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Measurement of self-reported pain intensity in children and adolescents

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Abstract

Acute and chronic pain is a common experience in children and youth. A thorough assessment is fundamental to understand this experience and to assess and monitor treatment responses. The intensity of pain is the parameter most commonly assessed. In this article, we describe the different methods employed to assess pediatric pain intensity and review well-validated and commonly used self-report measures of pain. This review is based on the recent systematic reviews conducted for the Pediatric Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials Consensus Group and the Society of Pediatric Psychology. Amongst the several types of pediatric pain measures, self-report, when available, is regarded as the primary source of information about pain intensity, to be complemented by observation and knowledge of the context. There is a large number of self-report measures of pediatric pain intensity; and there is some agreement that professionals in the clinical and research practice should assess pain intensity using the Pieces of Hurt Tool, the Faces Pain Scale, the Oucher, or Visual Analogue Scales because these measures have shown to have sound psychometric properties and clinical utility. Despite the increased number of age-appropriate self-report measures of pediatric pain intensity over the last years, we report several research gaps and priorities of future research.

Keywords: Pain intensity; Pediatric pain; Measurement; Self-reports; Psychometric properties; Clinical utility

Introduction

Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" by the International Association for the Study of Pain (IASP [1] p. 210). Such a definition parallels, to some extent, the widely accepted and used biopsychosocial model of pain [2]. It goes beyond the biomedical perspective which dominated the field years ago. Pain is much more than a simple, straightforward, sensory experience. Pain results from the interaction of multiple factors, physical, as well as emotional, cognitive, behavioral, and contextual [3].

Pain is unpleasant but necessary. Pain has biological value, it can be a sign that something dangerous is occurring in the body. That is, pain can warn us of actual or impeding tissue damage and motivate the individual to escape or avoid further harm. Indeed, acute pain is defined by the IASP as pain that usually has an identifiable relationship to injury or disease and it has a recent onset and probable limited duration [1]. However, there are times when the pain experience is unnecessary, it happens when pain has lost its value as a signal of danger. This is true of most painful medical procedures and is typical in chronic pain problems. Chronic pain is defined by the IASP as pain that persists beyond normally expected healing [1]; however, it might also occur without a physical injury [4]. It is experienced as recurrent (i.e., repeated) or continuous (i.e., persistent) in nature [4].

Pain, either acute or chronic, is a very common experience in children and youth. Many children are exposed to acute painful procedures (e.g., needles for immunization and blood sampling, and surgery) with immunizations being the most frequently performed procedure in pediatric setting

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[5]. On the other hand, the prevalence of chronic pain is estimated to range from 15% to 30% with headache and abdominal pain the most common recurrent pain problems (e.g., Ref. [6] and [7]).

Both acute and chronic pain are often under-recognized and not treated appropriately, which may lead to both short and long-term negative consequences [8]. Accurate pain assessment using reliable and valid measures is the cornerstone of effective treatment. The purpose of this article is to (a) provide an overview of the measurement of pain intensity in children and youth, (b) outline the approaches to assessment of pediatric pain, (c) describe single item self-report measures with well-established reliability and validity for clinical and research use, and (d) discuss future areas for research.

Pain intensity

When assessing pediatric pain (acute and chronic) there are multiple dimensions that can be assessed. These dimensions include: (a) sensory (e.g., intensity, word descriptors, duration, location, and frequency), (b) affective/cognitive (pain unpleasantness), and (c) impact of pain in aspects of every day life (physical, social, emotional, and role functioning). While it is important to assess each of these domains, the most commonly used parameter in clinical and research practices is the measurement of the intensity of pain or how much it hurts [9]. Moreover, pain intensity has been recently suggested as being a primary outcome domain to be used in pediatric pain clinical trials by the Pediatric Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials Consensus Group (Ped-IMMPACT [10]).

Several systematic reviews of pediatric pain measures have been published over the past few years [11–13]. These reviews were commissioned by two independent working groups: Ped-IMMPACT group and the Society of Pediatric Psychology (SPP). In general terms, both groups summarize and describe the most relevant measures to assess the key domains in the field of pediatric pain based on empirical evidence as well as experts' opinions. The Ped-IMMPACT group was an initiative that included academic researchers, government funding and regulatory agencies, and the pharmaceutical industry. The aim of this group was to determine which domains and measures should be used in clinical trials for pediatric pain. This consensus group commissioned two systematic reviews of pain intensity measures for children 3–18 years of age in line with their recommendations to use pain intensity as a primary outcome measures in pediatric clinical trials. These two systematic reviews aimed to identify self-report pain intensity [12] and observational measures of pain intensity [13] with well-established psychometric properties that could be recommended for use in clinical trials. On the other hand, the SPP commissioned reviews of measures used by pediatric psychologists working as scientist-practitioners to assess several areas of interest, including pain. The SPP review of pediatric pain measures, unlike the previous systematic reviews commissioned by Ped-IMMPACT, did not only focus on identifying pain intensity measures, but also measures intended for assessing other pain-related domains. The goal of this review was to identify measures with well-established psychometric properties that could be used in clinical practice.

The results derived from these three reviews are relevant as they focused on pain intensity but they approached the reviews from different perspectives (research versus clinical practice). The Ped-IMMPACT was focused more heavily on reliability and validity of pain intensity measures, whereas the SPP recommendations were more focused on clinical utility. Clinical utility refers to the applicability of the measure within clinical context [14].

Second, the two groups used different methodologies to review and develop recommendations about pain intensity measures. On one hand, the Ped-IMMPACT group used a two-stage process. In the first phase they conducted a Delphi Survey and held a 2-day consensus conference regarding the core domains to be assessed in clinical pain trials. The second phase was the commissioning of two independent systematic reviews to identify reliable and valid pain intensity measures; one on self-report measure and the other on behavioral observation measures for children 3–18 years of age (Refs. [12 and 13] respectively). On the other hand, the SPP results were based on the Society Pediatric Pain Assessment Task Force recommendations, a survey of members of the Society Pediatric Pain listserv, and a search of literature. Despite these methodological differences in selecting scales for review, both groups used the same criteria to evaluate the quality of measures included in the reviews. These criteria combine appropriate demonstration of the psychometric properties of the measure with more practical considerations (i.e., accurate and precise presentation of the measure) in an attempt to operationalize evidence-based assessment. These criteria were suggested by Cohen et al. [15].

Finally, PedIMMPACT excluded from their reviews measures designed and tested exclusively for children younger than three years, and Cohen et al. [15] did not.

Table 1 lists all single item pain intensity measures identified by both groups with some descriptive information. However, we will describe in more detail those measures that receive ratings of "well established" by both working groups at this time. For a review of well-validated disease-specific pain intensity measures, see Ref. [11].

Type of pain intensity measures

Before describing pain intensity measures with well-established psychometric properties recommended by both groups it is important to mention that there are three main approaches to the assessment of intensity of pain in children: physiological, behavioral, and self-report (for other previous extended reviews, see Refs. [48,49]). There are a number of