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International Classification of Diseases-11 chronic pain severity specifiers for children and adolescents: a validation study

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Abstract

The 11th revision of the International Classification of Diseases (ICD-11) now includes separate chronic pain diagnoses that may be extended by chronic pain severity specifiers. These specifiers comprise 3 dimensions—pain intensity, pain-related distress, and pain-related interference—rated on an 11-point numerical rating scale referring to the past 7 days. Like the chronic pain diagnoses, these specifiers were originally developed for adults. The current study, therefore, aimed to adapt and validate the 3 ICD-11 chronic pain severity specifiers for pediatric chronic pain patients and evaluate their clinical utility. After adapting the specifiers using feedback from patients and experts, data were collected from N = 319 pediatric chronic pain patients aged 8 to 17 years in a tertiary care setting using 4 assessment methods: patient interview, patient questionnaire, parent-proxy, and healthcare-professional-proxy. Despite all patients having chronic pain, not all reported having experienced pain in the past 7 days. The 3 severity dimensions were interrelated but not unidimensional; both interrater and test–retest reliability were large. While patterns of concurrent and discriminant validity were as expected, correlations with related measures were small. Predictive validity regarding treatment recommendation was small to medium. Most, but not all, suggested severity categories ("none," "mild," "moderate," "severe") were sufficiently distinct within this sample. The chronic pain specifiers provide a quick and easy biopsychosocial description. They should, however, be interpreted with caution in clinical practice, as the psychometric quality is insufficient for making therapeutic or reimbursement-related decisions for individual pediatric patients based solely on these 3 items.

Keywords: ICD-11, Pediatrics, Chronic pain, Pain severity, Clinical utility, Biopsychosocial, Pain intensity, Pain-related distress, Pain-related interference, Children, Adolescents, Psychometrics

1. Introduction

In the 11th revision of the International Classification of Diseases (ICD-11), chronic pain diagnoses comprise a distinct category with explicit diagnostic criteria developed by an International Association for the Study of Pain (IASP) Task Force.[40] In this revision, chronic pain is defined as multifactorial (ie, biopsychosocial) and recurring or persisting for more than 3 months. The diagnostic codes of all chronic primary and secondary pain diagnoses can be supplemented with an optional extension code that specifies pain severity, encompassing pain intensity, pain-related distress, and pain-related interference. This pain severity extension code is intended to reflect the patient's experience rather than the healthcare professional's (HCP) judgement,[40,47] which is why HCPs should ask a standardized question for each severity dimension during the diagnostic assessment.[22,40] Each question is rated on an 11-point numerical rating scale (NRS) referring to the last 7 days.[40] The metric value is then converted into one of the 4 World Health Organization (WHO) severity categories: "none," "mild," "moderate," and "severe."[40,47] This optional extension code aims to enhance comparability across international samples, make the course of pain severity within patients more visible, and facilitate the standardized assessment of pain-related distress and interference.[2,16,40]

The use of 3 single items to capture pain severity is a practical approach that is likely easy to implement in clinical practice. In an initial study, these proposed chronic pain severity items were validated in an adult chronic pain population using patient self-report questionnaires. In that sample, the single items demonstrated good psychometric properties and moderate to large correlations with corresponding validated scales.[16] However, like the new chronic pain diagnostic criteria, these severity specifiers were originally developed for adults[40,44] and may not be directly transferable to the pediatric population.[31,44] While the use of an 11-point NRS to measure pain intensity has been extensively validated in pediatric samples,[8] the single-item measures for

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pain-related distress and pain-related interference have yet to be validated in a pediatric population.

The current study aims to adapt and validate the 3 ICD-11 chronic pain severity specifiers for pediatric chronic pain patients and evaluate their clinical utility. Through several rounds of feedback from patients and experts, the specifiers will be adapted to ensure comprehensibility and face validity. Patients will rate each item twice, enabling the measurement of test–retest reliability. The study will explore whether the 3 specifiers are independent or share a common underlying latent factor (factorial validity). In addition, the study will assess concurrent and discriminant validity by examining correlations across assessment methods (patient interview, patient questionnaire, parent-proxy, and HCP-proxy) and with related measures. Finally, the study will evaluate predictive validity by determining the ability of the 3 specifiers to predict clinically useful outcomes, such as HCPs' global ratings of each patient's pain problem and recommendations for further treatment. Detailed hypotheses are described in the methods section.

2. Methods

2.1. Participants and design

The validation of the 3 chronic pain severity specifiers was conducted as part of a larger study examining ICD-11 chronic pain diagnoses in pediatric patients. All patients under 18 years old who presented at a specialized pediatric pain center for the first time between March 30 and October 29, 2021 were included (N = 402[31]). Additional inclusion criteria were obtaining informed consent to participate in the validation study, the patient being at least 8 years old (see Section 2.2), and pain beginning more than 3 months ago (ICD-11 chronic pain criterion[48]). N = 83 patients were excluded from the current analyses for being younger than 8 years (n = 24), not providing consent (n = 50), or having a pain onset less than 3 months ago (n = 9). The final analyzed sample included N = 319 patients (72.1% girls; M_{age} = 13.6 years, SD_{age} = 2.7 years; for pain and psychological characteristics, see **Table 1**). As expected for this population,[11,43] the age distribution diverged between girls and boys starting from age 14, with more than 3 times as many girls than boys presenting at the specialized pediatric pain center.

2.2. Material and procedure

Except for the severity ratings, all patient-reported outcomes were completed approximately 2 months before the initial appointment at the specialized pediatric pain center.

2.2.1. Severity ratings

The ICD-11 extension codes for chronic pain severity include pain intensity, pain-related distress, and pain-related interference. The IASP Task Force condensed these 3 dimensions into 3 items, each representing one construct.[40] In the current study, these 3 items were adapted for children and adolescents through several feedback loops. Comprehensibility and face validity were ensured by conducting cognitive interviews with pediatric chronic pain patients during their inpatient stay (N = 4, 75% girls, M_{age} = 14.5 years, range: 13-16 years). The patients were instructed to think aloud while reading each item and subsequently probed about central aspects.[3] They explained to the interviewer what they thought the items meant and made suggestions for improving comprehensibility.

