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Living in Fear of Your Child's Pain: The Parent Fear of Pain Questionnaire

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Abstract

Fear and avoidance have been consistently associated with poor pain-related outcomes in children. In the context of the pediatric pain experience, parent distress and behaviors can be highly influential. The current study validated the Parent Fear of Pain Questionnaire (PFOPQ) to assess a parent's fears and avoidance behaviors associated with their child's pain. Using the PFOPQ in conjunction with measures of parent and child pain-related variables, we tested the Interpersonal Fear Avoidance Model (IFAM). The sample comprised of 321 parents and their child with chronic or new-onset pain who presented to a multidisciplinary outpatient pain clinic. An exploratory factor analysis yielded a 4-factor structure for the PFOPQ consisting of Fear of Pain, Fear of Movement, Fear of School, and Avoidance. As hypothesized, Fear of Pain was most closely related to parent pain catastrophizing and child fear of pain, while Avoidance was most closely related to parent protective behaviors and child avoidance of activities. In testing the IFAM, parent behavior contributed directly and indirectly to child avoidance while parent fear and catastrophizing contributed indirectly to child avoidance through parent behavior and child fear and catastrophizing, in turn, influencing child functional disability levels. The current study provides the first measure of parent pain-related fears and avoidance behaviors and evaluates the theorized IFAM. These results underscore the important influence of parents on child pain-related outcomes and puts forth a psychometrically sound measure to assess parent fear and avoidance in the context of their child's pain.

Keywords

chronic pain; anxiety; pain-related fear; functional disability; psychological assessment; fear avoidance model of pain

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Introduction

Parent distress and behaviors have a demonstrated impact on a child's pain experience, whether in the context of acute [2,4] or chronic pain [13,27]. The Interpersonal Fear Avoidance Model of Pain (IFAM) was recently put forth as one theoretical framework for understanding the perpetuation of pain-related disability in children (**Figure 1**; adapted from [15]). The IFAM builds upon the Fear Avoidance Model of Chronic Pain [37] with the inclusion of parent cognitive-affective and behavioral factors that have either been proven to impact child outcomes or are theorized to do so. Within the IFAM, when parents interpret a child's pain expression through the lens of their own catastrophic appraisals and pain-related fears, they are more likely to engage in maladaptive parenting behaviors (minimizing, protective). Such parent behavior can result in the child avoiding activities and ultimately having higher levels of functional disability. In addition, the parent may suffer emotionally and experience interference of their own life goals as a result of their child's pain, getting caught up in a cycle of avoidance and activity restriction.

Evidence supports the relationships between multiple elements of the IFAM theoretical model. For instance, both parent pain catastrophizing and protective behavior have been associated with prioritizing pain control [6] and functional disability [23,41] in children with pain with protective behavior mediating the relationship between parent pain catastrophizing and child school functioning [22]. Parent minimization has been associated with child somatic symptoms [7], poor child functioning [9], and decreased parent acceptance of pain [33]. However, specific relationships between parent pain-related fear and maladaptive behaviors, particularly as it relates to child functioning, has yet to be examined due to the lack of a specific measure to assess pain-related fear in parents.

The aim of the current study was to develop and validate a measure that specifically assesses parent pain-related fears in the context of their child's pain. The Parent Fear of Pain Questionnaire (PFOPQ) was based on the Fear of Pain Questionnaire-parent report [32]. Each item on the PFOPQ reflects a parent's own pain-related fears and avoidance behaviors ("I cancel plans when my child is in pain"). We evaluated the psychometric properties of the PFOPQ through examining item variability, factor structure, and internal consistency. Construct validity was examined via bivariate correlations between PFOPQ and parent catastrophizing, parent maladaptive behavior, and child pain-related fear. Lastly, utilizing the PFOPQ, we tested the IFAM in predicting child functional disability.

We hypothesized that the PFOPQ would be psychometrically strong and have three subscales: Fear of Pain, Fear of School, and Avoidance, based on pilot testing of the PFOPQ (detailed in the Methods). We hypothesized that PFOPQ-Fear of Pain would be most closely linked to parent pain catastrophizing and child fear, while PFOPQ-Avoidance would be most closely linked to maladaptive parent responses and child avoidance. Lastly, we anticipated that we would find an excellent fit for the IFAM model with parent fear demonstrating a direct (on child avoidance) and indirect (through protective and minimizing responses) influence on child avoidance and functional outcomes (see **Figure 2**).

Method

Participants

Patients ages 8 to 18 and an accompanying parent who presented for a multidisciplinary pain clinic evaluation between January 2012 to April 2014 were invited to participate. Of the 452 patients who were eligible for the study, 321 were enrolled (71% recruitment rate). Primary reason for not enrolling was research recruitment conflicting with clinic schedule (e.g., patient arrived late, lengthy evaluation). Parents were predominantly mothers (92%) and the majority were married (67%). Parents were generally well-educated, with 64% of mothers having completed college (42%) or a graduate degree (22%) and 61% of fathers completing college (34%) or a graduate degree (27%).

