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Pain catastrophizing in children with chronic pain and their parents: Proposed clinical reference points and re-examination of the PCS measure

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Abstract

The current study aimed to validate the child and parent pain catastrophizing scale in a large chronic pain sample and to identify child pain catastrophizing clinical reference points. Patients and parents (n= 697) evaluated at a pediatric pain program completed the Pain Catastrophizing Scale, child (PCS-C) and parent (PCS-P) report, along with additional measures of psychological functioning. The measure's psychometric properties were examined, as well as relations across demographic, pain, and psychological characteristics and pain catastrophizing. Clinical reference points were identified for the PCS-C from differences in pain catastrophizing across levels of disability, depressive symptoms, and anxiety. Overall, we did not find support for the hypothesized three-dimension structure and recommend potentially removing items 7 and 8 for both the PCS-P and PCS-C due to floor/ceiling effects. The 11-item PCS-C is most parsimonious as a unitary construct, while the 11 item PCS-P is comprised of two factors. Although parent catastrophizing was significantly associated with child outcomes after controlling for pain level, it was no longer significant when accounting for child catastrophizing. When comparing PCS-C scores based on child outcomes, significant differences emerged for low, moderate, and high catastrophizing levels.

It appears that the influence of parent catastrophizing on outcomes can be explained through its impact on child catastrophizing levels. Lastly, PCS-C reference points derived from this large sample can aid clinicians in assessment and treatment planning, in turn increasing the utility of the PCS-C for both clinical and research purposes.

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Introduction

Pain catastrophizing is a cognitive attributional style characterized by a negative mindset, magnification, and rumination about pain [28]. Pain catastrophizing is an important psychological construct in pediatric chronic pain assessment, measured by the Pain Catastrophizing Scale-Child and Parent reports (PCS-C; PCS-P) [7; 11]. Catastrophizing in children has been linked to poor functioning and higher pain levels [7; 12; 26] and identified as a significant predictor of persistent pain and central sensitization into young adulthood [35].

Additionally, higher levels of parent's catastrophic thinking regarding their child's chronic pain are associated with a greater tendency to restrict their child's pain-inducing activity [3] and a greater tendency to prioritize attempts to control their child's pain [2]. Parent pain catastrophizing has also been found to be a mediating factor between protective parental responses and levels of disability [12; 18; 36]. Parent and child catastrophizing have been found to be highly concordant, with high levels strongly associated with poor patient outcomes [19].

Despite growing evidence of the importance of assessing and targeting child and parent catastrophizing, the constructs have not been thoroughly validated with English-speaking pediatric patients with chronic pain. The original PCS-C was validated with Dutch-speaking healthy children and a small Dutch pediatric chronic pain sample [7], while the PCS-P was validated with Dutch-speaking caregivers of children with chronic pain [11]. The Dutch PCS-C and PCS-P maintained the three-factor structure of the adult version [27] that has been widely used. PCS-C factor validity was also tested in a community population of English-speaking children [20] with results suggesting a revised three-factor structure with removal of two items. Although the English version of the PCS-C and P are extensively used for clinical and research purposes, each measure's item variability and factor structure have never been examined among English-speaking children with chronic pain or parents of children with chronic pain. Furthermore, there are no validated reference points for clinically elevated levels of pain catastrophizing in youth.

This analysis evaluates the psychometric properties of the English version PCS-C and PCS-P with a large sample of pediatric chronic pain patients and their parents. In addition, it explores if: (1) demographic variables and pain characteristics differ across pain catastrophizing levels for children and for parents, (2) child and parent pain catastrophizing uniquely contribute to child outcomes of disability, depressive symptoms, and anxiety symptoms, and (3) we can establish valid clinical reference points for the PCS-C.

We hypothesized that the 3-factor structure of the parent and child PCS would be upheld and that pain catastrophizing levels would not differ significantly by demographic variables, but that higher pain levels would relate to higher levels of catastrophizing. We also hypothesized that both child and parent catastrophizing would uniquely predict child outcomes. Lastly, we hypothesized that, consistent with previous research establishing clinical reference points for related constructs [14; 25], tertiles of high, moderate, and low

catastrophizing groups would differ significantly across child outcomes, suggesting potential clinical reference points for children with chronic pain.