During the pilot phase (N = 31, 74.2% girls, M_{age} = 12.9 years, range: 6-17 years), HCPs were asked whether the patients were able to answer the questions during the interview and how the items could be improved. According to the HCPs, patients were generally able to report their pain intensity and pain-related interference, but younger children particularly struggled to answer the pain-related distress item. All adjustments were made in consultation with chronic pain experts (N = 12, including n = 6 HCPs working in tertiary care) to ensure content validity. These experts agreed that only patients aged 8 years or older should be included in the validation sample to ensure a minimum level of reading comprehension and the ability to verbalize responses to the 3 chronic pain severity items.

The 3 chronic pain severity items were assessed through multiple methods: self-report questionnaire and parent-proxy reports completed just before the appointment (using pen and paper), patient self-report during the pain clinic appointment via interview with the HCP, and through HCP-proxy during or immediately after the initial appointment using electronic assessment (**Fig. 1**). Pain intensity, pain-related distress, and pain-related interference regarding a patient's main pain location were rated retrospectively for the past 7 days on an 11-point NRS. The items (originally presented in German) and their translations are displayed in **Table 2**. In cases where raters did not adhere to the 11-point scale (eg, marking multiple numbers or placing the mark between 2 numbers), the mean of all marked numbers was recorded and rounded to the nearest whole number. This was the case in 31 patient questionnaire self-reports (9.7%), 20 parent proxy reports (6.3%), and 3 patient interview self-reports (0.9%). While none of the HCP-proxy reports were missing, a small amount of data were missing for patient interviews (n = 36; 11.3%), patient questionnaires (n = 2; 0.6%), and parent-proxy reports (n = 6; 1.9%).

2.2.2. Demographic information

Before the initial appointment, patients provided their date of birth and sex. For the current analyses, the age at the initial appointment was used.

2.2.3. Pain characteristics (healthcare professional's rating)

After the initial appointment, HCPs provided a global rating of each patient's pain problem using an 11-point NRS ("Please provide an overall rating of the pain problem. On a scale from 0 to 10, how severe would you rate this pain problem?"[14]). The HCPs also assessed the presence of emotional distress and pain-related interference for each pain location (dichotomous), reported the pain duration for each location (ordinal scale), and gave a recommendation for intensive interdisciplinary pain treatment (IIPT[11]; dichotomous).

2.2.4. Emotional pain perception

Emotional pain perception was reported by patients using the *Affective Pain Perception* subscale of the Pain Perception Scales for Adolescents (German version; SES-J[45]), which is based on the McGill Pain Questionnaire.[26] This subscale measures affective pain perception and consists of 8 emotionally laden words to describe pain. Patients are more likely to use these words when they are emotionally distressed by pain (eg, "unbearable"). Patients aged 8 to 17 years were asked to rate whether they would describe their pain using these words, using a four-point scale (1 = "do not agree" to 4 = "strongly agree"). The total score was obtained by summing these subscale items. This scale has been shown to correlate strongly with pain intensity, pain-related disability, and pain catastrophizing.[45] In the current sample, n = 5 (1.6%) patients had missing SES-J items. The internal consistency of the Affective

Table 1

Pain and psychological sample characteristics.

Variable (measure)	*n* (%)/M (SD)
Pain location (HCP)*	
Head	228 (71.5%)
Limb	113 (35.4%)
Visceral	111 (34.8%)
Back	100 (31.3%)
No. of pain locations (HCP)	
1	170 (53.3%)
2	87 (27.3%)
3	40 (12.5%)
4	22 (6.9%)
Pain duration (HCP)†	
3-6 mo	8 (2.5%)
6-12 mo	29 (9.1%)
1-2 y	55 (17.2%)
2-3 y	43 (13.5%)
> 3 y	184 (57.7%)
IIPT recommendation (HCP)	202 (63%)
Emotional pain perception (SES-J; 8-32; n = 314)	20.7 (5.3)
Generalized anxiety (RCADS; 0-18; n = 307)	5.2 (3.5)
Depression (RCADS; 0-30; n = 307)	11.0 (6.0)
Pain-related disability (PPDI; 12-60; n = 261)	37.9 (9.1)
Global pain severity (HCP; 0-10)	7.0 (1.9)

Sample size: N = 319. Possible scale ranges are provided in brackets.
* Multiple locations possible.
† Refers to the pain location with the longest pain duration.
HCP, reported by healthcare professional; IIPT, intensive interdisciplinary pain treatment; SES-J, pain perception scales for adolescents; RCADS, Revised Children's Anxiety and Depression Scale; PPDI, Pediatric Pain Disability Index.

Pain Perception subscale in this sample was good (McDonald ω = 0.80, 95% CI = [0.77-0.84]).

2.2.5. Anxiety and depression

Anxiety and depression were assessed in patients aged 8 to 17 years using the German version of the Revised Children's Anxiety and Depression Scale (RCADS[38]). The RCADS includes generalized anxiety and depression subscales (6 and 10 items, respectively) with each item rated on a four-point scale (0 = "never" to 3 = "always"). Total scores for each subscale were calculated by summing the respective items. The RCADS demonstrates good convergent validity, showing large correlations with other anxiety and depression measures and small correlations with the Chronic Pain Grading, a chronic pain severity measure that combines pain intensity, disability, and school absence.[38] In the current sample, n = 12 patients (3.8%) did not complete the questionnaire. Both RCADS subscales exhibited good internal consistency in this sample (McDonald $\omega_{depression}$ = 0.87, 95% CI = [0.84-0.89]; and $\omega_{anxiety}$ = 0.81, 95% CI = [0.78-0.84]).

2.2.6. Pain-related disability

Pain-related disability was assessed using the Pediatric Pain Disability Index (PPDI), which has been validated in a German sample of pediatric pain patients aged 11 to 17 years.[17] Patients rated how often pain interfered with 12 different activities (eg, "reading") on a 5-point scale (1 = "never" to 5 = "always") over the last 4 weeks. The total score was the sum of all 12 items. The PPDI demonstrates significant moderate correlations with pain intensity and small correlations with depression and anxiety scores.[17,39] Because this measure is only validated for children aged 11 to 17, it was administered to n = 267 (83.7%) participants who were at least 11 years old at baseline. Six patients (2.2%) had missing data. The PPDI exhibited good internal consistency in this sample (McDonald ω = 0.84, 95% CI = [0.81-0.87]).

