

## A Developmental Analysis of the Factorial Validity of the Parent-Report Version of the Adult Responses to Children's Symptoms in Children Versus Adolescents With Chronic Pain or Pain-Related Chronic Illness

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**Abstract:** The widely used Adult Responses to Children's Symptoms measures parental responses to child symptom complaints among youth aged 7 to 18 years with recurrent/chronic pain. Given developmental differences between children and adolescents and the impact of developmental stage on parenting, the factorial validity of the parent-report version of the Adult Responses to Children's Symptoms with a pain-specific stem was examined separately in 743 parents of 281 children (7–11 years) and 462 adolescents (12–18 years) with chronic pain or pain-related chronic illness. Factor structures of the Adult Responses to Children's Symptoms beyond the original 3-factor model were also examined. Exploratory factor analysis with oblique rotation was conducted on a randomly chosen half of the sample of children and adolescents as well as the 2 groups combined to assess underlying factor structure. Confirmatory factor analysis was conducted on the other randomly chosen half of the sample to cross-validate factor structure revealed by exploratory factor analyses and compare it to other model variants. Poor loading and high cross-loading items were removed. A 4-factor model (Protect, Minimize, Monitor, and Distract) for children and the combined (child and adolescent) sample and a 5-factor model (Protect, Minimize, Monitor, Distract, and Solicitousness) for adolescents was superior to the 3-factor model proposed in previous literature. Future research should examine the validity of derived subscales and developmental differences in their relationships with parent and child functioning.

**Perspective:** This article examined developmental differences in the structure of a widely used measure of caregiver responses to chronic pain or pain-related chronic illness in youth. Results suggest that revised structures that differ across developmental groups can be used with youth with a range of clinical pain-related conditions.

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**Key words:** Pediatric pain, parental behaviors, chronic pain, children, adolescents, Adult Responses to Children's Symptoms, factor analysis.

**A**n understanding of child chronic and recurrent pain necessitates understanding of the social and familial context in which pain is experi-

enced.<sup>2,9,12,33</sup> Caregiver behaviors exert a powerful influence on child pain behaviors.<sup>3,6,40,45</sup> Specifically, solicitous and protective behaviors (eg, positive

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reinforcement for pain behaviors such as activity restriction) have been associated with a variety of negative outcomes among children and adolescents with recurrent/chronic pain.<sup>5,6,13,25,30,39,40,44,49</sup> Protectiveness has also been associated with caregiver emotional distress, catastrophizing, and helplessness.<sup>39</sup>

For more than 2 decades, the predominant measure used to assess parental responses to pediatric chronic pain was the Illness Behavior Encouragement Scale (IBES<sup>46</sup>), which assessed solicitous responding to abdominal pain and symptom complaints. To capture a wider range of parental response styles, the Adult Responses to Children's Symptoms (ARCS) was developed as an extension of the IBES.<sup>48</sup> Initial factor analysis suggested a 3-factor structure (Protect, Minimize, and Encourage & Monitor). Among mothers of youth (aged 8–15 years) with recurrent abdominal pain, Protect scores were associated with higher child gastrointestinal symptoms, health care costs, and self-reported parent protective behaviors.<sup>44</sup> The validity of the other subscales is less established. To date, only 1 study examined the factorial validity of the ARCS in a sample of youth (aged 8–17 years) with various chronic pain conditions. Although the 3-factor model provided good fit to the data, several modifications to the original measure were required.<sup>5</sup> Moreover, this reanalysis did not include exploratory factor analysis (EFA) of the revised measure, which is typically conducted in measure development work. To date, research has not examined other factor structures beyond the original 3-factor model that would likely account for a greater percentage of variance in parental responses.

Use of the ARCS has led to important insights into the relationship between caregiver behaviors and pediatric chronic pain,<sup>6,13,25,32,40,42,44</sup> including the influence of behavioral interventions on parental responses.<sup>27,28,31,35</sup> However, studies examining the psychometric properties of the ARCS included youth (eg, 8–17 years) spanning various developmental stages who were treated as a homogeneous group. It is unclear whether the scale performs differently in children versus adolescents, which may affect interpretation of research data in studies conducted among both children and adolescents. Adolescence is a unique developmental period wherein autonomy from caregivers and reliance on peers substantially increases.<sup>50</sup> The incidence of most types of chronic pain increases throughout childhood and adolescence.<sup>24</sup> Moreover, the demands and impact of parenting a child with chronic pain likely change as children progress toward adulthood.

This study is the first to examine the factorial validity of other factor structures of the ARCS beyond the original 3-factor model. It is also the first study to apply a developmental analysis to the measurement of caregiver responses to child pain and symptom complaints by examining the factorial validity of the ARCS *separately* in caregivers of children versus adolescents with chronic pain or pain-related chronic illness. In light of important developmental differences between children and adolescents and the potential impact of developmental

stage on parenting processes, it was hypothesized that the underlying structure of the ARCS might differ between children and adolescents.

## Methods

### Participants

Participants included 743 caregivers (92.7% mothers) of children and adolescents (468 girls, 275 boys) aged 7 to 18 years (mean age = 12.75 years, standard deviation = 2.79 years). Participants were allocated to developmental groups (ie, "child group" and "adolescent group") based on definitions put forth by the Standards for Research in Child Health, an international initiative to enhance the reliability and relevance of randomized clinical trials in childhood and adolescence.<sup>47</sup> Specifically, the child group included caregivers of children between the ages of 7 and 11 years ( $n = 281$ ), and the adolescent group included caregivers of children between the ages of 12 and 18 years ( $n = 462$ ). Splitting the sample at 12 years is justified based on developmental differences that emerge at this age (eg, beginning of the period of Formal Operations in Piaget's Stages of Cognitive Development marked by the onset of abstract thinking<sup>36</sup>).

Data were pooled from 3 multisite research studies that included caregivers of children and adolescents with recurrent/chronic pain or pain-related chronic illness (inflammatory bowel disease). This includes both data from published studies<sup>25–28,48</sup> and ongoing data collection. The research was conducted at 5 sites: 2 in Seattle, WA (Seattle Children's Hospital and University of Washington), 1 in Tacoma, WA (Mary Bridge Children's Hospital), 1 in Morristown, NJ (Goryeb Children's Hospital/Atlantic Health System), and 1 in Nashville, TN (Vanderbilt University). Four sites collected data from caregivers of children with recurrent and chronic pain (eg, functional abdominal pain, musculoskeletal pain;  $n = 558$ ), and 1 site collected data from parents of children diagnosed for at least 3 months with inflammatory bowel disease (Crohn's disease or ulcerative colitis;  $n = 185$ ).

Across all research studies from which data were pooled, the following common inclusion criteria were used: 1) child or adolescent had a primary presenting complaint of chronic or recurrent pain (persistent pain  $\geq 3$  months) or was diagnosed with inflammatory bowel disease at least 3 months prior, 2) child or adolescent was within 7 to 18 years of age (ie, 7–17, 8–18, or 10–17 years), and 3) caregiver was able to read and comprehend questionnaires in English. Caregivers were excluded if their child or adolescent had a comorbid chronic illness (diabetes, arthritis, cancer), developmental delay, or cognitive impairment. Caregivers of children and adolescents were typically recruited through physician referral from pediatric gastroenterology and multidisciplinary pain clinics. Participants were also recruited through pediatric clinics and community-posted flyers. The data included from all research studies were collected as part of site-specific institutional review board approved

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