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PAIN BELIEFS AND QUALITY OF LIFE IN YOUNG PEOPLE WITH DISABILITIES AND BOTHERSOME PAIN

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Abstract

Objectives—Pain beliefs have been hypothesized to play an important role in pediatric pain. However, research examining the associations between pain-related beliefs and measures of function in youths with disabilities is limited.

Methods—Eighty-four youths (mean age = 14.26 years; SD = 3.27) with physical disabilities who indicated they also had bothersome pain were interviewed and asked to rate their average pain intensity in the past week, and to complete measures of pain-related beliefs and health-related quality of life.

Results—A number of pain beliefs were associated with different physical and psychosocial function domains, although different beliefs appeared to play different roles, depending on the function domain examined. Across all of the health-related quality of life domains studied, a belief that pain is influenced by one's emotions was associated with lower levels of function. No differences were found in pain beliefs related to age. In addition, a small difference in pain beliefs was found for sex; specifically girls were more likely than boys to endorse the belief that pain is influenced by emotions.

Discussion—The findings provide new information regarding the role that pain beliefs have in predicting function, and have important clinical implications regarding how youth with physical disabilities and pain might be most effectively treated.

Keywords

Peds-SOPA; Pain beliefs; Chronic pain; Youths; Disability

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INTRODUCTION

Pain beliefs have been hypothesized to play an important role in pediatric pain¹. For example, pain beliefs have been found associated to function², coping³ and adjustment⁴ in samples of youth with pain. Generally speaking, results from these studies have shown significant relationships between pain-related beliefs viewed as adaptive (e.g., a belief in one's ability to control pain) with active coping, better function and adjustment⁵. On the other hand, pain beliefs considered as being maladaptive (e.g., a belief that pain is a sign of damage and that activity should be avoided) have been reported to be significantly associated with passive coping, worse function and adjustment⁶. However, the pattern of associations found is not always consistent. For example, the belief that exercise is important, which is usually considered to be adaptive, in some research has been shown to have a negative relationship with disability (e.g.,⁷), a positive association with disability (e.g.,²) or a no significant relationship with disability (e.g.,⁸).

Research examining the associations between pain beliefs and measures of important function domains in pediatric samples remains very limited. This is particularly true for research that examines pain in youth with disabilities (i.e., youth with Neuromuscular Disease, Cerebral Palsy, Spina Bifida, etc.), a population that often experiences chronic pain problems⁹. To the best of our knowledge, only one study has examined pain-related beliefs and their associations with function in a population of youths with disabilities. In a study which was designed to develop and validate a pediatric pain belief measure, Engel and colleagues¹⁰ found positive associations between pain interference and beliefs hypothesized to be maladaptive. More recently, Miró and colleagues² found that the belief that one can control the pain prospectively predicted a decrease in pain intensity over the course of a year, whereas the belief that one's emotions impact pain predicted the development of chronic pain. Although these studies are generally consistent with research findings from adult populations (e.g.,¹¹), additional studies are needed to clarify the importance of pain beliefs in adjustment to pain in pediatric samples, in particular in the under-studied group of young people with disabilities and chronic pain.

There are a number of reasons to expect that the factors which influence adjustment to chronic pain might differ between individuals with and without a physical disability in addition to having a pain problem. For example, individuals with both a disability and pain have more potential stressors – including the additional psychological and physical challenges associated with having a physical disability – which could potentially influence their quality of life than pain alone. For example, the presence of these additional challenges could potentially reduce the relative importance of pain intensity on function, for those quality of life domains that are strongly influenced by the disability (i.e., there would be less variance available in the quality of life domain to predict). On the other hand, it is also possible that the presence of additional stressors (associated with having a disability) could make children more vulnerable to the effects of pain, thereby increasing the role that pain-related beliefs play in function. To better understand the role of pain beliefs in function across different populations, including populations of children with pain, research is needed to study these factors in these populations.

Because pain beliefs are modifiable – they change with cognitive behavioral therapy (CBT) treatment in both adult¹² and youth¹³ populations – research showing which pain beliefs are most closely associated with important outcomes would be particularly useful for determining the specific pain beliefs that should be targeted by cognitive-behavioral treatments for youths with pain, including youths with physical disabilities and pain. On the basis of these studies, perhaps treatments could specifically focus on increasing certain beliefs thought to be adaptive (e.g., beliefs that exercise is beneficial for pain management or about the controllability of pain), and reducing beliefs thought to be maladaptive (e.g., beliefs that others should be solicitous in response to their pain or that pain is a signal of damage).