2.3. Analyses

The significance level was set to α = 0.05 for all statistical tests. Correlations (τ/*r*) of < |0.12|, < |0.24|, < |0.41|, and >= |0.41| and effect sizes (Cohen *d*/*h*) of < |0.15|, < |0.36|, < |0.65|, and >= |0.65| were interpreted as "very small," "small," "moderate," and "large/high," respectively, based on benchmarks from social psychology.[25] All analyses were performed using R[29] and RStudio.[35]

2.3.1. Multiple imputation of missing data

Best practice involves replacing missing values with likely values, preferably using multiple imputation.[41] Analyses were conducted

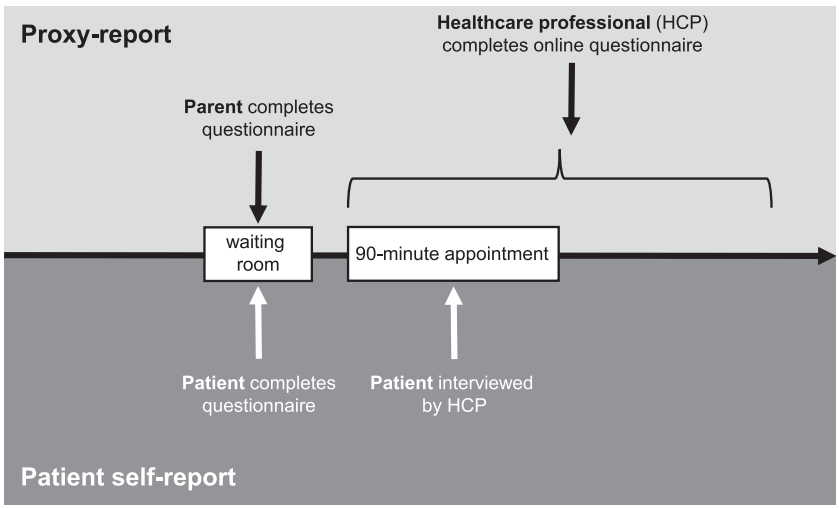

Figure 1. Assessment protocol of International Classification of Diseases-11 chronic pain severity specifiers.

Table 2

Pain severity items completed by patients during the interview or questionnaire self-report.

Measure	English (translated)*	NRS 0	NRS 10	German (original)	NRS 0	NRS 10
Intensity	During the last 7 days, how intense was your pain most of the time?	No pain	Strongest pain	In den letzten 7 Tagen, wie stark waren deine Schmerzen meistens?	Keine Schmerzen	Stärkste Schmerzen
Pain-related distress	During the last 7 days, how much did your pain distress you; meaning it made you sad, angry, discouraged, …?	Not at all	Very much	In den letzten 7 Tagen, wie stark haben dich deine Schmerzen belastet; also traurig, wütend, mutlos, … gemacht?	Gar nicht	Sehr stark
Pain-related interference	During the last 7 days, how much did your pain interfere with school, everyday life, and leisure time?	Not at all	Very much	In den letzten 7 Tagen, wie stark haben dich deine Schmerzen in Schule, Alltag und Freizeit gestört?	Gar nicht	Sehr stark

Instruction supplied in self-report: "The following three questions are about how you usually experienced your main pain in the last 7 days. Please indicate the number that best describes your experience."*

* Simple forward translation from German, English translation not validated.

NRS, numerical rating scale.

using multivariate imputation by chained equations (MICE; 30 datasets, 20 iterations, predictors with $\tau > 0.1$; see supplemental digital content, Fig. S1, http://links.lww.com/PAIN/C247 for the predictor matrix; R package *mice*[42]), unless indicated otherwise (eg, item properties, item response theory analyses, and analyses of severity categories). Missing PPDI-scores were not imputed for children below 11 years (systematic missingness).

2.3.2. Item properties

Analyses of item properties were performed using complete cases. Items were described using medians and interquartile ranges. Distributions of item responses were inspected visually for violations of normality. Differences in distributions between girls and boys were compared using Kolmogorov–Smirnov tests. Kruskal–Wallis tests were used to investigate differences between sex and age groups, while Friedman rank sum tests were used to evaluate differences among raters.

2.3.3. Reliability

Reliability was assessed through test–retest reliability (comparing self-report questionnaire ratings before and interview ratings during the initial appointment) and interrater reliability (comparing ratings from patients, parents, and HCPs). Test–retest and interrater reliability were measured using Kendall coefficient of concordance (*W*) for 2 and 3 raters, where *W* ranges from 0 (no agreement) to 1 (perfect agreement; R package *irr*[13]). *W* can be transformed to the Spearman correlation coefficient: a correlation of $r = 0$ between 2 raters corresponds to $W = 0.5$, and between 3 raters to $W = 0.33$.[12,23] In addition, Kendall Tau (τ) was calculated (R package *psych*[32]).

2.3.4. Validity

2.3.4.1. Factorial validity

To determine whether the 3 chronic pain severity items represent independent constructs or load onto a single latent factor, a confirmatory factor analysis with one underlying factor was conducted for the severity ratings collected during the interview (R packages *psych* and *lavaan*[32,34]). Dimensionality was further assessed using item response theory with the rating scale model and marginal maximum likelihood estimation (R package *TAM*[33]; complete case analysis).

2.3.4.2. Concurrent and discriminant validity

Concurrent and discriminant validity were investigated using a multi-trait/multi-method matrix.[7] Each chronic pain severity item—pain intensity, pain-related distress, and pain-related interference—was assessed using 4 methods: self-report and parent-proxy right before the patient's appointment, interview during the appointment, and HCP-proxy immediately after (**Fig. 1**). Theoretically, correlations should be higher between similar constructs and between constructs assessed using similar methods. The highest correlations, therefore, are expected within the same construct and method, such as intensity rated in both interview and questionnaire self-report (mono-trait/hetero-method, similar methods because of the same rater). When correlating different constructs, such as intensity and interference, correlations should be higher when measured with the same method (eg, both measured during the interview; hetero-trait/mono-method) than with different methods (eg, one measured during the interview and the other using parent-proxy; hetero-trait/hetero-method).

