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Association Between Widespread Pain Scores and Functional Impairment and Health-Related Quality of Life in Clinical Samples of Children

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Abstract: **Pain involving several body regions generally represents nervous system pathophysiology shifting from predominantly peripheral to more central. In adults, higher widespread pain scores are clinically meaningful and confer risk for poor response to treatment. It is unknown whether widespread pain is similarly important in children. To address this gap, we conducted an observational study examining 1) associations between widespread pain and functional impairment and health-related quality of life (HRQOL) in clinical pediatric samples, and 2) associations among sociodemographic factors and pain catastrophizing with widespread pain scores. Participants were 166 children aged 10 to 18 years from 3 samples (acute pain, presurgery, chronic pain). Children self-reported pain intensity, pain catastrophizing, functional impairment, and HRQOL. Children indicated pain locations on a body diagram, which was coded using the American College of Rheumatology definition of widespread pain. Results revealed higher widespread pain scores were associated with greater functional impairment with routine activities ($F = 3.15$, $P = .02$) and poorer HRQOL ($F = 3.29$, $P = .02$), adjusting for pain intensity, study group, and demographic characteristics. Older age ($B = .11$, $P = .02$), and Hispanic ethnicity ($B = .67$, $P = .04$) were associated with higher widespread pain scores. Findings support incorporating evaluation of widespread pain into pediatric pain assessment. Future research is needed to examine the longitudinal effect of widespread pain on children's treatment outcomes.**

***Perspective:** This article examines the association between widespread pain scores and functional impairment and HRQOL in community and clinical samples of children. Assessment of the spatial distribution of the pain experience provides unique information that may identify children at risk for poorer health.*

Key words: *Widespread pain, pain location, pediatric pain, health-related quality of life, health outcomes, surgery, acute pain, chronic pain.*

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Widespread pain is defined as the presence of pain that crosses anatomical boundaries and peripheral nerve distributions, and is therefore generally thought to represent amplification at the central nervous system level.[20,27] Emerging research in adults supports consideration of widespread pain as a continuum,[23,25] where increasingly widespread pain represents pain mechanisms shifting from more peripherally driven by nociceptive input, to more centrally driven by augmented pain and sensory processing. Using this definition, widespread pain may

occur across painful conditions including those previously thought to primarily have peripheral mechanisms driving the pain (eg, knee osteoarthritis). Thus, the concept of the "widespreadedness" of pain has potential implication across a wide range of clinical samples.

Previous research suggests that the spatial distribution of pain may provide unique information on pain experience above and beyond pain intensity, which has historically received the most focus in research. In adult studies, higher scores on a widespread pain scale have been reported to be associated with poorer health than lower widespread pain scores.[4,5,11] Identifying the presence of widespread pain may also have a potential effect on treatment decisions. For example, pain that is becoming more centralized on the continuum is also less likely to respond to treatments targeting nociceptive signaling[27] and potentially more likely to respond to centrally acting analgesics. Moreover, recent studies examining response to surgical treatment have shown that widespread pain is associated with greater opioid requirements[4,11] and persistence of pain after surgery,[5] even with widespread pain scores well below the threshold for a diagnosis of fibromyalgia. Another aspect of spatial distribution of pain reported to influence health and function in adults is the specific pattern of pain sites.[2,8,10] For example, axial pain[2] and knee pain[8,10] were associated with greater disability in several clinical samples of adults.

In children, widespread pain has been characterized as either present or absent, with terms such as widespread pain[15] or multiple pains[14] used descriptively in community samples or in clinical samples.[13] In community samples, prevalence rates of widespread pain in school-age children range from 7 to 15%.[12,16] In clinical samples, children with fibromyalgia report poor physical and psychosocial functioning.[13] The measurement of pain location on a standard body outline is widely used in clinical research and practice.[9,22] However, there has been surprisingly little attention to understanding the entire continuum of the spatial distribution of pain in children, and whether increasingly widespread pain confers higher risk for poor health-related functioning as found in adult cohorts. The influence of specific patterns of pain location also has not been explored.

The primary aim of this study was to expand the study of widespread pain in children, by examining the association between widespread pain and functional impairment and health-related quality of life (HRQOL) in clinical samples of children. Similar to research conducted in adult samples, we were interested in examining widespread pain across the continuum (spanning low and high levels of widespread pain) and comparing it with associations found using pain intensity. On the basis of the literature in adults, we hypothesized that higher widespread pain scores would be associated with greater functional impairment and poorer HRQOL, adjusting for pain intensity, study group, and sociodemographic characteristics. We also explored whether pain in specific locations was associated with functional impairment and HRQOL. Our secondary aim was to examine sociodemographic and psychological factors associated with widespread pain scores in these children, including age, sex, race, ethnicity, and pain catastrophizing, controlling for study group. We hypothesized that greater pain catastrophizing would be associated with higher widespread pain scores.

Methods

Setting and Participants

Participants included 166 children 10 to 18 years of age from 3 clinical samples (acute pain, presurgery, and chronic pain) at a children's hospital in the northwestern United States, who were currently or previously enrolled in 2 ongoing longitudinal studies examining risk for development of chronic pain. Data from the first assessment (baseline) before any interventions were used. The 3 samples included: 1) acute pain group (n = 58), patients presenting to the Orthopedics clinic or Emergency Medicine for evaluation of a new-onset musculoskeletal pain problem (<2 weeks' duration); 2) presurgery group (n = 53), patients who had a musculoskeletal deformity, including spinal deformity (adolescent idiopathic scoliosis, juvenile scoliosis, spondylolisthesis, kyphosis) or chest wall deformity (pectus excavatum and pectus carinatum) and were scheduled for surgery; and 3) chronic pain group (n = 55), patients seeking treatment (initial evaluation) at a specialty pediatric chronic pain clinic for chronic musculoskeletal pain (≥3 months' duration, weekly pain). Across all groups, children were excluded from the study if 1) they had a serious comorbid chronic medical condition (eg, diabetes, cancer, arthritis), 2) they were developmentally delayed, or 3) they or their parent/guardian were unable to speak and read English fluently.

Procedures

Study procedures were approved by the institutional review board. Potentially eligible children were identified from clinic schedules. Children interested in participation provided their assent and parents provided written consent for study procedures. Across groups, participation rate was 43% among children approached. The primary reason for nonparticipation was families indicating that they did not have time to take part in a research study. Participants either received surveys in the mail or they completed the questionnaires as part of a laboratory study visit.

Measures

Pain Intensity

Children reported on average pain intensity experienced over the preceding week ("In the past 7 days…") using an 11-point numeric rating scale (0 = "no pain" and 10 = "worst pain possible"). Numeric rating scales for pain intensity have been broadly used in samples of children in this age range with acute and chronic pain.[21]