Patients were predominantly Caucasian (90%) and female (74.8%). Mean age was 13.73 (SD=2.47). Primary pain diagnosis included: Musculoskeletal pain (43.2%), Complex Regional Pain Syndrome (CRPS; 18.6%), Neuropathic (not CRPS; 7.3%), Functional Abdominal Pain (6.6%), Headache (including chronic daily, tension, migraine, and combined headaches; 6.0%), Endometriosis (3.5%), and other diagnoses (e.g., juvenile rheumatoid arthritis, inflammatory bowel disease, Ehlers-Danlos Syndrome/joint hypermobility, gynecological pain, genitourinary pain, postural orthostatic tachycardic syndrome, conversion disorder; 14.8%). Primary pain location included: lower extremity (37.1%), upper extremity (11.3%), back/neck (19.2%), abdomen (including flank and chest, 14.2%), head (including jaw and face, 8.5%), hip/pelvis (5.7%), and diffuse body pain (4.1%). Duration of pain ranged from less than one month to over 15 years with a median duration of 13 months; 8.8% reported pain duration of less than 3 months.

Measures

Parent fear of pain—The Parent Fear of Pain Questionnaire (PFOPQ) was adapted from the validated Fear of Pain Questionnaire, parent report [32]. Items were modified to reflect the parent's own fear associated with their child's pain experience (e.g., “My child's feelings of pain are *scary for me* vs. *scary for him/her*.”) In a pilot study 31 parents (predominantly mothers) of children who underwent a multidisciplinary pain evaluation completed parent-proxy (FOPQ-P) and parent self-report (PFOPQ) versions. Data were analyzed using bivariate correlations of subscales and paired samples t-tests of individual items. The FOPQ-P and PFOPQ total scores were significantly correlated ($r=.65$, $p<.01$), but 13 of the 23 individual items were significantly different from one another. Notably, all 10 items on the Avoidance of Activities scale were significantly different. This suggests that although parent report of child fear/avoidance is closely related to parents' own fear/avoidance, the two measures assess separate experiences. The item response format is on a 5-point Likert-type scale ranging from “strongly disagree” to “strongly agree.” Additional details regarding the psychometric properties of the PFOPQ are in the Results.

Pain catastrophizing—The Pain Catastrophizing Scale for parents (PCS-P) [11,14] assesses negative thinking associated with pain. It is comprised of 13 items rated on a 5-point scale. Items are summed to derive a total score. Higher scores indicated higher levels

of catastrophic thinking. Internal consistency of the Total Score on this measure in the current study is .90.

Parenting behaviors—The Adult Responses to Children's Symptoms [8,35] assesses parents' responses to their children's pain. The protective and minimization scale were examined in this study, as these subscales have received previous support in the literature [9,28]. Higher scores equate to more frequent use of a particular response. Items on the Protect scale refer to protective parental behavior such as giving the child special attention and limiting the child's normal activities and responsibilities. Items on the Minimize scale discount and criticize the child's pain as excessive. Alpha reliabilities for the two subscales in the current sample were: .83 for Protect and .67 for Minimize.

Child Factors

Pain intensity—Children were asked during the psychology interview to provide their average pain rating on a standard 11-point numeric rating scale from 0 (no pain) to 10 (most pain possible) [38].

Child fear of pain—The Fear of Pain Questionnaire for children [32] is a self-report inventory to assess pain-related fears. Each item is rated on a 5-point Likert-type scale from 0 = 'strongly disagree' to 4 = 'strongly agree.' The FOPQ-C consists of 24 items with strong internal consistency ($\alpha = .92$). This measure has two subscales: Fear of Pain ($\alpha = .89$) and Avoidance of Activities ($\alpha = .86$). Construct validity for this measure is supported with significant relations found for the FOPQ-C with child somatization, anxiety, and catastrophizing. Criterion-related validity is also supported with significant relations between higher FOPQ-C scores and greater functional disability and more frequent doctor visits in the previous three months. Internal consistency for the Fear of Pain and Activity Avoidance subscale were .91 and .90, respectively.

Pain catastrophizing—The Pain Catastrophizing Scale, Child report [11] assesses negative thinking associated with pain. The PCS-C includes 13 items, which are rated on a 5-point scale ranging from 0 = "not at all true" to 4 = "very true." Items are summed to derive a total score ranging from 0-52; higher scores reflect higher levels of catastrophic thinking. Clinical reference points for the PCS-C are low (0-14), moderate (15-25), and high (26 and greater) catastrophizing [29]. Internal reliability for the current sample was .93 for the PCS-C

Functional disability—The Functional Disability Inventory (FDI) [40] is a scale 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 two weeks; total scores are computed by summing the items. Higher scores indicate greater disability. The internal consistency in this sample was .90.