In addition, each item's correlations with constructs assessed in questionnaire self-report before the initial appointment were examined, including emotional pain perception (SES-J), anxiety and depression (RCADS), and pain-related disability (PPDI). Higher correlations are anticipated between the single pain-related distress item and the anxiety and depression scales, as well as between the single pain-related interference item and the pain-related disability scale. All items are expected to correlate with emotional pain experience. Because there are no statistically significant sex differences in pain severity in tertiary care settings,[14] negligible correlations between pain severity and sex are expected. Higher pain severity is expected in older patients.[14,43]

2.3.4.3. Predictive validity and cutoff validation

Healthcare professional's recommendations for further treatment and their global ratings of pain problems were correlated with the 3 chronic pain severity items. Higher ratings on these severity items are expected to predict a greater chance of IIPT recommendation and higher global pain severity ratings.

Treede et al.[40] suggest specific cut-offs for all chronic pain severity items (0, 1-3, 4-6, 7-10) and align these with the WHO categories "none" (0), "mild" (1), "moderate" (2), and "severe" (3). The frequencies of these categories were compared between patients with and without IIPT recommendation using chi-squared (χ^2) tests. Further χ^2-tests were conducted to compare patients who received the highest WHO category for all 3 chronic pain severity items against those who did not, in terms of their IIPT recommendations.

To examine whether the recommended WHO categories are sufficiently distinct within a tertiary care sample, the 4 categories were compared using the HCP global rating of each patient's pain severity. This was done using one-way Welch ANOVAs and Games–Howell post-hoc tests, robust methods for samples with unequal variances (R package *rstatix*[20]). As multiple imputation

could lead to a single patient being assigned to multiple categories, all analyses concerning the WHO categories were conducted using complete cases only.

2.4. Ethical approval

This study was approved by the Witten/Herdecke University Ethics Committee (reference number: 187/2020, October 21, 2020).

3. Results

3.1. Item properties (complete cases)

Severity item distributions are displayed in **Figure 2**. For nearly all chronic pain severity specifiers and assessment methods, the full 11-point scale range was used (with the exception of category "1" of pain intensity rated by parent-proxy, which was never selected). Visual inspection revealed that the ratings were not normally distributed. For some specifiers, such as intensity, there were more ratings of 0 than would be expected assuming normality, and there appeared to be floor effects for pain-related distress. Because of the violation of normality assumptions, Kendall Tau was reported as the measure of association (sections 3.2 and 3.3; τ may be interpreted equivalently to Pearson r, see section 2.3).

Statistically significant differences were observed in the distribution and central tendency of ratings between boys and girls. Girls gave higher ratings across all chronic pain severity items and assessment methods (after Benjamini–Hochberg correction,[4] all $P_{adj} < 0.05$ for Kolmogorov–Smirnov and for Kruskal–Wallis tests; supplemental digital content, Table S2, http://links.lww.com/PAIN/C247). Further Kruskal–Wallis tests between age groups (8-10, 11-13, and 14-17 years) revealed no statistically significant differences when boys and girls were analyzed separately (age groups based on Grothus et al.[14]; supplemental digital content, Table S2, http://links.lww.com/PAIN/C247). However, when inspecting the entire sample without distinguishing sexes, older patients reported higher pain-related distress (see supplemental digital content, Table S2, http://links.lww.com/PAIN/C247).

Statistically significant differences were observed among the raters for all 3 chronic pain severity items (Friedman rank sum test; intensity: $\chi^2(3) = 13.84$, $P = 0.003$; distress: $\chi^2(3) = 66.13$, $P < 0.001$; interference: $\chi^2(3) = 10.15$, $P < 0.001$). Post-hoc tests (Benjamini–Hochberg corrected; R package *PMCMRplus*[27]) revealed that parents rated pain intensity significantly lower than HCPs ($P_{adj} = 0.028$, effect size $r = 0.17$). In both the self-report questionnaire and interview, patients rated their pain-related distress significantly lower than parents ($r = 0.24$) and HCPs ($r = 0.32$; all $P_{adj} < 0.001$). No statistically significant differences between raters emerged for interference ratings (all $P_{adj} > 0.05$).

3.2. Reliability

3.2.1. Interrater reliability

Corrected for ties, Kendall coefficient of concordance yielded $W_{intensity} = 0.85/.87/.79$, $W_{distress} = 0.80/.86/.73$, and $W_{interference} = 0.82/.86/.78$ when comparing 2 raters (patient interview vs parent, patient interview vs HCP, and parent vs HCP, respectively). Effect sizes were large ($r = 0.46$-0.74). For all 3 raters, concordance was $W_{intensity} = 0.78$, $W_{distress} = 0.73$, $W_{interference} = 0.76$, which corresponds to $r = 0.59$-0.67, also indicating large effects. Thus, interrater reliability was high for the 3 chronic pain severity items. Kendall Tau for each interrater combination ranged from $\tau = 0.36$ (distress: parent vs HCP) to $\tau = 0.64$ (intensity: patient interview vs HCP; **Table 3** and supplemental digital content, Table S3, http://links.lww.com/PAIN/C247).

3.2.2. Test–retest reliability

Patients were asked to rate the 3 chronic pain severity items twice: once directly before (self-report) and once during (interview) the 90-minute appointment. Test–retest reliability was high, with Kendall coefficient of concordance corrected for ties yielding $W_{intensity} = 0.93$, $W_{distress} = 0.89$, and $W_{interference} = 0.88$ (corresponding to $r = 0.77$-0.87). Kendall Tau ranged from $\tau = 0.64$ to 0.78 (**Table 3**).