Methods

Procedure

All measures were completed for clinical purposes as part of an initial multidisciplinary evaluation. Data for this analysis was extracted from a large IRB-approved retrospective record review examining pain-related psychological factors in children and adolescents with chronic pain. Questionnaires are mailed to families prior to the child's headache/pain clinic evaluation. Parents and children are asked to complete measures separately and bring them to the clinic evaluation. Children at the Pediatric Headache Program were evaluated by a neurologist and psychologist. Children at the Chronic Pain Clinic were evaluated by a physician, physical therapist, and psychologist. A psychologist reviewed all questionnaire data prior to the clinical interview.

Participants

There were 765 records extracted from our ongoing clinical databases. Evaluation dates ranged from September 2008 to March 2013. Only participants with complete PCS-C and PCS-P data were included in this analysis (n=697 total; 534 from the chronic pain clinic, 163 from the pediatric headache program). Participants were primarily White (92.2%) and female (77.6%), consistent with the population of children seen in this tertiary care setting (see Table 1). Mean age was 13.9 years. Most prevalent primary pain diagnoses include headache (25.6%), neuropathic (e.g., complex regional pain syndrome; 22.7%), or musculoskeletal (e.g., leg pain; 21.1%). Duration of pain varied extensively from 1–209 months, with a median duration of pain of 15 months (see Table 1 for further details).

Measures

Demographic and medical variables—Demographic and medical variables were extracted from patient clinical charts.

Pain intensity—During the clinic evaluation, patients were asked to provide average pain ratings on a standard 0–10, 11-point numeric rating scale [32]. A "0" indicates no pain at all while a "10" indicates the most pain possible.

Pain catastrophizing—The Pain Catastrophizing Scale, Child and Parent report (PCS-C [7]; PCS-P [11] is a validated self-report measure adapted from the Pain Catastrophizing Scale [27] that is used to assess negative thinking associated with pain. The PCS-C and PCS-P include 13 items, which are rated on a 5-point scale ranging from 0 = "not at all true" to 4 = "very true." The items are divided across three subscales: rumination (4 items, e.g. "When I have [my child has] pain, I can't keep it out of my mind"), magnification (3 items, e.g. "When I have [my child has] pain, I keep thinking of other painful events") and helplessness (6 items, e.g. "When I have [my child has] pain, I feel like I can't go on"). Items are summed across subscales to derive a total score ranging from 0–52; higher scores

reflect higher levels of catastrophic thinking. Internal reliability estimates for the current sample were 0.93 for the PCS-C and 0.91 for the PCS-P.

Functional disability—The Functional Disability Inventory (FDI [[34]] is a self-report scale for children and adolescents that assesses difficulty in physical and psychosocial functioning due to physical health. The instrument consists of 15 items concerning perceptions of activity limitations during the past 2 weeks; total scores are computed by summing the items. Higher scores indicate greater disability. Scores ranging from 0–12 are classified as none or minimal disability, 13–29 as moderate disability, and scores ≥30 reflect severe disability [14]. The FDI has good reliability and validity [5]. Internal reliability for the current sample was 0.90.

Depressive Symptoms—The Children's Depression Inventory (CDI [[15]] was used to assess child depressive symptoms. The CDI is a 27 item self-report measure where items are rated on a 3-point scale. Higher total scores indicate higher levels of depressive symptoms. Internal reliability for the current sample was 0.88.

General Anxiety—The Revised Children's Manifest Anxiety Scale (RCMAS 1 & 2 [[21; 22]] is a well-validated and reliable self-report measure used to assess symptoms of anxiety in children ages 7–17. All items, except for the lie scale items, are summed to obtain a total anxiety score. Internal reliability for the current sample was 0.93.