Procedure

Participants were recruited during their multidisciplinary pain clinic evaluation at the Chronic Pain Clinic at Boston Children's Hospital (BCH). Patients and their parents were

brought to a private room by a research assistant and asked to consent/assent both for this particular research study and also if their responses to clinic measures could be used for research purposes. The Parent Fear of Pain Questionnaire was completed specifically for this study, whereas all other measures are part of a standard clinic battery either on paper or via our electronic data capture system. The current study was approved by the Institutional Review Board at BCH. To test the Interpersonal Fear Avoidance Model (IFAM), we extracted data from an ongoing IRB-approved clinical database maintained in our Pediatric Pain Rehabilitation Center (PPRC; see [20]) for additional details on the program) collected from December 2011 to November 2014. All measures were part of the clinical packet that was sent home via mail prior to admission to complete and brought in on the first day of treatment.

Statistical Analyses

Data was entered into SPSS version 21.0 (SPSS IBM, New York, USA). Descriptive statistics were conducted to examine underlying assumptions of normality for all variables of interest. To refine the items on the PFOPQ, significant skewing or kurtotic response patterns were examined. Item-total correlations were calculated. Maximum likelihood factor analyses with oblique rotation were conducted for the PFOPQ to establish subscales for the measure [10]. Construct validity of the PFOPQ was examined with bivariate correlations. Lastly, structural equation modeling (SEM) with Mplus software [24] was employed using a separate sample of patients and parents to evaluate an interpersonal fear avoidance model in children. SEM was considered superior to other analytic techniques, such as multiple regression, because it is possible to simultaneously evaluate the overall fit of complex models as well as the significance of individual model pathways, to reduce measurement error, to compare alternative models, and to include cases with missing data in the model [24]. Full information maximum likelihood estimation (FIML) was employed to account for missing data. Based on recommendations by Bentler and Bonnet [3] and Ullman [34], 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). A sample size of 100-200 subjects is generally considered adequate for testing complex models in SEM [19], thus there was a sufficient sample size in this study. We tested the fit of the Interpersonal Fear Avoidance model framework (**Figure 3**) with child functional disability as the outcome and then evaluated the strength and direction of individual model parameters.

Results

PFOPQ item selection and factor analysis

Each of the 23 reworded items (from the FOPQ-P) was examined to determine its contribution to the scale. Two items violated assumptions of normality and were therefore omitted. Item #8: "I worry when my child is in pain" was highly endorsed ($M=3.0$, $SD=.88$; kurtosis = 2.46) and item #23: "I don't think that my child should do schoolwork with his/her present pain" was rarely endorsed ($M=.52$, $SD=.79$; kurtosis = 4.06). Next, item-total correlations were conducted, with all items meeting the $r > .30$ criteria (ranging from .35 to .68)[12].

The 21 remaining items were entered into a maximum likelihood factor analysis with oblique rotation. The criteria of eigen values > 1 resulted in a four factor solution. Taking into account Cattell's elbow criteria on the scree plot [12] (4 factors), eigen values, and the number of hypothesized dimensions (3 factors), a 4 factor solution that included a fourth Fear of Movement factor best explained the structure of the PFOPQ. The resultant 21-item scale had a Cronbach's alpha of .91. Sample mean for the scale was 28.7 ($SD = 13.7$). PFOPQ total scores were normally distributed across the parent sample. Possible scores ranged from 0 to 84 with tertile scores distributed on the low end of the distribution with 0-23 reflecting the lowest tertile/low fear, 24-33 the middle tertile, and 34-84 representing the highest tertile/high fear.

The results are consistent with the hypothesized subscales, with revision (see **Table 1**). Factor 1, labeled Avoidance, contains 6 items ($\alpha = .87$). Sample mean for the subscale was 8.2 ($SD = 5.3$). Factor 2, labeled Fear of Pain, contains 7 items ($\alpha = .85$). Sample mean for the subscale was 9.8 ($SD = 5.6$). Factor 3, labeled Fear of School, contains 4 items ($\alpha = .74$). Sample mean for the subscale was 4.5 ($SD = 3.4$). Factor 4, labeled Fear of Movement, contains 4 items ($\alpha = .69$). Sample mean for the subscale was 6.2 ($SD = 3.3$). All factors were intercorrelated (see Table 2) with 57.9% of the variance accounted for across the four scales.