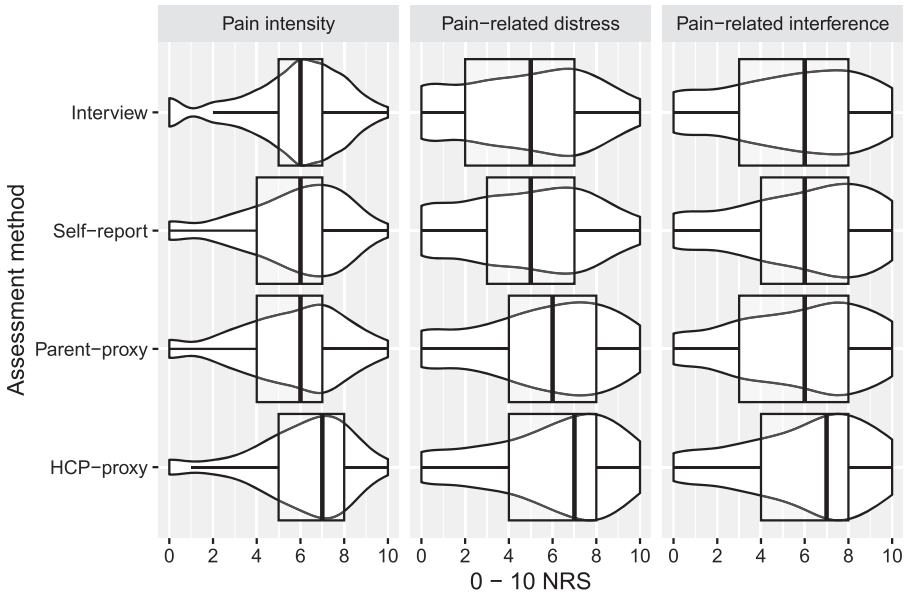

Figure 2. Distribution of severity ratings for each assessment method (layered boxplots and violin plots; complete cases). The thick vertical line represents the median; the surrounding box represents the interquartile range. Items were rated on an 11-point numerical rating scale (0: not at all; 10: very much). HCP = healthcare professional.

3.3. Validity

3.3.1. Factorial validity

A confirmatory factor analysis investigated the usefulness of extracting a single underlying factor. Model fit was poor across various fit indices (*CFI* = 0.86, *RMSEA* = 0.39, *SRMR* = 0.18). However, internal consistency was good (McDonald ω = 0.84, 95% CI = [0.74-0.93]). These findings suggest that while the 3 chronic pain severity items are interrelated, they are not unidimensional.[37] This is also reflected descriptively in **Figure 3**, where correlations between constructs are evident, yet some independence remains (eg, patients reporting severe intensity and pain-related interference, but no pain-related distress, as seen in the lower left part of **Fig. 3**). Further exploration of dimensionality was conducted using item response theory with n = 285 cases where at least one item was assessed during the interview. A rating scale model revealed that although item-thresholds were correctly ordered within each item, the NRS categories were disordered regarding the sum score of all 3 items. This further indicates multidimensionality; if the items measured the same latent construct, higher total scores would correspond with higher item ratings. Consequently, combining the items into a total score is not warranted.

3.3.2. Concurrent and discriminant validity

Correlations within constructs measured using different methods (mono-trait/hetero-method: interview compared to other methods) were large for intensity (τ = 0.60-0.78), pain-related distress (τ = 0.48-0.66), and interference (τ = 0.52-0.64).

Emotional pain perception (SES-J) demonstrated small but statistically significant positive correlations with all 3 chronic pain severity items assessed during the interview (τ = 0.16-0.17). Both depression and anxiety scores correlated strongest with the pain-related distress severity item (τ = 0.20 and τ = 0.16, respectively), while depression also correlated significantly with pain intensity (τ = 0.12) and interference (τ = 0.13). The sum score of pain-related disability showed small, significant positive correlations with pain-related interference (τ = 0.22) and pain-related distress (τ = 0.15) severity items. Most severity items showed small significant correlations with age and sex, with higher ratings of chronic pain severity observed for girls and older patients. All correlations are presented in a multi-trait/multi-method matrix (focus on patient-report during interview using multiply imputed data: **Table 3**; full matrix using complete cases: supplemental digital content, Table S3, http://links.lww.com/PAIN/C247).

3.3.3. Predictive validity

Healthcare professionals recommended IIPT for n = 202 patients (63.3%). The correlations between the 3 chronic pain severity items and HCPs' recommendations for IIPT were small to moderate (τ = 0.17-0.28, **Table 3**), indicating that higher severity ratings were associated with a higher chance of receiving an IIPT recommendation. The strongest correlations emerged for pain intensity, while the weakest were for pain-related distress. HCPs'

Table 3

Associations of pain severity ratings assessed in patient interviews with other measures.

Measure	Pain intensity					Pain-related distress					Pain-related interference				
	τ	*SE*	*P*	P_{adj}	*df*	τ	*SE*	*P*	P_{adj}	*df*	τ	*SE*	*P*	P_{adj}	*df*
Interview															
Intensity	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Distress	**0.45**	0.05	<0.001	<0.001	304.91	—	—	—	—	—	—	—	—	—	—
Interference	**0.51**	0.05	<0.001	<0.001	307.25	**0.52**	0.05	<0.001	<0.001	300.86	—	—	—	—	—
Questionnaire															
Intensity	**0.78**	0.04	<0.001	<0.001	300.40	**0.38**	0.05	<0.001	<0.001	307.09	**0.43**	0.05	<0.001	<0.001	305.08
Distress	**0.42**	0.05	<0.001	<0.001	311.05	**0.66**	0.04	<0.001	<0.001	309.81	**0.44**	0.05	<0.001	<0.001	305.59
Interference	**0.49**	0.05	<0.001	<0.001	311.37	**0.45**	0.05	<0.001	<0.001	305.71	**0.64**	0.04	<0.001	<0.001	302.66
Parent-proxy															
Intensity	**0.60**	0.05	<0.001	<0.001	303.22	**0.35**	0.05	<0.001	<0.001	306.99	**0.41**	0.05	<0.001	<0.001	301.23
Distress	**0.41**	0.05	<0.001	<0.001	310.94	**0.48**	0.05	<0.001	<0.001	309.75	**0.39**	0.05	<0.001	<0.001	305.54
Interference	**0.43**	0.05	<0.001	<0.001	309.50	**0.38**	0.05	<0.001	<0.001	306.35	**0.52**	0.05	<0.001	<0.001	302.78
HCP-proxy															
Intensity	**0.64**	0.04	<0.001	<0.001	298.84	**0.40**	0.05	<0.001	<0.001	304.99	**0.44**	0.05	<0.001	<0.001	305.39
Distress	**0.39**	0.05	<0.001	<0.001	308.18	**0.59**	0.05	<0.001	<0.001	302.33	**0.43**	0.05	<0.001	<0.001	304.90
Interference	**0.40**	0.05	<0.001	<0.001	309.58	**0.41**	0.05	<0.001	<0.001	302.13	**0.59**	0.05	<0.001	<0.001	299.50
Emotional pain perception	**0.17**	0.06	0.003	0.004	308.05	**0.17**	0.06	0.003	0.004	303.64	**0.16**	0.06	0.005	0.006	303.57
Generalized anxiety	0.06	0.06	0.261	0.266	301.16	**0.16**	0.06	0.005	0.006	293.75	0.05	0.06	0.411	0.411	298.78
Depression	**0.12**	0.06	0.032	0.035	298.57	**0.23**	0.06	<0.001	<0.001	296.23	**0.13**	0.06	0.028	0.031	294.13
Pain-related disability	0.10	0.06	0.091	0.096	258.30	**0.15**	0.06	0.018	0.021	257.00	**0.22**	0.06	<0.001	0.001	253.85
Global pain severity (HCP)	**0.33**	0.05	<0.001	<0.001	307.53	**0.31**	0.05	<0.001	<0.001	301.02	**0.36**	0.05	<0.001	<0.001	299.53
IIPT rec. (HCP)*	**0.28**	0.05	<0.001	<0.001	304.88	**0.17**	0.06	0.003	0.004	295.61	**0.20**	0.06	<0.001	0.001	299.45
Age	0.07	0.06	0.205	0.213	309.74	**0.19**	0.06	0.001	0.001	305.61	**0.14**	0.06	0.013	0.016	298.63
Girl	**0.15**	0.06	0.006	0.007	307.92	**0.18**	0.06	0.002	0.002	302.47	**0.12**	0.06	0.035	0.038	302.87