Statistical Analysis

All data were entered and analyzed using SPSS version 21 and AMOS version 21. Descriptive statistics examining item skew and kurtosis were calculated to examine underlying assumptions of normality for the PCS-C and PCS-P. Item-total correlations were calculated for both measures. Given that the PCS-C and PCS-P were previously validated measures, confirmatory factory analysis (CFA) was first conducted to determine if the current 3-factor structure would be upheld in a pediatric chronic pain sample. Based on recommendations by Bentler and Bonett [1] and Ullman [30], the following statistics were used to evaluate model fit: χ^2, χ^2/df (≤2 acceptable); Comparative Fit Index (CFI;≥.90 acceptable, ≥.95 excellent); and Root Mean Square Error of Approximation (RMSEA;≤.08 acceptable, ≤.05 excellent). As described in the results, poor fit, skewed items, and unaccounted for shared variance motivated using an exploratory factor analysis to explore alternative factor structures [6]. Descriptive statistics were calculated for all demographic, medical, and study variables. Pearson product-moment correlation coefficients were computed to assess the relationships among total pain catastrophizing scores, age, duration of pain, typical pain rating, and psychosocial variables. One-way ANOVAs were used to examine parent and child catastrophizing scores by gender and pain diagnosis. Linear regression analyses were conducted to examine the association between the PCS-C and PCS-P and the outcomes (disability, depression, anxiety), adjusting for demographic and pain variables. Lastly, using one-way ANOVAs, we examined potential differences in child catastrophizing levels across child outcomes to develop clinically meaningful reference points for the PCS-C.

We examined quartile and tertile groupings of PCS-C scores based on methods used previously to establish clinical reference points for levels of pain-related disability [13; 14]. We first classified scores in four levels of catastrophizing (No/ minimal, Mild, Moderate, and Severe), using quartile groupings based on distribution of PCS-C scores, One way analysis of variances (ANOVAs) and post-hoc tests were then conducted in order to test the validity of the classification and determine whether using quartile reference points was clinically meaningful as measured by significant differences in levels of pain-related disability, depressive symptoms, and anxiety across all four groups. Our goal was to systematically modify and refine the classification (e.g. from quartile to tertile) such that increasing levels of pain catastrophizing would align with statistically significant decreases in physical functioning and increases in emotional distress (depressive symptoms and anxiety) and thus reflect distinct and clinically meaningful reference points for the PCS-C.

Results

Item variability and skew

PCS-C—We examined the means, standard deviations, skew, and kurtosis for all items (Table 2). Two items were noteworthy. Item #7, “When I have pain, I keep thinking of other painful events” was rarely endorsed (M=.52, SD=.98) with a skew of 1.98 and kurtosis of 3.08. Item #8,“When I have pain, I want it to go away,” was highly endorsed (M=3.33, SD=.73) with a skew of −1.47 and kurtosis of 3.93. Item-total correlations were conducted and ranged from .46 to .77, with item #7 (.46) and item #8 (.47) being the two lowest correlating items; all remaining items correlated above .50.

PCS-P—Consistent with the PCS-C, item #7 “When my child has pain, I keep thinking of other painful events” was rarely endorsed (M=.52, SD=.98) with skew of 1.98 and kurtosis of 11.40. Item #8 “When my child has pain, I want it to go away” was highly endorsed (M=3.39, SD=.67) with a skew of −1.35 and kurtosis of 3.83. Item-total correlations were conducted and ranged from .35 to .75. Notably, the lowest correlating items were #7 (.35) and #8 (.38) with all remaining items correlating above .40.

Confirmatory Factor Analysis

The hypothesized three-factor model for the PCS-C and PCS-P was tested with structural equation modeling in order to examine the fit of the overall model. The model fit was poor [$\chi^2(62) = 351.80$, $p<.01$; $\chi^2/df = 5.67$; CFI = .94, RMSEA = .08 (90% CI = .074-.090)]. The model fit for the PCS-P was also poor [$\chi^2(62) = 436.7$, $p<.01$; $\chi^2/df = 7.04$; CFI = .92, RMSEA = .09 (90% CI = .085-.102)]. We were concerned that the two problematic items (#7 and #8) were contributing to the poor overall model fit. Unfortunately, removing these two items from the CFA resulted in one subscale consisting of only two items and this would be rendered unstable. Additionally, the modification indices suggested adding error covariances for several pairs of items, allowing many items to cross-load across the three factors, suggesting shared variance between items that is not explained by the current three-factor model. These two issues, coupled with the fact that this is the first examination of this measure in a large clinical sample of youth with chronic pain, led us to pursue an

exploratory factor analysis with and without items #7 and #8 for the child and parent versions of the PCS.

Exploratory Factor Analysis

For both measures we first ran maximum likelihood factor analysis with oblique rotation with all items included and then re-ran the EFA excluding items 7 and 8.