It would also be useful to determine if there are any differences in the associations between pain beliefs and function due to differences related to sex or age, as it has been reported in some studies with adults with physical disabilities and chronic pain (e.g.,^{14,15}) and youth with chronic pain (e.g.,^{16,17}). It is not known if these sex-related differences could extend to populations of youth with disabilities and pain. Furthermore, it is possible that these beliefs could be related to age. Learning about the moderating role of sex and age, if present, would help us to determine if treatment programs should or should not be adapted to specific population subgroups.

Given these considerations, the aim of this work was to improve our understanding of the role that pain-related beliefs play in the adjustment of youths with disabilities and pain. As indicated previously, there is very limited information in pediatric populations available upon which to develop specific directional hypotheses about these associations, and the research that is available is not always consistent. However, with this caveat in mind, in general we anticipated that previous research showing significant associations between measures of adaptive and maladaptive beliefs and measures of pain and function in pediatric pain populations would replicate in a sample of youths with physical disabilities and chronic pain. Specifically, that adaptive beliefs about pain (i.e., the belief of control over the pain) would show a significant positive and independent association with quality of life domains, whereas maladaptive beliefs about pain (i.e., the belief in oneself as disabled, that emotions could impact pain, and the appropriateness of solicitous responses to their pain) would show a significant negative and independent association with quality of life domains. We did not make any *a priori* predictions regarding the associations that would emerge with respect to the belief about a medical cure, the appropriateness of medication, and exercise to manage pain, or the belief about medical cure as the solution for his or her pain problem, given the inconsistency of previous findings regarding these specific beliefs in pediatric populations. In addition, we sought to determine if there were any age- or sex- related differences in the beliefs that the sample held about pain.

2. METHODS

2.1. Participants

Data for the current analyses came from a convenience sample of 84 young people with physical disabilities who had completed a survey about pain in youths with physical disabilities that included the questionnaires assessing the domains that were the focus of this

study. Although a number of papers have been published using data from this survey, none of the previous studies have sought to answer the study questions that are the focus of the current study. Previous articles have described the characteristics of pain problems in the sample⁽¹⁸⁾ as well as the role of pain catastrophizing⁽¹⁹⁾ and perceived social support in the adjustment and function⁽²⁰⁾ of this sample of youth with physical disabilities. To take part in the complete original survey, potential participants needed to: (1) be between 8 and 20 years old chronologically; (2) have a diagnosis of cerebral palsy, neuromuscular disease, spinal cord injury, spina bifida, or limb deficiency (acquired or congenital); (3) report experiencing bothersome pain within the past three months; (4) be able to understand and speak English; (5) have no more than mild cognitive impairment as determined by a brief screening with the parent, and a passing score on a by the modified version of the Mini-Mental State Examination (MMSE)²¹ administered either in-person or via telephone; and (5) have the capacity for expressive communication which may include the use of augmentative communication devices. None of the potential participants had any cognitive impairment, therefore none of them were to be excluded from the study. Participants were not limited only to children (i.e., 17 years old or younger) but also included young adults (i.e., up to 20 years old), because many pediatricians continue to treat patients that they have a history of treating even after they become 18 years old.

Procedures—Further details on the study procedures can be found in the original work²². To summarize, study participants were recruited with different techniques and from different sources including word of mouth, mailing from clinics, and contacts with a summer camp sponsored by the Muscular Dystrophy Association (USA). Potential participants who were 18 years old or older provided written consent; whereas those who were younger gave informed assent or written consent to participate, and their parents or guardians provided written consent. Following enrollment, participants were interviewed either via telephone or in person (when possible). Participants were compensated \$25 for completion of the questionnaire. The study procedures were approved by the Institutional Review Board at the Children's Hospital and Regional Medical Center (Seattle, WA; USA).

Measures—Participants in the original study were administered a structured interview that requested information from a number of demographic, pain, psychological and quality of life related domains. The data from the interviews used in the current analyses asked for demographic/descriptive information: age, sex, and medical diagnosis information.