Cells contain Kendall Tau (τ), standard errors (SE), *P*-values, and degrees of freedom (*df*). Benjamini–Hochberg correction for 54 tests was used to adjust *P*-values. Tau of $P_{adj} < 0.05$ are set in bold. Analyses were conducted using multiple imputation. A full multi-trait/multi-method matrix based on the complete cases is supplied in supplemental digital content, Material S2, http://links.lww.com/PAIN/C247.

* Dichotomous variable where a healthcare professional's (HCP) recommendation for intensive interdisciplinary pain treatment (IIPT) is coded as "yes" = 1 and "no" = 0.

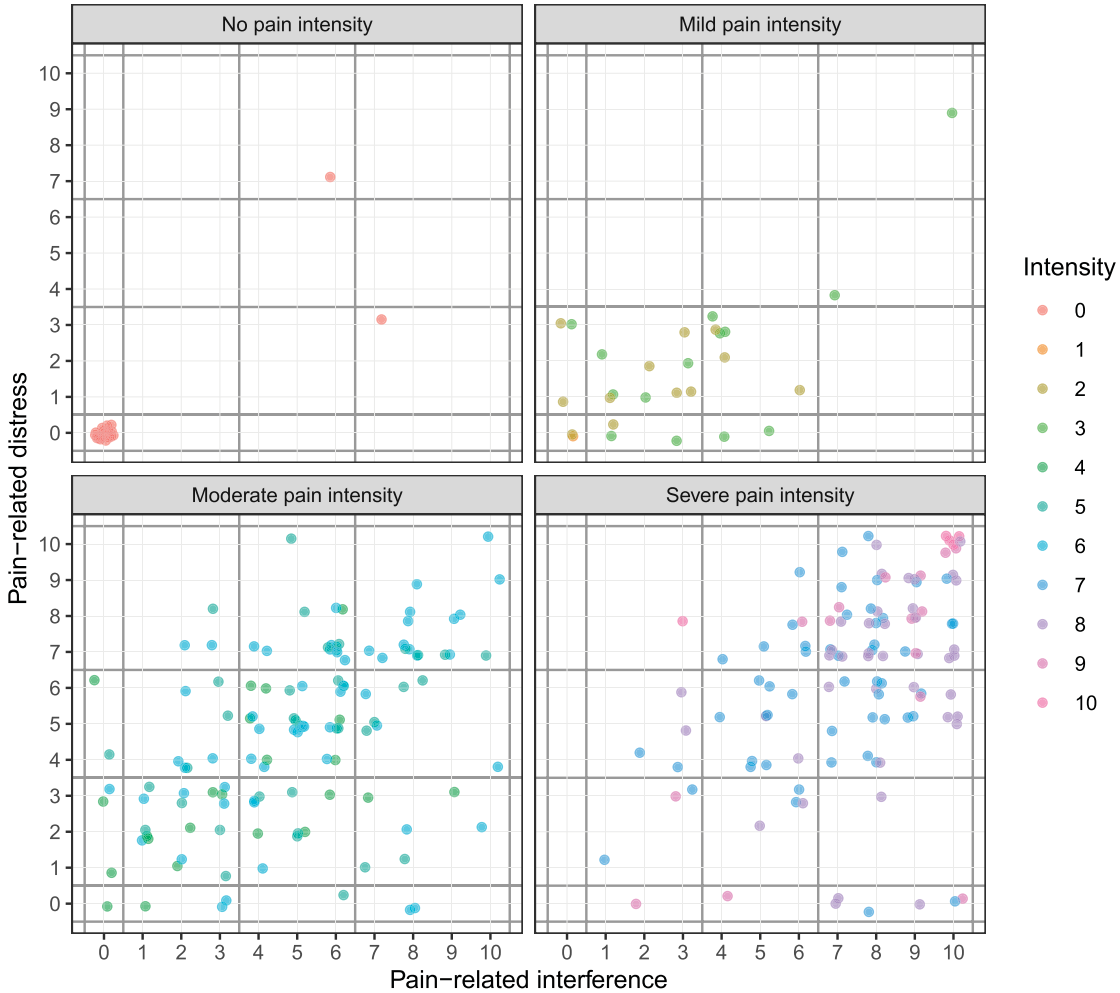

Figure 3. Scatterplot of chronic pain severity ratings assessed during patient interviews (n = 273 complete cases). Items were rated on an 11-point numerical rating scale (0: not at all; 10: very much). Each dot represents one patient. Dot-color indicates their pain intensity rating. Panels are divided by pain intensity category (none = 0, mild ≤ 3, moderate ≤ 6, severe ≥ 7). As only whole numbers are possible, dots are jittered randomly to avoid overplotting. Thick grey lines delineate the severity categories for pain-related distress and pain-related interference.

global ratings of patients' pain problems were moderately correlated with all 3 severity items (τ = 0.31-0.36; **Table 3**): higher ratings of chronic pain severity provided by patients during the interview were associated with higher global ratings given by HCPs afterward.

For all 3 chronic pain severity items assessed during the interview, all 4 severity categories suggested by Treede et al.[40] applied to both patients who received a recommendation for IIPT and those who did not (complete case analysis). The latter reported lower proportions of severe (Cohen $h = -0.59$ to -0.31) and moderate ($h = -0.23$ to -0.02) pain, and higher proportions of mild (h = 0.15-0.33) and no (h = 0.52-0.76) pain across all 3 chronic pain severity items (χ^2 = 23.20-51.58, all $P < 0.001$; **Fig. 4**).

