PAIN® 154 (2013) 813–823

PAIN®

www.elsevier.com/locate/pain

A cross-sectional examination of the relationships between caregiver proximal soothing and infant pain over the first year of life

Lauren Campbell [a], Rebecca Pillai Riddell [a,b,c,*], Hartley Garfield [b,c], Saul Greenberg [b,c]

[a] York University, Toronto, Canada
[b] Hospital for Sick Children, Toronto, Canada
[c] University of Toronto, Toronto, Canada

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

ARTICLE INFO

Article history:
Received 9 August 2012
Received in revised form 29 December 2012
Accepted 7 February 2013

Keywords:
Immunization
Infant
Pain management
Parent
Regulation
Soothing

ABSTRACT

Although previous research has examined the relationships between caregiver proximal soothing and infant pain, there is a paucity of work taking infant age into account, despite the steep developmental trajectory that occurs across the infancy period. Moreover, no studies have differentially examined the relationships between caregiver proximal soothing and initial infant pain reactivity and pain regulation. This study examined how much variance in pain reactivity and pain regulation was accounted for by caregiver proximal soothing at 4 routine immunizations (2, 4, 6, and 12 months) across the first year of life, controlling for preneedle distress. One latent growth model was replicated at each of the 4 infant ages, using a sample of 760 caregiver–infant dyads followed longitudinally. Controlling for preneedle infant distress, caregiver proximal soothing accounted for little to no variance in infant pain reactivity or regulation at all 4 ages. Preneedle distress and pain reactivity accounted for the largest amount of variance in pain regulation, with this increasing after 2 months. It was concluded that within each immunization appointment across the first year of life, earlier infant pain behaviour is a stronger predictor of subsequent infant pain behaviour than caregiver proximal soothing. Given the longer-term benefits that have been demonstrated for proximal soothing during distressing contexts, caregivers are still encouraged to use proximal soothing during infant immunizations.

1. Introduction

The archaic view that infants are relatively insensitive to pain has been refuted numerous times over the past 3 decades. It is now known that pain in early infancy can have lasting consequences [24,27,46–48]. Recognizing the crucial importance of the caregiver to the infant in pain [37], research is beginning to focus on caregiver pain management behaviours during infant immunizations.

Whereas distraction [8,15,17,19] has been associated with decreased pain-related distress and verbal reassurance [8,14,42,45] has been associated with increased pain-related distress, findings pertaining to proximal soothing (eg, rocking or hugging the infant) have been less clear.

Although several studies have found that proximal soothing is either associated with, or causes, decreased pain-related distress [8,12,20,21], one study found that proximal soothing was only effective when combined with other caregiving behaviours [29], and another study found that proximal soothing was related to prolonged distress regulation [6]. However, this latter study measured distress regulation and proximal soothing concurrently (opposed to the former studies which were all either randomized controlled trials or used lag sequential analysis). Thus, it can be speculated that the timing of proximal soothing might play a role in the direction (positive/negative) of the relationships between proximal soothing and infant pain.

Interestingly, despite the steep developmental trajectory that occurs across the infant's first year [35–37], including that of caregiver–infant interactions [11,13], little research on caregiver proximal soothing has taken infant age into account. Accordingly, researchers are behooved to make more fine-grained comparisons within this unique period of development.

The differentiation between pain *reactivity* and pain *regulation* as qualitatively different phases of an infant's pain experience has recently been brought into the field [5]. Whereas *reactivity*

* Corresponding author. Address: The Opportunities to Understand Childhood Hurt (OUCH) Laboratory, York University, Department of Psychology, Faculty of Health, Room 038J Atkinson College Building, 4700 Keele Street, Toronto, ON, Canada M3J 1P3. Tel.: +1 416 736 2100x20177; fax: +1 416 736 5814.
E-mail address: rpr@yorku.ca (R. Pillai Riddell).

0304-3959/$36.00
http://dx.doi.org/10.1016/j.pain.2013.02.006

has been defined as differences in infant initial arousal [5], *regulation* has been defined as differences in infant response modulation [43]. The Development of Infant Actions in Pain Responding (DIAPR) Model [35,39] highlights the importance of differentiating between these 2 pain phases, given they are hypothesized to be subject to different biopsychosocial influences [25]. Whereas pain reactivity is viewed as more a function of genetic/biological sensory thresholds and previous pain experiences, pain regulation is viewed as a function of broader contextual factors, such as caregiver pain management behaviours [36]. Moreover, the DIAPR model postulates the relationships between caregiver pain management behaviours and infant pain-related distress will differ according to the infant's age, becoming stronger over time as relational patterns within the dyad become more stable [11]. No research on caregiver proximal soothing to date has differentially examined pain reactivity compared to pain regulation within a single study.