Pain intensity was measured with a 0 – 10 Numerical Rating Scale (NRS-11). Participants were asked to rate their average pain intensity in the past week by selecting a number between 0 (“No pain”) and 10 (“Pain as bad as could be”) that best represented the intensity of their pain. The NRS-11 has been found to be valid and reliable when used with young people in general,²³ even when used with children as young as 6 years of age²⁴, as well as young people with physical disabilities²⁵.

Pain-related beliefs were assessed with the pediatric version of the Survey of Pain Attitudes (SOPA)¹⁵. The Peds-SOPA¹⁰ differs in two relevant issues, in comparison with the original adult version: (1) it has been reduced to twenty-nine true-false statements, and (2) the “harm” scale (in the adult version) has been renamed as the “exercise” scale to reflect the

changes that have undergone the content of the scale's items. The Peds-SOPA includes seven scales: *Control* (the extent to which the child believes he/she can control the pain), *Medical Cure* (the extent to which the child believes in a medical cure for the pain problem), *Solicitude* (the extent to which the child believes that others should be solicitous in response to their experience of pain), *Medication* (the extent to which the child believes that medication is an appropriate treatment for pain), *Emotion* (the extent to which the child believes that their emotions impact their pain), *Exercise* (the extent to which the child believes that exercise is beneficial for pain management), and *Disability* (the extent to which the child believes that one is unable to function because of pain). Children have to report how much they agree with the attitudinal statements on a 3-point Likert scale (0 = I do not agree with this, 1 = I am not sure, 2 = I agree with this). To obtain a score for each Peds-SOPA scale, the ratings of the items within each scale need to be averaged after reversing the score of a few items. The Peds-SOPA scores have shown to be valid and reliable when used with young people with physical disabilities and with a community sample^{10,2}.

Health-related quality of life was assessed with the Child Health Questionnaire (CHQ–CF87)²⁶. We selected this measure to assess health-related quality of life as it assesses a number of key quality of life domains. The CHQ–CF87 is an 87-item questionnaire that was designed to assess psychosocial and physical well-being in children 5–18 years; the self-reported version, however, was designed for children ages 10 or older. The questionnaire measures 12 physical and psychosocial domains: (1) Physical Functioning (9 items; a high score means that child performs all types of physical activities, including the most vigorous, without limitations due to health); (2) Role Functioning: Emotional (3 items; a high score means that the child has no limitations in schoolwork or activities with friends due to emotional problems); (3) Role Functioning: Behavioral (3 items; a high score means that the child has no limitations in schoolwork or activities with friends due to behavioral problems); (4) Role Functioning: Physical (3 items; a high score means that the child has no limitations in schoolwork or activities with friends due to physical health); (5) Bodily Pain (2 items; a high score means that the child has no pain or limitations due to pain); (6) General Behavior (17 items; a high score means that the child never exhibits aggressive, immature, delinquent behavior); (7) Mental Health (16 items; a high score means that the child feels peaceful, happy and calm all of the time); (8) Self-Esteem (6 items; a high score means that the child is very satisfied with abilities, looks, family/peer relationships and life overall); (9) General Health Perceptions (12 items; a high score means that the child believes that his/her health is excellent and will continue to be so); (10) Change in Health (1 item; a high score means that the child's health is much better now than one year ago); (11) Family Activities (6 items; a high score means that the child's health never limits or interrupts family activities nor is family a source of tension); and (12) Family Cohesion (1 item; a high score means that the family's ability to get along is rated "excellent"). Response options vary by the item; each item consists of 4–6 response options. The CHQ–CF87 is scored by first computing a raw score, and then transforming it to standardized scores. Standardized scores can range from 0 to 100. The scales in the CHQ–CF87 have demonstrated adequate psychometric properties in a number of samples of young people with physical and psychological diagnoses²⁶. The CHQ–CF87 is commonly used^{27–30}, and has been shown to be valid via their significant associations with other important quality of life domains^{31–35}, as well as their responsivity