Among patients in the highest severity category for all 3 dimensions (n = 55; **Fig. 3**), n = 44 (81.5%) received a recommendation for IIPT. This proportion was significantly larger compared to the other patients ($\chi^2 = 8.31$, $P = 0.004$, h = 0.49). Despite meeting the ICD-11 chronic pain criteria and presenting to tertiary care (Section 2.1), 18 patients reported "none" in all 3 categories (**Fig. 3**). Further inspection revealed that 15 (83.3%) of these patients presented with migraine-like headaches, and that all but one fulfilled the ICD-11 chronic primary pain criteria for headache.[31]

When comparing patients' severity ratings assessed during the interview with the HCPs' global ratings of their pain problem, significant differences among severity categories emerged ($F_{intensity}$ (3, 58) = 20.7, $F_{distress}$ (3, 119) = 15.9, $F_{interference}$ (3, 94) = 25.3; all $P < 0.001$; complete cases). Post-hoc comparisons revealed that most, but not all, categories were significantly different from each other. Specifically, there were no significant differences between the mild vs moderate pain intensity categories (1 vs 2; estimate: 0.96 [−0.04 to 1.96]; P = 0.065), the none vs mild pain-related distress categories (0 vs 1; estimate: 0.59 [−0.60 to 1.77]; P = 0.565), or the moderate vs severe pain-related distress categories (2 vs 3; estimate: 0.48 [−0.111 to 1.08]; P = 0.154). In contrast, all pain-related interference categories differed significantly (see supplemental digital content, Table S4, http://links.lww.com/PAIN/C247).

4. Discussion

The current study aimed to adapt and validate the 3 ICD-11 chronic pain severity specifiers for chronic pain patients aged 8 to 17 years. Together with patients and experts, these specifiers were adjusted to be easily understood by children and adolescents, ensuring comprehensibility and face validity. The specifiers were assessed through patient interviews, as intended

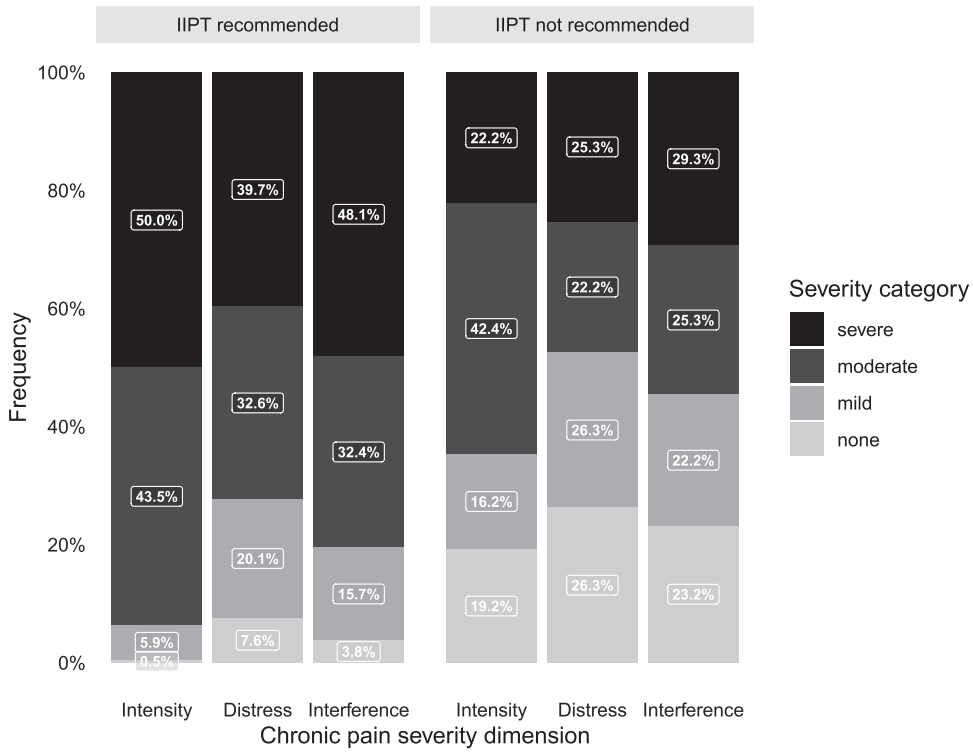

Figure 4. Distribution of severity categories within each chronic pain severity dimension for patients with (n = 184-186) and without (n = 99) IIPT recommendation. Figure is based on complete cases.

by the original authors.[22,40] In addition, 3 other methods of assessment were used for validation: questionnaire self-report, parent-proxy, and HCP-proxy.

All 3 items demonstrated good test–retest reliability. Although all were rated twice within a short timeframe (before and during the appointment) referencing the same 7-day period, the correlation between pairs of ratings was not perfect. This may be because of contextual factors (eg, the presence of others in the room, the child reflecting more deeply on their pain during the appointment) or variation in self-report methods (interview vs questionnaire self-report). Interrater reliability was strong, with the highest concordance observed between patients and HCPs and the lowest between parents and HCPs. Findings from other studies suggest that agreement among patients, parents, and HCPs may be influenced by patient characteristics (eg, acute or recurrent pain, sex, age) and methodological factors (eg, blinding of raters, setting, methods of measurement and analysis).[1,6,9,15,18,19,21,24,36] Most studies conclude that patient self-report is generally preferred over proxy reports. In the current study, patient ratings did not differ significantly from those of HCP or parent proxies for pain intensity and pain-related interference; however, patients rated their pain-related distress significantly lower than did their parents or HCPs. While assessing the patient perspective remains the gold standard, HCP-proxy assessments may be a viable alternative when patient self-report is not feasible. When doing so, it is important to consider that proxy raters may perceive pain-related distress differently than the patient.