PFOPQ, demographic, and pain-related factors

One-way ANOVAs were conducted to examine differences in PFOPQ Total and subscale scores across categorical demographic factors, pain diagnosis, and pain location. There were no differences in PFOPQ total and subscale scores based upon child gender, parent marital status, parent education, or parent employment status. With regard to pain diagnosis, there were differences in PFOPQ Avoidance subscale scores based on patient pain diagnosis, $F(6, 310) = 2.26, p < .05$. Tukey post-hoc tests revealed a trend for parents of patients with functional abdominal pain to report more avoidance than parents of patients with musculoskeletal pain, though this was not statistically significant ($p = .06$). The PFOPQ total score and remaining PFOPQ subscales were not significantly different based on pain diagnosis. For pain location, there were differences in PFOPQ Avoidance ($F(6, 311) = 3.00, p < .01$) and PFOPQ School ($F(6, 311) = 4.39, p < .001$) subscale scores based on patient pain location. Tukey post-hoc tests revealed that parents of patients with abdominal/flank reported higher PFOPQ Avoidance scores than parents of patients with back/neck pain ($p < .05$) and lower extremity pain ($p = .05$). Additionally, then parents of patients with lower extremity pain reported lower PFOPQ School scores than parents are patients with head/face pain ($p < .05$), upper extremity pain ($p < .05$), diffuse body pain ($p < .05$), and abdominal/flank pain ($p = .05$). The PFOPQ total score and remaining PFOPQ subscales were not significantly different based on pain location.

Pearson Product Moment correlations were conducted to examine PFOPQ scores with child age, average pain ratings, and duration of pain. Child age and average pain ratings were not associated with PFOPQ total scale or subscale scores. Pain duration was modestly correlated with the PFOPQ Avoidance subscale ($r = .11, p < .05$), while the PFOPQ total score and all

other subscales were not significantly associated with pain duration. Given the preponderance of Caucasian participants (90%) we did not examine race or ethnicity.

PFOPQ construct and criterion-related validity

Relations between the PFOPQ, parent variables and child variables are displayed in **Table 2**. As predicted, PFOPQ-Fear of Pain was most strongly associated with parent pain catastrophizing ($r=.62$, $p<.01$) and child fear of pain ($r=.41$, $p<.01$), with parent avoidance most closely linked to protective behavior ($r=.52$, $p<.01$) and child avoidance ($r=.48$, $p<.01$). PFOPQ-Fear of Movement and PFOPQ-Fear of School were most correlated with protective parenting behavior, $r=.34$ and $r=.45$, $p's<.01$, respectively. Although minimizing behavior was hypothesized to be associated with PFOPQ scores, it was only modestly associated with PFOPQ-Avoidance ($r=.14$, $p<.05$).

Interpersonal Fear Avoidance Model

Participant characteristics—Patients from the Pediatric Pain Rehabilitation Center (see [20] for description of the PPRC program) were predominantly Caucasian (80%) and female (81%) and ranged in age from 8 to 19 years ($M=13.9$, $SD=2.7$). Primary pain diagnosis included: Complex Regional Pain Syndrome (CRPS; 52%), Neuropathic (not CRPS; 17%), Musculoskeletal pain (11%), Functional Abdominal Pain (6%), Headache (including chronic daily, tension, migraine, and combined headaches; 6%), and other diagnoses (e.g., postural orthostatic tachycardia syndrome, conversion disorder; 8%). Duration of pain ranged from one month to 12 years with a median duration of 10.3 months; 7% reported pain duration of less than 3 months.

Correlations among model variables in the PPRC patient sample are detailed in Table 3. Results of SEM analysis show that the proposed Interpersonal Fear Avoidance Model did not provide good fit to the data, $\chi^2(30) = 144.83.8$, $CFI = .79$, $RSMEA = .15$. Evaluation of the modification indices showed that the model fit would be improved by including the Avoidance subscale from the PFOPQ as an indicator of parent behavior rather than an outcome associated with child disability. We thought this change was theoretically reasonable because the Avoidance subscale is comprised of parent behaviors in response to their child's pain (e.g., I cancel plans when my child is in pain), in a similar vein to the Protect and Minimize subscales of the ARCS which originally represented the parent behavior latent variable. Evaluation of this modified model showed that it provided good fit to the data, $\chi^2(30) = 46.95$, $CFI = .97$, $RSMEA = .06$ ($CI=.02-.09$). All path coefficients were significant and in the expected (positive) direction (see **Figure 4**), with exception of the path from Parent Fear and Catastrophizing to Child Avoidance ($r=-0.46$, $p=.07$) and the factor loading of parent minimization on parent behavior ($r=0.07$, $p=.38$), which were non-significant. Altogether, the IFAM model accounted for 20% of the variance in functional disability outcomes.