to treatment^{36,37}. Although the CHQ-87 provides a very broad assessment of multiple important domains of physical and psychological function, we determined that one of the scales – Change in Health – was not an appropriate criterion measure in the current analyses, because it assesses perceived change over the *past* year. Given that a primary goal of the current analyses was to identify beliefs that should be targeted for treatment to effect function (i.e., beliefs which should be evaluated in future studies to determine if they influence function), and that it would not be possible for current beliefs to impact past changes in health, we decided to only include as criterion measures those scales that assess current function. Thus, our planned analyses evaluate the associations between pain-related beliefs and 11 of the 12 CHQ-87 scale scores. Finally, although all of the study participants were asked the CHQ questions, not every participant provided responses to each question, so the number of participants for whom we have CHQ scale scores varies slightly as a function of the scale. We have scores from 82 participants for the Self-Esteem, Behavioral, Family Activities, Family Cohesion, scales, 83 participants for the Role-Physical and Role-Behavioral scales, and 84 for the Role Emotional, Bodily Pain, General Health, Mental Health, and Physical Function scales.

Data Analyses—We first computed descriptive statistics to describe the sample, including the mean, standard deviation, and range of the participants' ages, and the numbers and percentages of males and females, and diagnoses of the study participants.

T-tests for independent samples were performed to investigate the differences in pain attitudes between males and females. T-tests for independent samples were also used to investigate the difference between younger children (those under the age of 12 years) and older children (those 12 years old and above), and correlations were also used to explore the relationship between age and Peds-SOPA scores.

Finally, we performed a series of 7 regression analyses to test the hypothesis that participants' beliefs about pain attitudes were significantly associated with measures of function (11 of the CHQ scale scores, described above), when controlling for demographic variables (age and sex, entered in the first step) and average pain intensity (0 – 10 NRS rating of pain intensity, entered in the second step).

RESULTS

Description of the study sample

Demographic and descriptive information for the participants is presented in Table 1.

Differences in pain beliefs as a function of participant age and sex

The only significant difference in the Peds-SOPA scales that was found was for the Peds-SOPA Emotion scale. Girls were more likely than boys to endorse the belief that emotions impact pain (Mean [SD] score for girls = .77 [.60] *versus* boys = .49 [.59]; $t(82) = 2.84$, $p < .01$). No significant differences in the Peds-SOPA scales were found as a function of age group (age 11 years old or lower versus 12 years old or higher). In addition, the associations between the Peds-SOPA scale scores and chronological age were all weak and non-significant (rs range, $-.11$ to $.18$, all $ps = NS$).

Associations between Pain attitudes and Quality of life

The results of the regression analyses showed that average pain intensity made a significant contribution to the prediction of 8 of the 11 CHQ scales examined, including: Role Behavioral ($R^2_{change} = .12$, $F_{change} = 10.65$, $p < .01$); Role Emotional ($R^2_{change} = .09$, $F_{change} = 7.49$, $p < .01$); Bodily Pain ($R^2_{change} = .26$, $F_{change} = 30.37$, $p < .001$); General Behavior ($R^2_{change} = .12$, $F_{change} = 10.31$, $p < .01$); Mental Health ($R^2_{change} = .20$, $F_{change} = 20.31$, $p < .001$); Self-Esteem ($R^2_{change} = .08$, $F_{change} = 6.89$, $p < .05$); General Health ($R^2_{change} = .25$, $F_{change} = 26.79$, $p < .001$); and Family Activities ($R^2_{change} = .05$, $F_{change} = 4.47$, $p < .05$). The SOPA scales, as a group, made a statistically significant contribution to the prediction of 7 of the 11 CHQ scales: Role Physical ($R^2_{change} = .16$, $F_{change} = 2.23$, $p < .05$); Role Emotional ($R^2_{change} = .25$, $F_{change} = 3.89$; $p = .001$); Bodily Pain ($R^2_{change} = .17$, $F_{change} = 3.39$, $p < .01$); Mental Health ($R^2_{change} = .17$, $F_{change} = 2.87$, $p < .05$); Self-Esteem ($R^2_{change} = .23$, $F_{change} = 3.45$, $p < .01$); General Health ($R^2_{change} = .16$, $F_{change} = 2.84$, $p < .05$); and Family Activities ($R^2_{change} = .17$, $F_{change} = 2.34$, $p < .05$).