PCS-C—With a criteria of eigenvalues >1, a 2-factor solution emerged with the items from the helplessness and magnification subscale on the first factor and the four items from the rumination subscale on the second factor. All items adequately loaded on these two dimensions, with 61.8% of the variance accounted for. When the EFA was run excluding items 7 and 8, a one-factor structure emerged, accounting for 58.8% of the variance (see Table 3 for individual factor loadings for the two-factor and one-factor solutions).

PCS-P—With a criteria of eigenvalues >1, a 2-factor solution emerged consisting of predominantly rumination and magnification on the first factor and helplessness on the second factor. One item cross-loaded across the two factors (item 6). This structure accounted for 58% of the variance. When the EFA was run excluding items 7 and 8, a two-factor structure persisted, with 64.3% of the variance accounted for. The first factor generally consisted of rumination and magnification, with the second factor composed exclusively of helplessness items (see Table 4 for individual factor loadings of the two-factor 13-item and 11-item versions).

Overall, we did not find support for the hypothesized three-dimension structure and recommend potentially removing items 7 and 8 for both the PCS-P and PCS-C due to floor/ceiling effects. The 11-item PCS-C is most parsimonious as a unitary construct, while the 11 item PCS-P is comprised of two factors.

Demographic and pain factors with pain catastrophizing

Age and pain duration were not significantly correlated with child or parent catastrophizing scores (see Table 4). One-way ANOVA results examining differences in parent and child pain catastrophizing scores by gender and pain diagnosis were not significant. Average pain rating was modestly correlated with child (r= .26, p<.01) and parent (r=.13, p<.01) catastrophizing.

Child outcomes and pain catastrophizing

At the bivariate level both parent and child catastrophizing were significantly associated with child outcomes of disability, depressive symptoms, and general anxiety (see Table 5). The magnitude of the relations was stronger for child compared to parent catastrophizing levels across outcomes.

Given that child and parent catastrophizing were moderately correlated (r= .43, p<.01), we examined the unique contribution of each on child outcomes. Parent catastrophizing was a significant predictor of functional disability, depressive symptoms, and anxiety symptoms after controlling for pain level (see Table 6). Parent catastrophizing accounted for 3%, 3%,

and 5% of each outcome, respectively. However, the modest relationship between parent catastrophizing and child outcomes was no longer significant after including child catastrophizing in the regression model. Child catastrophizing uniquely accounted for 4%, 8%, and 14% of the disability, depressive symptoms, and anxiety outcomes, respectively.

Clinical reference points for the PCS-C

As the PCS-C is used quite frequently in clinical practice to assess for levels of catastrophic thinking about pain, we examined whether meaningful clinical reference points could be derived in a large sample of children with chronic pain. We examined differences in functional disability, depressive symptoms, and anxiety across the quartile and tertile groups. Given that we did not measure parent-specific behavior or emotional functioning, we did not examine clinical reference points for the PCS-P.

PCS-C—Across quartiles, the omnibus ANOVAs were significant for differences in disability, depressive symptoms, and anxiety. When examining post-hoc pairwise comparisons with Scheffe's adjustment for multiple comparisons, disability and depressive symptoms were not significantly different across the four groups but anxiety symptoms were different with progressively higher levels of anxiety across the four catastrophizing groups. For tertiles, the omnibus ANOVAs were significant across all outcomes with significant differences found with scheffe post-hoc pairwise comparisons for the low, moderate, and high catastrophizing groups (see Table 7 for further details).

Results for the PCS-C suggests three clinical reference points: low (0–14), moderate (15-25), and high (26 and greater) catastrophizing.

Discussion

The current analysis extends prior work on the Pain Catastrophizing Scale in children and parents by examining the psychometric properties of the English language PCS-C and PCS-P with a large population of patients with chronic pain and their parents. Additionally, relationships between parent and child pain catastrophizing and demographic factors, pain characteristics, and child outcomes were examined. Lastly, we sought to establish clinical reference points for child pain catastrophizing levels.

Our findings indicate that, psychometrically, two items lacked sufficient variability and may not be clinically useful. Overall there was not strong evidence for three distinct dimensions of pain catastrophizing in children with chronic pain and their parents. Furthermore, the measure was invariant across demographic and pain-related factors. In examining its relation to pain-related outcomes, it appears that the influence that parent catastrophizing has on child functioning can be explained through child catastrophizing. Lastly, potential clinical reference points for low, moderate, and high catastrophizing levels for children were identified. These scores may provide much needed clinical interpretative guidelines for these frequently used assessment measures.