Discussion

The current investigation validates a measure of parents' own pain-related fear and avoidance in the context of their children's pain. Item refinement and exploratory factor

analysis resulted in a 21-item psychometrically sound measure with four subscales: Fear of Pain, Fear of Movement, Fear of School, and Avoidance. The Parent Fear of Pain Questionnaire (PFOPQ) was invariant across demographic variables with some differences observed by pain diagnosis and location. Construct validity was supported for the subscales in relation to parent pain catastrophizing, child fear of pain, and protective parent behavior, as hypothesized. Most exciting, we were able to evaluate for the first time the theoretically derived Interpersonal Fear Avoidance Model [15] in a second sample of youth with persistent pain. We found an excellent fit for a complex model, after a minor modification to include parent avoidance as an indicator of parent behavior. Thus, the clinical data appears to support our theoretical assertion regarding important contextual influences on child pain-related fear and associated functional outcomes, including parents' own pain related fears.

In our pilot testing, we found a distinct difference between the Fear of Pain Questionnaire, Parent report [32] and the current PFOPQ, which had been modified to reflect a parent's own pain-related fears and avoidance behavior. In the current large pain clinic-based sample, we found that two of the 23- items had insufficient variability to be included on the final measure. One item reflects whether parents worry about their child's pain and suffered from ceiling effects, as it was highly endorsed, thus not clinically meaningful. This is understandable, as it would be expected that a parent would worry about their child in pain and does not necessarily reflect a pathological process. The second item, in which parents report on whether they believe it is unreasonable for their child to do schoolwork while in pain suffered from floor effects, as it was rarely endorsed. This was reassuring as school-related activities are centrally important to a child's academic and social growth, and likely to be affected by pain [36]. Further, this suggests that most parents do believe that their child should do schoolwork even in the presence of pain. Thus, the role of clinicians may be less centered on convincing parents of this fundamental idea and instead collaborating with schools and families to ensure a supportive school environment with adequate accommodations, putting both the child and parent at ease [21].

When the remaining 21 items were submitted to an exploratory factor analysis, a four-factor solution clearly emerged. Unlike the parent proxy version, which consists of three subscales, a fourth subscale emerged, labeled Fear of Movement. Each of the items on this new subscale had been part of the Avoidance of Activities subscale on the parent proxy measure. The Fear of Movement items reflect a parent's worries or concerns about their child engaging in physical activities (e.g., "I am afraid that my child might hurt him/herself if (s)he exercises"). Further, the items that comprise the PFOPQ-Avoidance subscale reflect a parent's own avoidant behavior (e.g., "I cancel plans when my child is in pain") and the impact of their child's pain on their life (e.g., "My child's pain controls my life"). This differentiation likely contributed to the results we later found in testing our interpersonal fear avoidance model, wherein the PFOPQ-Avoidance subscale was best represented as an indicator of parent behavior rather than as an independent predictor of child functioning. Construct validity of the PFOPQ was solid with strong associations that were theoretically grounded. For example, PFOPQ-Fear of Pain was most closely linked to pain catastrophizing while PFOPQ-Avoidance was most correlated with protective parenting behavior. Parent minimization behavior was only modestly related to PFOPQ-Avoidance. This may reflect the relative infrequency that this behavior is endorsed by parents ($M=0.64$

vs. $M=1.46$ for protective behavior), and its presence may be associated with greater parent life disruption/impairment associated with child pain.

With the PFOPQ now validated, we tested the Interpersonal Fear Avoidance Model in a second sample of patients from our intensive pain rehabilitation program (see **Figure 2**). Although we initially hypothesized that parent avoidance would be directly associated with functional disability, we found that it was better represented as an indicator of parent behavior, along with parent protective behaviors. Otherwise, no other modifications were made to our hypothesized model and we found an excellent fit to the data. We found an indirect influence of parent distress on child outcomes through child emotional responses *and* parent behaviors. At the broadest level, these findings underscore parents as a key context for understanding, assessing, and managing pediatric pain [26] and provide evidence for the bidirectional relationship between parent factors and child functioning [27]. Our specific model findings are consistent with prior work that has found parent protective behavior to mediate the relation between parent distress and child outcomes [22,30,33], as well as work supporting the indirect influence of parent emotional functioning (i.e., catastrophizing and stress) on child outcomes through child emotional responses [39]. Unlike findings by Vowles and colleagues [39] and the pediatric fear avoidance model put forth by Asmundson and colleagues [1], we also found a direct relation between parent behavior and child behavior. This may be due to the inclusion of parent avoidance behavior from the PFOPQ, which was the strongest indicator of parent behavior and reflects a new dimension not previously captured in relation to how a parent responds to their child's pain. Altogether, it appears that each component of the model exerts an influence either directly or indirectly on a child's ultimate level of functioning.

