al., 1993; Manimala et al., 2000). However, several of these studies did observe at least one causal relationship (in an optimal direction) with behavioral measures of children's coping outcomes (Blount et al., 1992; Gonzalez et al., 1993; Manimala et al., 2000). The contextual parent variable of presence versus absence showed mixed results, depending on the type of children's outcome measured (Gonzalez et al., 1989). [Supplementary Table S9](#) summarizes the aforementioned findings.

Discussion

This systematic review serves to help inform the field by offering four key findings that emerged regardless of age, health status of the sample, sample size, and quality of each study. First, combinations of parent behaviors (for better or for worse) are more predictive of children's coping responses and outcomes than are individual parent behaviors alone. Second, parent coping-promoting behaviors enacted in combination are the most consistent predictors of optimal children's coping responses, and parent

distress-promoting behaviors enacted in combination are the most consistent predictors of children's distress (i.e., less optimal coping outcomes). Third, less optimal parent cognitive-affective variables predict less optimal cognitive-affective children's coping outcomes, and this finding is most consistent for parent negative expectation of child distress. Finally, parent verbal reassurance is a suboptimal parent behavior that appears to have a cyclical relationship with children's distress, whereby verbal reassurance occurs both before and after children's distress.

Relationship Cluster I: Children's Coping Responses and Children's Coping Outcomes

Composite measures of children's coping responses combining an assortment of coping behaviors were most consistently linked to more optimal children's coping outcomes. Thus, it appears that children who use a variety of coping responses fare the best in terms of levels of distress. In the cognitive domain, children's catastrophizing appeared to be differentially related to more negative emotional (i.e., fear) versus sensory (i.e., pain from the physical stimulus) sequelae of the needle-related procedure. This pattern of findings did not vary based on age, health status of the sample, sample size, or quality of each study.

Relationship Cluster II: Parent Cognitive-Affective, Behavioral, and Contextual Variables and Children's Coping Responses

Parent "coping-promoting behaviors" (i.e., nonprocedural talk, humor, commands to use coping strategies) engaged in combination as well as individually were consistently associated with children's use of optimal coping responses that "paralleled" the parents' behaviors, with this relationship persisting when accounting for a range of other factors (contextual, child demographic, and parent cognitive-affective). A particularly interesting finding was that cognitive-affective parent variables such as catastrophizing about their child's pain, fear during the procedure, and having an anxious predisposition were unrelated to children's coping responses. These findings suggest that what parents do in the distressing context of needle-related procedures (particularly pertaining to constructive "coping-promoting behaviors" enacted toward their child) is more influential from a child coping response perspective than how parents may be feeling about or perceiving the stressful situation involving their children. In terms of parent training programs, these appear particularly helpful for promoting children's breathing-related coping responses. Finally, the relationship between parent behaviors and children's behavioral coping responses appears to be bidirectional. As with Relationship Cluster II, these patterns of findings did

not vary when considering age, health status of the sample, sample size, or quality of each study.

Relationship Cluster III: Parent Cognitive-Affective, Behavioral, and Contextual Variables and Children's Coping Outcomes

Composite measures of parent "distress-promoting behaviors" composed of a range of different behaviors were most consistently associated with less optimal children's coping outcomes, with this relationship persisting when controlling for a range of other factors (contextual, child demographic, and parent cognitive-affective). Within the domain of "distress-promoting" behaviors, parent verbal reassurance consistently emerged as a key discrete behavior linked in a bidirectional manner (i.e., parent to child; child to parent) with less optimal children's coping outcomes. Findings pertaining to cognitive-affective parent variables were particularly nuanced, based on type of parent variable, type of coping outcome, as well as the health status and age range of the sample. Synthesizing these factors, it appears that the link between parent cognitive-affective variables and children's coping outcomes is strongest when the child coping outcomes "parallel" the parent variable (i.e., are also "cognitive-affective," such as children's fear or parent perception of children's pain, rather than children's actual report of pain from the physical stimulus). Another interesting pattern was that the most consistent link between cognitive-affective parent variables (i.e., spanning across self-report, behavioral, and physiological child coping outcomes) was when parents had negative expectations about their children's distress, their child had more distress. A possible explanation could be that parents with less positive expectations may be acting in less constructive/supportive manners toward their children, thus contributing toward greater child distress. Findings from experimental studies suggest that parent training programs can be helpful for reducing behavioral indicators of child distress. This finding provides further support for the use of multidimensional pain assessment measures (i.e., that include a behavioral component), rather than just self- or other-report. As with Relationship Clusters I and II, these patterns of findings did not vary when considering age, health status of the sample, sample size, or quality of each study.