Psychometric evaluation

In examining the psychometric properties of both the child and parent pain catastrophizing scales, two items lacked significant variability. Item 8 which states “When I am in pain, I want the pain the go away,” was highly endorsed by most patients, and this response pattern is consistent with a recent validation of the English language PCS-C in healthy children [20]. A desire for pain to no longer be present is quite intuitive and suggests that this item may not provide any differential or clinically meaningful information. The other troublesome item, #7, which states, “When I have pain, I keep thinking of other painful events” was rarely endorsed. Given how infrequent this item was endorsed, a positive response to this item may be an important indicator of intrusive thoughts the patient may be having. Item analysis was not reported in the validation of the Dutch version of the PCS-C and PCS-P, thus, it is unclear if items 7 and 8 lacked variability in the original validation [4].

With regards to confirmatory factor analysis, the hypothesized three-dimensional structure was not supported in the PCS-C or PCS-C. This led us to conduct exploratory factor analysis with and without the two problematic items. For the PCS-C, the 13-item version reflected a two-dimensional construct consisting of helplessness/magnification and rumination while the 11-item version emerged as a unitary construct. Based on these results, it is not clear that pain catastrophizing as measured with the PCS in children and adolescents can be reliably discerned as multidimensional and, thus, may be best interpreted as a unitary construct. That is in line with results from a recent evaluation of the German PCS-C (SKS-D) that resulted in a onefactor structure [16].

Also contrary to prior findings [11], two factors emerged for both the 13 and 11-item versions of the PCS-P: helplessness emerged separately while rumination/magnification collapsed together. The previously reported fit of the three factor structure for PCS-P [11] was not particularly strong and only worsened with our large sample. Inclusion of error covariances and presence of high correlations between the sub scales in the original validation analysis [11] reflects that these dimensions may not be as separate as they have been theorized to be.

Furthermore, despite establishment of the three PCS subscales, most research examining pain catastrophizing in children and parents has focused on the total scale score [9; 19], with the current results supporting a one or two dimensional measure. In clinical practice, the differentiation between the dimensions of catastrophizing (i.e. magnification, helplessness, rumination) is likely subtle and, thus, unlikely to impact treatment decisions significantly.

Associations with demographics and outcomes

Both parent and child catastrophizing were invariant across demographic and painrelated factors, including pain diagnosis. This is contrary to prior research that has identified gender differences in pain catastrophizing [27; 29]. With modest associations between pain level and catastrophizing levels, it appears that many other factors contribute to the degree to which an individual catastrophizes about their pain. In fact, it may be that a tendency to catastrophize drives perception of pain severity [10; 19], as put forth in the Fear Avoidance

Model [24; 31] and other models of pain-related beliefs and functioning [37]. Further research is needed to understand the directionality of this relationship.

Although parent catastrophizing was significantly associated with child levels of disability, anxiety symptoms, and depressive symptoms after controlling for level of pain, there was no longer a direct link between the two when child catastrophizing was accounted for in the regression model. This suggests that the influence that parent catastrophizing has on child functioning can be explained through child catastrophizing, which aligns with recent theories [14]. The influence of parent catastrophizing can be explained through child catastrophizing by way of two possible mechanisms: 1) a child who naturally catastrophizes may send cues to the parent, who responds by catastrophizing about the pain, or 2) the parent transmits their catastrophic interpretations to the child. This latter explanation is consistent with prior work examining parental influences on adolescent beliefs and outcomes where parent catastrophizing and stress directly influence adolescent beliefs (acceptance, catastrophizing), indirectly influencing pain-related outcomes [33]. Although prior work demonstrated that child catastrophizing was significantly associated with pain-related outcomes in children after controlling for parent catastrophizing using partial correlations [19], this is the first study to examine how each uniquely contributes to these processes.

Clinical reference points

Through identifying significant differences in child functioning across catastrophizing levels, we derived potential reference points for low, moderate, and high catastrophizing levels for the PCS-C. This approach to creating clinically meaningful scoring reference points has proved clinically useful for the Functional Disability Inventory [14]. It helps clinicians to quickly and meaningfully interpret scores on the PCS-C, aid in treatment decisions for children and adolescents with chronic pain, as well measure clinically significant changes in catastrophizing levels. For example, being able to identify high levels of catastrophizing in a patient points directly to cognitive-behavioral treatment to target negative beliefs associated with pain [23; 38].