The beta weights associated with each predictor from these analyses are presented in Table 2. As can be seen, and as might be expected, pain intensity showed a negative association with all 11 of the CHQ scales examined, with beta weights ranging from $-.19$ to $-.53$. These associations were statistically significant for 8 (73%) of the 11 scales. The Peds-SOPA scales showed different patterns of associations with the CHQ scales, depending on the specific Peds-SOPA scale and CHQ scale involved. Three scales – Harm, Medical Cure, and Medication -- did not contribute independently to the prediction of any CHQ scales. One Peds-SOPA scale predicted just one CHQ scale after controlling for demographic variables and the effects of pain intensity: Solicitude predicting General Health (a greater belief that family should be more solicitous was associated with lower perceptions of general health).

Two Peds-SOPA scales predicted two CHQ scales each: the Disability scale (a greater endorsement of the belief that one is necessarily disabled by pain) was associated with greater limitation in performing all physical activities, including self-care, due to health [Physical Functioning] and greater limitation in school work or activities with friends as a result of physical health [Role Functioning: Physical] and the Pain Control scale (a greater endorsement of perceived pain control) was associated with more self-esteem [Self-Esteem scale] and a greater sense of family cohesion [Family Cohesion scale]. The Peds-SOPA scale that was most strongly and consistently associated with the CHQ scales (with 7 of 11 associations significant) was the Emotion scale. Across all of the CHQ domains, a belief that pain is influenced by one's emotions was associated with lower levels of function.

DISCUSSION

The primary objective of this work was to study the role that pain-related beliefs play in the adjustment of young people with disabilities who also reported that they had bothersome pain. Two key findings emerged. First, we found that pain intensity was significantly and moderately-to-strongly associated with lower levels of function across a wide variety of quality of life domains. Second, we found that a number of pain beliefs were associated with different quality of life function domains, although different beliefs appeared to play different roles, depending on the function domain examined. In general, the findings provide

support for the study hypothesis. Specifically, beliefs hypothesized to be adaptive (i.e., control beliefs) showed a positive association with function, whereas beliefs hypothesized to be maladaptive (i.e., disability, solicitous, and emotion-related beliefs) showed a negative association with function. However, no significant associations between measures of function and exercise beliefs, medical cure beliefs or medication beliefs were found in this sample of youth with disabilities and pain. The findings have important implications for understanding the negative impact that pain can have in the lives of young people with physical disabilities, as well as for the development of treatments to address this negative impact.

Research has consistently demonstrated that pain can impact psychological and physical functioning. Studies with samples of adults and youths with chronic pain as a primary presenting problem, as well as with samples of adults or youths with pain secondary to a disability diagnosis, such as neuromuscular disease, cerebral palsy or multiple sclerosis, have shown that pain can impair a person's cognitive processes³⁸, emotional function^{39–43}, sleep quality⁴⁴, social and recreational activities^{45,46}, and school, work and vocational activities⁴⁷. Our study extends these previous findings by examining a broad range of psychosocial and physical function domains in the same sample. The results emphasize the need to teach youth effective strategies for managing pain and its impact as early as possible, before it progresses to have additional negative effects on function and potentially contribute to the development of feelings of helplessness.

The findings were interesting with respect to both the beliefs that were and were not associated with function. Although we cannot conclude from the correlational analyses used here that beliefs impact or moderate the impact of pain on function, a lack of a significant association can serve as evidence that a particular belief is unlikely to play a causal role. Thus, the beliefs that pain necessarily indicates physical harm and that activity should therefore be avoided, that a medical cure exists for the pain problem, and that medications are appropriate treatments for pain – although they have been shown to be negatively associated to function domains in some adult samples with chronic pain^{48–50}, – appear to be of less importance to function in young people with disabilities and pain. These findings suggest that in populations of youth with disabilities and pain, CBT treatments that target pain-related beliefs may have more benefits if they focus on changing beliefs other than beliefs about the meaning of pain, a medical cure pain, and medications as a treatment for pain.