Clinical Implications

Parents and medical professionals should be encouraged to support children in using a variety of coping responses (i.e., deep breathing, nonprocedural talk, making coping statements, and using humor) during needle-related procedures. Not only do these behaviors used in conjunction appear to be beneficial, but

providing a variety of options to children will likely be helpful in what can be an overwhelming context. Parents should be encouraged and empowered to engage in a variety of coping-promoting behaviors and taught explicitly to avoid distress-promoting behaviors. These recommendations can be applied by health care professionals not only during the procedures, but also proactively by way of parent training programs as well as other instructional materials (e.g., pamphlets, DVDs). It may be particularly helpful to inform parents who appear anxious, fearful, or who tend to catastrophize of the benefits of engaging in coping-promoting behaviors and support them in engaging in these behaviors. Additionally, parent negative expectation of child distress should be screened for and, in relevant cases, attempts should be made by health care practitioners to work with parents to promote more positive expectations (i.e., through discussion with parents and reminder of the strategies that can be used to support children's coping).

Limitations

The vast majority of studies were American (95%), many of which were from an affiliated group of researchers. Thus, the generalizability of findings from the present review may be limited. Additionally, the wide age ranges in the majority of studies may have resulted in important developmental differences being missed. Moreover, the lower quality of several studies must be taken into consideration, as well as that all studies were cross-sectional in design. Finally, because the study focused on the relationship of parent variables with children's coping, studies were required to include a children's coping response, a children's coping outcome, and a parent variable. Accordingly, studies that included two of the three but not all three variables were not included. As such, not all studies in the literature with informative findings pertaining to each of the three individual relationships were included.

Directions for Future Research

In light of the findings from the present review, several recommendations are put forth. First, renewing classic criticisms from previous reviews, future researchers are encouraged to move away from simply using "coping" as a catch-all term, and explicitly disentangle coping responses from coping outcomes. Second, future studies should consider analyzing the relationships between children's coping responses, coping outcomes, and parent variables according to different phases of the needle-related procedure (i.e., before, during, and after the procedure). Doing so may facilitate a more nuanced understanding of the complex and dynamic processes involved. Third, future research should be composed of samples with tighter

age ranges to account for the steep cognitive and behavioral developmental trajectory that occurs across childhood and the differential role of parents in coping from infancy to adolescence. Moreover, when examining findings across our results tables and considering patterns among age, it was hard to find patterns owing to paucity of data. This may reflect the lack of literature rather than an actual reflection of lack of age patterns.

Novel directions for future research should include adopting a more *developmental* conceptualization of children's coping (Skinner & Zimmer-Gembeck, 2007) by concurrently examining other developing subsystems that may underlie this construct (i.e., cognition, language, attention) as infants transition from being wholly regulated from distress by parents to autonomous self-regulation in adolescence.

Supplementary Data

Supplementary data can be found at: <http://www.jpepsy.oxfordjournals.org/>.

Acknowledgments

The authors thank Cheri Nickel and Alana Marson for performing the data searches, and Jordana Waxman for methodological consultation.

Funding

This research was funded by awards to Dr Pillai Riddell from the Canadian Foundation for Innovation, and salary support from her inaugural York Research Chair in Pain and Mental Health. Ms Campbell received awards from the Canadian Institutes of Health Research and is a recipient of the Meighen Wright Graduate Scholarship in Maternal-Child Health and the Ontario Mental Health Foundation (OMHF) Research Studentship. Ms DiLorenzo is a recipient of the Meighen Wright Graduate Scholarship in Maternal-Child Health and the Ontario Graduate Scholarship (OGS). Ms Campbell and Ms DiLorenzo are trainee members of Pain in Child Health (PICH), a strategic research training initiative of the Canadian Institutes of Health Research.

Conflicts of interest: None declared.

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