While the 3 chronic pain severity ratings are interrelated, they are not unidimensional or redundant. As originally suggested,[40] they should not be combined into a total score but rather reported individually. The multi-trait/multi-method matrix generally revealed expected patterns, with stronger correlations observed for similar constructs and methods. However, it was unexpected that the chronic pain severity items were highly correlated with each other but not with the validated scales measuring similar constructs. For example, pain-related interference was strongly correlated with both intensity and distress items, but weakly correlated with pain-related disability as measured by the PPDI. This observation is supported by the high internal consistency of the severity specifiers. These results suggest that the 3 chronic pain severity items are not sufficiently discriminative within this pediatric sample, contrary to the moderate to high correlations previously found with validated scales in an adult population.[16] Consequently, it remains unclear what exactly the severity items assess in children. The moderate correlations between the chronic pain severity specifiers and the HCPs' global ratings of the patients' pain problems indicate that the 3 items likely reflect a construct resembling pain severity. One possible explanation for the low concurrent/discriminant validity of the 3 specifiers could be the use of a single item to assess complex constructs like distress and interference. Such items require abstract thinking, which could be difficult for children. This difficulty was apparent during the cognitive interviews, leading to the inclusion of examples in the pediatric items to make the concepts more tangible. While the patients who pretested the items approved these additions, the items may still be too abstract, especially for younger children.

Most, but not all, of the suggested severity categories were significantly distinct from each other when considering the global pain severity rated by HCPs. This finding may be attributed to the sample's relatively homogenous nature; all children in the current sample had a level of pain severity that prompted them to seek tertiary care. The severity category cut-offs might not be appropriate or sufficiently distinct for some samples. Therefore, reporting the raw NRS ratings along with appropriate statistics is recommended. Future research should aim to validate and adapt

the suggested cut-offs in a more heterogeneous sample to improve their clinical relevance.

Some pediatric patients with chronic pain did not report experiencing pain in the past 7 days and were thus categorized as having "no" pain according to the severity specifiers. This group may include younger patients, those with migraines, or patients assessed during school holidays.[30,44] Not all pediatric chronic pain patients experience pain every week, leading to potential inadequacies in describing their condition with the 7-day severity specifiers. While this brief timeframe was chosen by the original authors to minimize memory bias, it may not capture patients with longer remission periods. Future research should explore different timeframes (eg, 4 weeks) or frames of reference (eg, "when you last experienced your main pain") to better reflect how children experience chronic pain.

The 3 chronic pain severity items were weakly to moderately correlated with HCPs' recommendations for IIPT. This may be because of other factors, such as the patient's age, contraindications, or reimbursement requirements, which might impact the HCPs' recommendations. The observed correlations between the severity items and the HCPs' global ratings of the patients' pain problems align with prior research, which also reported moderate positive associations between HCPs' global ratings and composite measures of pain severity.[14] Thus, while the 3 chronic pain severity items offer a quick and convenient assessment of chronic pain severity, they cannot replace established measures in clinical practice.

4.1. Practical implications and future directions

Given their quick and easy assessment, future studies on pediatric chronic pain could use the 3 chronic pain severity items to enhance sample description and comparability. However, clinical decisions should not rely solely on these ratings because of their insufficient concurrent and predictive validity, their focus on the past 7 days, and potential variability across different constructs, measurement contexts, and patient populations. It remains unclear how useful these ratings could be in a pediatric primary care setting, and different cut-offs may be needed for different populations (eg, based on sex or age). Establishing data-based cut-off points to identify children in need of intensive treatment could make these specifiers a useful screening tool in primary care.

To evaluate the potential of the chronic pain severity specifiers as a meaningful addition to the ICD-11 diagnosis for pediatrics, longitudinal studies should investigate their test–retest reliability and sensitivity to change before, during, and after interventions. This would facilitate efficient monitoring by HCPs. Furthermore, integrating these multidimensional specifiers with ICD-11 chronic pain diagnoses could improve the recognition of pain-related distress and interference, potentially leading to optimized healthcare planning, policy development, and resource allocation. A randomized controlled trial could determine if incorporating the chronic pain severity specifiers into clinical practice results in more appropriate and effective pain therapy.

4.2. Strengths and limitations

This study is the first to validate the ICD-11 chronic pain severity items in a pediatric sample. To reduce patient burden and avoid disrupting clinical workflows, the standard clinical assessment conducted before the initial visit was used to validate the specifiers assessed during the initial visit. Correlations may thus be lower than expected, because the external measures refer to a different timeframe. However, these external measures demonstrated good stability in prior research.[10,46] That is, without an intervention, the measured constructs remain relatively stable; this is why responses are assumed to be similar during the 2-month waiting period. Future studies should still aim to assess all measures simultaneously. Moreover, additional pain-related constructs, such as pain catastrophizing, could be assessed to further narrow down the constructs underlying the 3 chronic pain severity specifiers.

Using a multi-trait/multi-method design allowed a thorough validation through various assessment methods.[7,49] Moreover, the use of HCP ratings and treatment recommendations, alongside self-report measures, strengthens the clinical relevance of the findings. However, it is important to consider that the correlations between raters might be influenced by the lack of blinding; HCPs were aware of the patient's responses, and parents might have discussed ratings with their children. Therefore, concordance could potentially be lower if raters were assessed independently. Despite this, the study reflects clinical reality, where ratings are typically given after interacting with the patient. The consecutive recruitment of all consenting patients at a specialized pediatric pain center reduces selection bias,[5,28] and the sample's age and sex distributions are comparable to other pediatric chronic pain populations.[11,43]

4.3. Conclusions

The ICD-11's inclusion of pain intensity, distress, and interference underscores the biopsychosocial nature of chronic pain. The 3 chronic pain severity items are easy to use and may simplify the assessment and reporting of multiple dimensions of chronic pain in research and clinical practice, potentially facilitating more comprehensive treatment approaches. These items should, however, be interpreted with caution. Although reliable and seemingly effective in assessing pain severity, the exact constructs each item measures remain unclear. Moreover, children with chronic pain who experience remission phases lasting longer than a week might be overlooked. Therefore, therapeutic or reimbursement-related decisions for individual patients should not rely solely on these 3 items. Generally, the shortcomings of one-item measures should be considered alongside their advantages.

Conflict of interest statement

B. Korwisi reports consulting fees from the International Association for the Study of Pain (IASP), outside the submitted work. B. Korwisi and A. Barke were part of the IASP Task Force that developed the classification. During that work, Philipps University Marburg received a grant towards their salaries from IASP. The remaining authors have no conflicts of interest to declare.

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Supplemental digital content

Supplemental digital content associated with this article can be found online at http://links.lww.com/PAIN/C247.

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