Limitations

With regards to limitations, it is notable that this study included cross-sectional data, thus any influence that parent catastrophizing may have on child catastrophizing or how either may influence child outcomes can only be interpreted as concurrently influential, rather than sequential. Although the sample is not ethnically diverse, it is reflective of the patient population typically seen in our pain clinic and the demographics reported in other pediatric pain clinics in the United States. Further consideration is needed to confirm the generalizability of these findings to other tertiary care settings. We did, however, find that our sample means (PCS-C m=21.0, PCS-P m=20.0) were higher than a healthy sample (PCS-C m=16.8 [20]), lower than an intensive rehabilitation sample (PCS-C m=29.6, PCS-P m=27.3 [33]), and fairly commensurate to what was found in a small Dutch sample of pediatric pain patients (PCS-C m=21.9 [7]), although higher than was found in a subset of children with pain in a large Englishspeaking community sample (PCS-C m=17.2 [20]). Finally, given that the PCS-C was adapted from an adult measure, it is possible that the

measure is not fully reflective of children and adolescent's catastrophic thoughts and worries about pain [8]. A recent topical review by Eccleston and colleagues [8] poses several important arguments from a developmental perspective for reappraising our current conceptualization of pain catastrophizing in children, as well as challenging the content of the PCS-C. This conceptual dissonance may also explain some of the inconsistencies of the factor structure of the PCS-C and PCS-P and the low item variability for two items on the scale. Despite these limitations, the PCS-C is widely used to assess pain-related catastrophizing in children for research and clinical evaluation, and thus a valuable measure. The current study provides potentially meaningful clinical reference points to interpret levels of pain catastrophizing in children that can be tied to treatment.

Future Directions and Conclusions

Moving forward, it is important to investigate whether PCS-C and PCS-P scores change in response to targeted treatment interventions and, if so, what other variables relate to this change. Furthermore, it is important to understand whether or not changes in catastrophizing levels implicate improvements in outcomes. Of note, a recent paper by Levy et. al. [17] found child catastrophizing to be a mediator of reductions in child-reported gastrointestinal symptom severity, but not other outcomes; thus more research is needed to understand how pain catastrophizing may differentially impact outcomes. Future research should also establish clinical reference points for the PSC-P based on parent- specific measures of behavior and emotional functioning.

In closing, chronic pain in children and adolescents is a complex, multi-faceted issue, with numerous psychological, psychosocial, and biological, and factors to consider. Pain catastrophizing is one type of cognitive response to this vast experience. Gaining a better understanding of children's and parent's responses to pediatric chronic pain contributes another piece to the puzzle, simultaneously offering clinicians another view into the family's pain experience as well as implications for optimizing treatment, diagnosis, and research.

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Summary

There is not strong evidence for the three-dimensional structure of the PCS-C or PCS-P. Proposed child clinical reference points may aid in assessment and treatment.

Table 1

Participant characteristics (n=697)

Variable	n	%
Gender		
Female	539	77.3%
Male	158	22.7%
Race		
White	642	92.2%
Black or African American	17	2.4%
Asian	10	1.4%
Multiracial	3	0.4%
Other	24	3.4%
Child's pain diagnosis		
Headache	175	25.6%
Neuropathic pain	155	22.7%
Musculoskeletal	144	21.1%
Back/neck pain	80	11.7%
Recurrent abdominal pain	51	7.5%
Other (e.g. chest pain)	49	7.2%
Gynecological or genitourinary	30	4.4%
Disability level		
None/Minimal (0–12)	173	25.8%
Moderate (13–29)	309	46.1%
Severe (30–60)	188	28.1%