With regards to limitations of the current study, consultation with key stakeholders is an important element of measure development. As described previously, the PFOPQ was based on the parent proxy version of the Fear of Pain Questionnaire that underwent expert panel review and parent/child feedback. As we did not repeat these procedures beyond parent pilot testing, it is possible that additional parent fears and avoidance behaviors may not be represented. In testing the Interpersonal Fear Avoidance Model all variables were collected at the same time point, at admission to the PPRC. Although the model includes directional arrows with parent and child beliefs and behaviors influencing child disability, these relationships are concurrent, and thus it is not possible to ascertain the direction of effect. Furthermore, this model only partially explained disability, and additional potentially relevant variables were not included (e.g., school factors [36], peer relationships[5]). Additionally, parents in this study were virtually all mothers, thus the influence of fathers on child outcomes continues to remain generally unexplored. Indeed, there is emerging evidence documenting the differential influences of maternal versus paternal responses to child pain experiences. Initial findings suggest tangible differences in parent pain catastrophizing and parent behavioral responses to child pain. Specifically, mothers report higher levels of pain catastrophizing compared to fathers and paternal catastrophizing was found to uniquely contribute to distracting parenting responses [17]. Additionally, while mothers and fathers demonstrated similar tendencies toward protective/solicitous behaviors, fathers reported engaging more in discouraging behaviors [16].

These findings have several implications for future research among youth with chronic pain and their parents. At the most basic level, further validation of the PFOPQ and of the IFAM model requires replication in additional samples of youth with chronic pain and their parents and extension to longitudinal models that can examine how prior parent fears and avoidance behaviors influence subsequent child avoidant behaviors and outcomes[25], in order to support the directionality of the pathways as currently depicted. Further, the original examination of the pediatric application of the FAM [31] found developmental differences between younger children and adolescent patients (i.e., pain-related fears were more influential for adolescent patients). This suggests that ongoing studies utilizing the IFAM should continue to examine potential developmental differences between the child/parent variables in the model; as such differences would have notable clinical implications. Additionally, examining the PFOPQ with conceptually related questionnaires (e.g., Bath Adolescent Pain-Pain Parent Impact Questionnaire [18]) would further validate the PFOPQ. Doing so may also help to extend and refine the IFAM model, by further elucidating how parent cognitive, emotional, and behavioral responses to their child's pain interact to influence child functioning.

With regards to clinical implications, the PFOPQ adds to a paucity of parent assessment tools to measure distress and changes in behavior in the context of a child's pain. It is striking that parent avoidance was the strongest indicator of parent behavior, which in turn was a robust predictor of child avoidance. This potentially reflects parent modeling and child observational learning and provides very specific targets for intervention at the parent level. In addition, the School and Fear of Movement subscales offer the opportunity to assess the impact of specific parent fears and avoidance behaviors on discrete child outcomes beyond functional disability, such as but not limited to school functioning and physical activity.

In conclusion, this study provides evidence supporting the Parent Fear of Pain Questionnaire to assess clinically germane constructs that ultimately influence the functioning of the parent and the child in pain.

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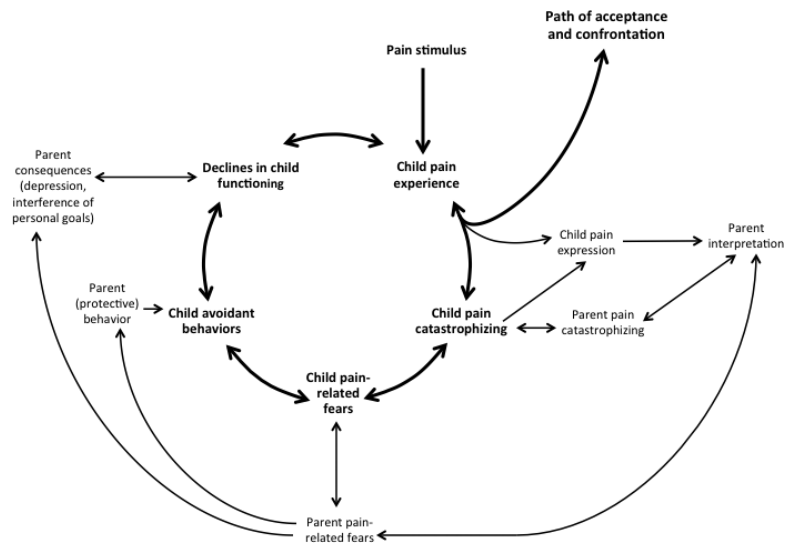


Figure 1. Interpersonal Fear Avoidance Model of Pain (IFAM)

In the IFAM model, a child or adolescent develops pain, often in response to an event, although it can also begin spontaneously. In the context of the child's pain experience, they either respond with progressive confrontation and acceptance of pain in their life for now or continue to perceive the presence of pain as threatening. This expression of threat and fear is observed and interpreted by the parent and reciprocally interacts with a parent's own catastrophic thinking about their child pain. This in turn leads to hypervigilance and persistent fear in the child and parent. In the context of heightened fear, the child avoids activities that they perceive as potentially harmful to his/her with parent protective behavior providing further encourage for avoidance behavior. Ultimately, this leads to declines in child functioning and limitations in the life of the parent/caregiver.