On the other hand, the belief that pain is influenced by emotions demonstrated a robust association with many (64%) of the quality of life domains assessed here. This belief appeared to be related particularly strongly to measures of self-esteem, emotional functioning, and mental health. This finding suggests the possibility that more might be gained by teaching children self-management strategies for buffering the negative impact of emotions on pain – and perhaps *vice versa* – than by teaching other strategies. Specifically, youth may benefit not only by learning how emotions can impact their pain and vice versa, but perhaps more importantly, by learning specific strategies for reducing those effects. Beliefs about the association between emotions and pain could be categorized into two general types; two types which are not differentiated by the Peds-SOPA Emotion scale

which simply assesses the belief that emotion effects pain. First, it is possible to have a high score on this scale and *recognize* that emotions impact pain. This might be viewed as potentially adaptive, as it provides a basis for the individual to learn stress management strategies to reduce this impact. However, endorsing such beliefs does not say anything about whether the respondent does or does not have the skills needed to reduce this impact. Second, it is possible to have a high score on the Peds-SOPA Emotion scale and be someone who lacks the ability to influence the effects of emotions on pain. Participants with high scores on the Emotion scale for this reason might be expected to do less well than those who score lower on the scale because they are able to influence the role that emotions have on pain. As a result, we are not able to tease apart these two potential reasons – one perhaps adaptive and one perhaps maladaptive – for higher scores on the Emotion scale. What the findings do suggest, though, is that beliefs related to the impact of emotions on pain are important for children with both a disability and pain. Further research will be needed to help understand the reasons for the associations found here. In the meantime, it seems reasonable to hypothesize that treatment could include helping children with disabilities (1) understand that emotions can impact on their pain and (2) be taught skills for reducing this impact. Treatments that could help accomplish this include cognitive restructuring, as taught by CBT interventions^{51,52}, psychological flexibility and acceptance, as taught by Acceptance and Commitment Therapy (ACT) interventions^{53,54}, and meditation and/or self-hypnosis training^{55–57}. Moreover, the current findings suggest that research to examine the causal impact of beliefs regarding the associations between emotions and pain on function, in particular, is warranted. Other beliefs may be important as well, including the potentially adaptive belief in a sense of control over pain, and potentially maladaptive beliefs in the importance of others being solicitous and that one is necessarily disabled by pain. Again, while it is important to acknowledge that the current findings do not provide support for these beliefs as causal agents, they do suggest that research to examine their potential impact on function is indicated.

In this study we did not find any differences on pain beliefs related to age. These results are inconsistent with the results reported by Miró et al.² with an otherwise healthy sample of schoolchildren, where significant differences were reported between younger and older children in control, harm and medical cure pain-related beliefs. Thus, even though additional research is needed in this area, if the results from the current study replicate in samples of youth with chronic pain, it would appear appropriate not to recommend that CBT treatments target different pain beliefs as a function of the age of the youth. Rather, CBT treatments ought to focus on the beliefs that are found central to all youth, and then adapt the procedures to the child's developmental stage as appropriate.

As in other studies, we found a very limited -- but statistically significant for one belief -- differences in the endorsement of pain beliefs as a function of sex. In this sample of young people with disabilities and bothersome pain, girls were more likely than boys to endorse the belief that pain is influenced by emotions. Other studies have also reported pain-related beliefs related to sex; however, the specific findings differ across studies, and no consistent pattern has emerged. For example, Hirsh et al.¹⁴, in a sample of adults with limb loss, reported that men were more likely to endorse beliefs related to personal control and the appropriateness of solicitous responses from others, whereas women were more likely to

endorse beliefs related to the appropriateness of the use of medication for pain management. More recently, Miró et al.², in a study with schoolchildren between 8 and 16 years of age, found that boys were more likely to trust in the doctors' abilities to cure their pain than girls. The divergence of findings between studies may be related to the specific characteristics of the participating samples rather than a reliable sex effect. Regardless of the reasons for the discrepant findings, as a group, these results suggest that CBT treatments for youths with disabilities and pain might not be made to be more beneficial by focusing on specific beliefs as a function of the patients' sex.