The goal of this study was to conduct cross-sectional analyses to examine the relationships between proximal soothing and pain reactivity/regulation at 4 immunizations (2, 4, 6, and 12 months) across the first year of life. Two research questions were posed: (1) at 2, 4, 6, and 12 months, what are the relationships between caregiver proximal soothing and infant pain reactivity/regulation? and (2) do these relationships change over age? It was hypothesized that: (1) caregiver proximal soothing would be more strongly related to pain regulation than to pain reactivity and (2) the relationships between caregiver proximal soothing and infant pain responding would increase over age.

2. Methods

2.1. Study population

The data from the present study are a part of an ongoing Canadian longitudinal study (the OUCH cohort), which is following caregivers and infants during 4 immunizations over the first year of life (2, 4, 6, and 12 months of age) and beyond. Caregiver–infant dyads were recruited from 3 pediatric clinics in the Greater Toronto Area. Infants were recruited beginning at 2 months of age and followed during their 2-, 4-, 6-, and 12-month routine immunization appointments. No previously published [37,42] or planned/submitted manuscripts from this cohort have hypotheses or analyses that overlap with the current study. At the time of the present analysis, the infant waves had been completed and the total sample size is 760. Of these 760 dyads, 256 were followed up 4 times (2, 4, 6, and 12 months of age), 263 were followed up 3 times (2, 6, 12 months or 4, 6, 12 months, or 2, 4, 6 months), 175 were followed up twice (all 2 time point permutations were possible) and 66 were followed up once (2 or 4 or 6 months). To maximize information used in this study's analyses, direct maximum likelihood estimation [3] was used so that all cases, including those without data for all 4 time points, contributed to model estimation.

Caregivers able to speak and read English, whose infants had no suspected developmental delays or impairments, chronic illnesses, and had never been admitted to a neonatal intensive care unit were eligible to participate in the study. Table 1 presents demographic variables for the entire sample. The mean age of caregivers was 33.46 (SD = 5.04). At the 2-, 4-, 6-, and 12-month immunization appointments, infants received an average of 1.92 needles (2 months [mean = 1.95, SD = .27], 4 months [mean = 1.95, SD = .29], 6 months [mean = 1.90, SD = .41], 12 months [mean = 1.91, SD = .47]. 37.6% of caregivers identified their heritage culture as European, 17.7% as Asian, 11.2% as Canadian/American, 7.5% as Jewish, 5% as African/Middle Eastern, 3.8% as South/Latin American, and 17.2% as Other.

2.2. Procedure

Research ethics boards at both York University and the Hospital for Sick Children approved the following protocol. Details of the procedure are published elsewhere [37]. Only a brief summary will be provided below. Caregivers and healthy, typically developing infants were recruited during immunization appointments and, depending on when they were recruited, followed for a maximum of 3 subsequent immunization appointments (4, 6, and 12 months). Video recording occurred from the moment the infant entered the examination room up until 5 min after the immunization or when the caregiver and infant had left the clinic room. The current withdrawal rate is 3%, with the most common reason given that caregivers no longer wanted to participate as a result of lack of interest and second most common reason being that the family was relocating.

2.3. Apparatus

To capture caregiver pain management behaviours and infant pain behaviours, two Canon HD video camcorders (HV20) were used. One camera was mounted on a tripod and fitted with a wide-angle lens to capture the caregiver pain management behaviours. The second camera used a handheld tripod, and a research

Table 1
Demographic characteristics.

Characteristic	2 mo (%)	4 mo (%)	6 mo (%)	12 mo (%)
Caregivers present at immunization				
Mother	49.2	58.5	59.4	55.2
Mother and father	40.5	33.6	31.1	27.3
Father	.8	1.2	2.0	10.4
Parent(s) and grandparent(s)	6.5	4.1	4.3	3.8
Other	3.0	2.6	3.2	3.3
Education level at recruitment[a]				
Graduate school or professional training	34.7	30.3	27.3	
University graduate	36.3	41.7	33.3	
Partial university	5.7	4.8	3.0	
Trade school or community college	15.0	16	25.8	
High school graduate	7.3	6.6	9.1	
Did not graduate from high school	1.0	.60	1.5	
Infant gender at recruitment[a]				
Male	51.2	46.1	53.7	
Female	48.8	53.9	46.3	

[a] No infants were recruited at 12 months.