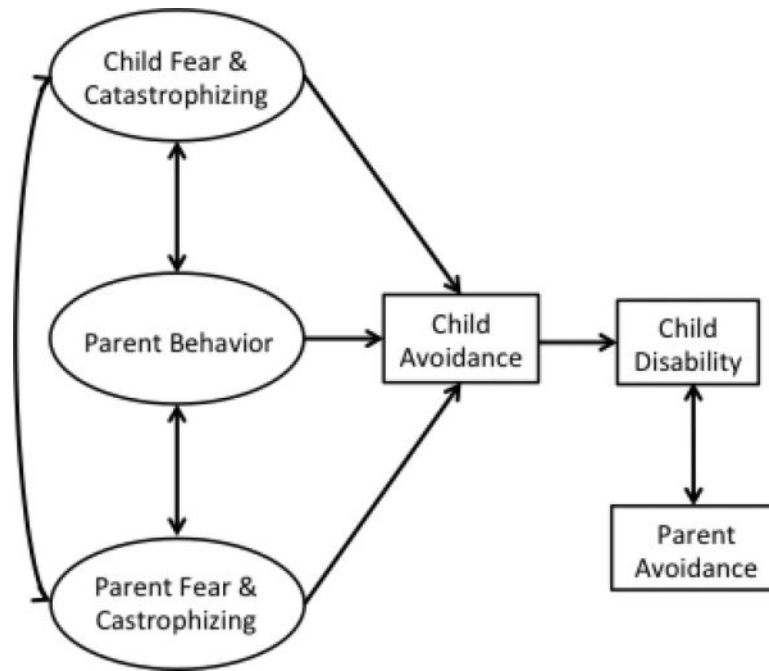


Figure 2. Theorized IFAM

In this statistical model, child fear and catastrophizing, parent behavior, and parent fear and catastrophizing reciprocally influence one another and collectively influence child avoidance behavior, which in turn predicts child disability. Child disability is reciprocally influenced by/influences parent avoidance behavior.



Figure 3. Initial IFAM tested

Child avoidance is measured with the Avoidance of Activities subscale of the Fear of Pain Questionnaire, Child report (FOPQ). Child disability is measured with the Functional Disability Inventory (FDI). Parent Avoidance is measured with the Parent Avoidance subscale of the Parent Fear of Pain Questionnaire (PFOPQ). PCS-C: Pain Catastrophizing Scale, Child report; ARCS: Adult Responses to Child's Symptoms; PCS-P: Pain Catastrophizing Scale, Parent report.

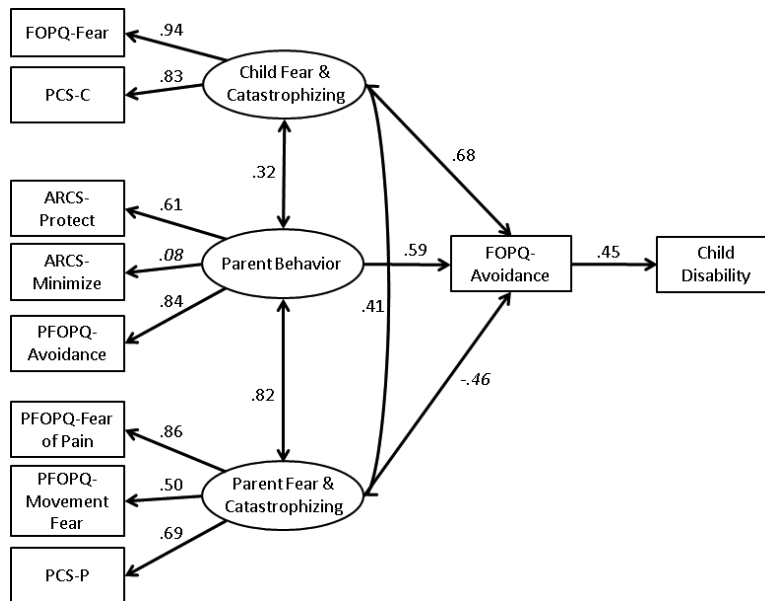


Figure 4. Final IFAM

Child fear and catastrophizing and parent behavior had a direct and indirect influence on child avoidance behavior, while parent fear and catastrophizing indirectly influenced child avoidance. Overall, the model accounted for 20% of the variance in functional disability, $X^2(30) = 46.95$, CFI = .97, RSMEA = .06 (CI=.02-.09).