Table 2

Descriptive statistics for PCS-C and PCS-P items

Item	Mean (*SD*)	Skewness (*SE*)	Kurtosis (*SE*)
Child PCS			
When I have pain…			
1. I worry all the time about whether the pain will end.	1.48 (*1.30*)	.41 (*.09*)	−1.01 (*.19*)
2. I feel I can't go on.	.92 (*1.12*)	1.03 (*.09*)	.05 (*.19*)
3. It's terrible and I think it's never going to get better.	1.17 (*1.30*)	.78 (*.09*)	−.63 (*.19*)
4. It's awful and I feel that it takes over me.	1.47 (*1.30*)	.35 (*.09*)	−1.08 (*.19*)
5. I can't stand it anymore.	1.83 (*1.34*)	.11 (*.09*)	−1.21 (*.19*)
6. I am afraid that the pain will get worse.	1.68 (*1.31*)	.17 (*.09*)	−1.16 (*.19*)
7. I keep thinking of other painful events.	.52 (*.98*)	1.98 (*.09*)	3.08 (*.19*)
8. I want the pain to go away.	3.33 (*.73*)	−1.47 (*.09*)	3.93 (*.19*)
9. I can't keep it out of my mind.	1.90 (*1.30*)	−.04 (*.09*)	−1.13 (*.19*)
10. I keep thinking about how much it hurts.	1.72 (*1.30*)	.18 (*.09*)	−1.10 (*.19*)
11. I keep thinking about how much I want the pain to stop.	2.52 (*1.25*)	−.57 (*.09*)	−.72 (*.19*)
12. There is nothing I can do to reduce the pain.	1.60 (*1.33*)	.29 (*.09*)	−1.16 (*.19*)
13. I wonder whether something serious may happen.	.93 (*1.18*)	1.10 (*.09*)	.178 (*.19*)
Parent PCS			
When my child is in pain…			
1. I worry all the time about whether the pain will end.	1.91 (*1.29*)	.09 (*.09*)	−1.09 (*.19*)
2. I feel I can't go on like this much longer.	1.05 (*1.18*)	.84 (*.09*)	−.38 (*.19*)
3. It's terrible and I think it's never going to get better.	.95 (*1.12*)	1.02 (*.09*)	.14 (*.19*)
4. It's awful and I feel that it overwhelms me.	1.01 (*1.17*)	.93 (*.09*)	−.18 (*.19*)
5. I can't stand it anymore.	.78 (*1.09*)	1.36 (*.09*)	.96 (*.19*)
6. I become afraid that the pain will get worse.	1.24 (*1.18*)	.66 (*.09*)	−.55 (*.19*)
7. I keep thinking of other painful events.	.22 (*.63*)	3.28 (*.09*)	11.40 (*.19*)
8. I want the pain to go away.	3.39 (*.67*)	−1.35 (*.09*)	3.83 (*.19*)
9. I can't keep it out of my mind.	1.66 (*1.20*)	.18 (*.09*)	−.94 (*.19*)
10. I keep thinking about how much he/she is suffering.	2.16 (*1.19*)	−.22 (*.09*)	−.84 (*.19*)
11. I keep thinking about how much I want the pain to stop.	2.70 (*1.14*)	−.77 (*.09*)	−.21 (*.19*)
12. There is nothing I can do to stop the pain.	1.90 (*1.21*)	.02 (*.09*)	−.98 (*.19*)
13. I wonder whether something serious may happen.	1.04 (*1.17*)	.91 (*.09*)	−.19 (*.19*)

Note. n's for the individual items ranged from 690 to 697.

Table 3

Summary of factor loadings for PCS-C and PCS-P

Item	PCS-C Two factors & 13-items		PCS-C One factor & 11-items
Item 3: … terrible and think it's never going to get better.	.92		.79
Item 4: … awful and feel it takes overwhelms me.	.80		.81
Item 5: … can't stand it anymore.	.80		.77
Item 2: … feel I can't go on.	.76		.722
Item 1: … worry all the time whether the pain will end.	.71		.77
Item 13: … wonder whether something serious may happen.	.65		.62
Item 6: … afraid that pain will get worse.	.61		.78
Item 12: … nothing I can do to reduce the pain.	.47		.55
Item 7: … keep thinking of other painful events.	.39		--
Item 9: … can't keep it out of my mind.		−.99	.80
Item 10: … keep thinking about how much it hurts.		−.81	.80
Item 11: … keep thinking about how much I want the pain to stop.		−.48	.69
Item 8: … want pain to go away.		−.40	--
Eigenvalue	**6.94**	**1.09**	**6.46**
% Variance	**53.4**	**8.39**	**58.8**