Table 1

Summary of Factor Loadings for PFOPQ

Item	Avoidance	Fear	School	Movement
I avoid making plans because of my child's pain.	0.80			
I cancel plans when my child is in pain.	0.72			
My world has become small because of my child's pain.	0.68			
My child's pain controls my life.	0.65			
When my child is in pain, I stay away from other people.	0.65			
When my child is in pain, I say things like 'I don't have any energy...'	0.50			
I think if my child's pain gets too bad, it will never get better.		0.75		
When the pain comes on strong, I think my child might become permanently injured.		0.65		
When my child is in pain, I am afraid that something terrible will happen.		0.62		
My child's pain causes my heart to pound.		0.54		
I am afraid that when my child's pain starts it's going to be really bad.		0.53		
My child's feelings of pain are scary for me.		0.52		
I find it difficult to calm my body down when my child is in pain.	0.37	0.46		
I think that being at school makes or would make my child's pain worse			0.85	
I think that doing schoolwork increases my child's pain.			0.64	
My child doesn't go to school because I think it makes the pain worse.			0.45	
I believe that my child cannot go back to school until his/her pain is treated.			0.44	
I am afraid that my child might hurt him/herself if (s)he exercises.				0.69
I can't let my child do all the things.				0.50
I think that being careful to not make unnecessary movements is the safest.				0.41
I try to avoid activities that cause my child's pain.				0.40
Eigenvalue	7.35	1.88	1.56	1.37
% Variance	35.0	8.95	7.41	6.51

Table 2
Intercorrelations, Means, and Standard Deviations for Parent Fear of Pain Questionnaire

Variable	2	3	4	5	6	7	8	9	10	11	12	M	SD
<i>PFOPO</i>													
1. Total score	.85**	.83**	.69**	.66**	.56**	.55**	.09**	.42**	.50**	.31**	.35**	28.69	13.69
2. Avoidance Activities		.58**	.46**	.47**	.45**	.52**	.14*	.33**	.48**	.18**	.35**	8.18	5.32
3. Fear of Pain			.45**	.37**	.62**	.37**	.10**	.41**	.38**	.32**	.23**	9.83	5.56
4. Fear of Movement				.35**	.33**	.34**	.02**	.22**	.26**	.20**	.24**	6.16	3.33
5. Fear of School					.24**	.45**	-.03**	.29**	.42**	.24**	.25**	4.53	3.37
Parent variables													
6. Pain Catastrophizing						.40**	.13*	.41**	.37**	.30**	.26**	26.71	10.52
7. Protective Behavior							.14*	.27**	.41**	.13*	.22**	1.46	0.66
8. Minimizing Behavior								.14*	.09*	.12*	.00	0.64	0.57
Child variables													
9. Child Fear of Pain									.74*	.73*	.47*	25.18	12.36
10. Child Avoidance of Activities										.55*	.53*	20.80	10.57
11. Child Pain Catastrophizing											.40*	30.87	12.65
12. Child Functional Disability												21.66	11.56

Note.

Correlations are two-tailed.

* p < .05

** p < .01

Table 3
Intercorrelations, Means, and Standard Deviations for Interpersonal Fear Avoidance Model variables

Variable	1	2	3	4	5	6	7	8	9	10	M	SD									
<i>Child fear and catastrophizing</i>																					
1. Child Fear of Pain		0.73	**	0.27	**	0.14	*	0.33	**	0.41	**	0.22	**	0.41	**	0.74	**	0.47	**	25.18	12.36
2. Child Pain Catastrophizing			0.13	*	0.12	*	0.18	**	0.32	**	0.20	**	0.30	**	0.55	**	0.40	**	30.87	12.65	
<i>Parent behavior</i>																					
3. Parent Protective Behavior				0.14	*	0.52	**	0.37	**	0.34	**	0.40	**	0.41	**	0.22	**	1.46	0.66		
4. Parent Minimizing Behavior					0.14	*	0.10	*	0.13	*	0.02	0.13	*	0.09	*	-0.00	0.64	0.57			
5. Parent Avoidance Behavior						0.58	**	0.46	**	0.45	**	0.48	**	0.35	**	8.18	5.32				
<i>Parent fear and catastrophizing</i>																					
6. Parent Fear of Pain							0.45	**	0.62	**	0.38	**	0.23	**	9.83	5.56					
7. Parent Fear of Movement								0.33	**	0.26	**	0.24	**	6.16	3.33						
8. Parent Pain Catastrophizing									0.37	**	0.26	**	26.71	10.52							
<i>Child avoidance and disability</i>																					
9. Child Avoidance of Activities											0.53	**	20.80	10.57							
10. Child Functional Disability													21.66	11.56							

Note.

Correlations are two-tailed.

* p < .05

** p < .01