Table 4

Summary of individual factor loadings for PCS-P

Item	PCS-P Two factors & 13-items		PCS-P Two factors & 11-items	
Item 10: … keep thinking about how much it hurts.	.88		.93	
Item 11: … keep thinking about how much I want the pain to stop.	.80		.82	
Item 9: … can't keep it out of my mind.	.67		.70	
Item 1: … worry all the time whether the pain will end.	.56		.59	
Item 8: … want pain to go away.	.47			--
Item 6: … afraid that pain will get worse.	.45	−.36	.48	−.32
Item 13: … wonder whether something serious may happen.	.40		.42	
Item 7: … keep thinking of other painful events.	.33			--
Item 5: … can't stand it anymore.		−.88		−.87
Item 2: … feel I can't go on.		−.86		−.85
Item 4: … awful and feel it takes overwhelms me.		−.86		−.83
Item 3: … terrible and think it's never going to get better.		−.60		−.57
Item 12: … nothing I can do to reduce the pain.		−.39	.32	
Eigenvalue	**6.25**	**1.31**	**5.94**	**1.31**
% Variance	**48.1**	**10.0**	**54.0**	**10.3**

Table 5

Bivariate correlations between study variables

Variable	1	2	3	4	5	6	7	8	Mean	SD	Range	N
1. Child's age	--	.10**	−.02	.03	.01	.07	.07	.06	13.9	2.4	8–19	697
2. Pain duration (months)		--	−.09*	−.12**	−.12**	.02	−.02	−.02	27.3	33.8	1–209	690
3. Typical pain rating			--	.27**	.14**	.12**	.26**	.13**	5.89	1.99	0–10	683
4. Disability				--	.09*	.32**	.32**	.20**	21.8	11.9	0–54	670
5. Depressive symptoms					--	.47**	.35**	.18**	57.7	13.1	34–100	661
6. Generalized anxiety						--	.45**	.23**	47.6	13.2	20–87	636
7. Child catastrophizing							--	.43**	21.0	11.5	0–52	697
8. Parent catastrophizing								--	20.0	9.91	0–49	697

Note.

* $p < .05$;

** $p < .01$.

Table 6

Child and parent pain catastrophizing on disability, depression, and anxiety

Variables	β	Beta	*t*	R^2 Change
Outcome: Disability				
Step 1				
Average pain	1.60	.27	7.15**	*.07***
Step 2				
Average pain	1.47	.25	6.632**	*.03***
Parent catastrophizing	.20	.17	4.60**	
Step 3				
Average pain	1.18	.22	5.30**	*.04***
Parent catastrophizing	.09	.08	1.38	
Child catastrophizing	.25	.24	5.83**	
Outcome: Depression				
Step 1				
Average pain	.91	.14	3.59**	*.02***
Step 2				
Average pain	.78	.12	3.07**	*.03***
Parent catastrophizing	.22	.17	4.30**	
Step 3				
Average pain	.35	.05	1.40	*.08***
Parent catastrophizing.	05	.04	.93	
Child catastrophizing	.36	.32	7.61**	
Outcome: Generalized anxiety				
Step 1				
Average pain	.80	.12	3.03**	*.01***
Step 2				
Average pain	.61	.09	2.37*	*.05***
Parent catastrophizing	.30	.22	5.74**	
Step 3				
Average pain	.04	.01	.16	*.14***
Parent catastrophizing	.07	.05	1.37	
Child catastrophizing	.48	.42	10.31**	

Note.

* $p < .05$;

** $p < .01$.

Table 7

One-way ANOVAs between child pain catastrophizing clinical reference points and psychological variables

	Catastrophizing groups			
Variable	**Low Mean (*SD*)**	**Moderate Mean (*SD*)**	**High Mean (*SD*)**	***f***
Child Catastrophizing				
Disability	17.6 (*11.5*)[a]	21.8 (*12.5*)[b]	25.6 (*10.4*)[c]	29.7**
Depressive symptoms	52.5 (*13.1*)[a]	57.8 (*11.7*)[b]	62.3 (*12.4*)[c]	36.0**
Generalized anxiety	41.1 (*12.3*)[a]	48.2 (*13.0*)[b]	53.9 (*11.0*)[c]	63.7**

Note.

** p<.01;

Within rows, means with different superscripts differ significantly at p<.05 (e.g., *a* is significantly different from *b* and *c*); For child catastrophizing, samples size for each group was n=235 (low), n=203 (moderate), and n=259 (high).