Several methodological limitations of our study should be acknowledged. First, while the size of the current sample is larger than many other studies of youths with chronic pain, and represents one of the very few studies examining pain in this population, the sample remains relatively small, and may or may not be representative of the population of youths with disabilities. Additional studies are therefore needed to evaluate the generalizability of the current findings. Second, due to the correlational nature of this study, it is not possible to draw causal conclusions from the results. Future longitudinal and experimental studies are therefore needed to determine if (1) changes in beliefs over time contribute to changes in function over time and (2) interventions that target specific beliefs have benefits on specific outcomes, and that any changes found in the beliefs targeted explain the treatment benefits found. However, although our design does not allow for causal conclusions, our study does identify those attitudes that are more and less likely to be playing a role, and therefore identifies those beliefs that warrant further attention in longitudinal and experimental studies. Third, given that all of the data collected were based on self-report, it is possible that response bias may have contributed to an over-estimation of the strengths of the associations due to shared method variance. Future studies should include objective measures of function, when possible, to address this issue. Fourth, it is possible that the findings might have been different had the measures been administered via paper-and-pencil test rather than by interview. Studies are needed to determine the generalizability of the current findings, perhaps by using different methods to assess beliefs. Finally, as alluded to previously, future research is needed to study the role that beliefs regarding emotions and pain play in adjustment to pain by assessing two subdomains of these beliefs; that is, (1) the understanding that emotions *can* influence pain and (2) a belief that one has the skills needed to impact the effects of emotions on pain. The Peds-SOPA in its current form does not allow to clearly differentiate between these subdomains.

Despite the study's limitations, the findings provide new information regarding the role that pain beliefs have in predicting function, and have important clinical implications regarding how young people with physical disabilities and chronic pain might be most effectively treated. Specifically, the findings suggest that pain treatments that help youth manage maladaptive beliefs (e.g., treatments that incorporate CBT) could be beneficial, and that these treatments should target skills to manage the effects of pain on emotions. On the basis of the results of this study, perhaps these treatments could focus on increasing beliefs about the controllability of pain, and reducing beliefs in solicitous responses, and that one is necessarily disabled because of pain. Finally, future research is needed to determine if psychosocial interventions targeting pain-related attitudes are as effective in youth with

disabilities and chronic pain as they have been in other groups of patients, including adults with disabilities and chronic pain⁵⁸.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What does this study add?

The findings provide new information regarding the role that pain beliefs have in predicting function, and have important clinical implications regarding how young people with physical disabilities and chronic pain might be most effectively treated.

Table 1

Description of the study sample (N = 84).

Variable	Percent	N	Mean (SD)	Range
Age, years		84	14.26 (3.27)	8 – 20
Sex				
Boys	56.0%	47		
Girls	43.0%	37		
Ethnicity/Race *				
White	72.6%	61		
Asian	10.7%	9		
Native American/ Pacific Islander	4.8%	4		
Black	3.6%	3		
Hispanic	4.8%	4		
Other	1.2%	1		
Diagnosis				
Cerebral Palsy	34.5%	29		
Congenital Limb Deficiency	1.2%	1		
Spina Bifida	27.2%	23		
Neuromuscular Disease	20.2%	17		
Spinal Cord Injury	9.5%	8		
Cerebral Palsy & Amputation	1.2%	1		
Amputation & Limb Deficiency	1.2%	1		
Average pain intensity			5.14 (2.45)	0 – 10

* Race/Ethnicity information was missing for 2 (2.4%) participants

Beta weights associated with the prediction of CHQ scale scores from measures of pain-related beliefs, controlling for age, sex, and average pain intensity

Table 2

Predictors	Child Health Questionnaire Scale										
	Physical Function	Role Func-Physical	Role Func-Behavioral	Role Func-Emotional	Bodily Pain	General Behavior	Mental Health	Self-Esteem	General Health Perception	Family Activities	Family Cohesion
Control variables											
Sex	-.01	-.20	-.19	-.11	-.17	-.12	-.19	-.10	-.11	-.11	.00
Age	-.14	-.21	-.01	.00	-.19	-.10	-.08	-.17	-.15	-.14	-.07
Pain intensity	-.20	-.19	-.36**	-.31**	-.53***	-.35**	-.46***	-.29*	-.52***	-.24*	-.21
SOPA scales											
Pain Control	.01	.02	-.07	.19	.03	.06	.12	.22*	.12	.21	.26*
Harm	.10	-.05	-.01	-.06	-.20	-.06	.03	-.06	-.12	-.06	.01
Solicitude	-.10	-.17	-.08	-.12	-.16	.00	-.11	.04	-.21*	-.06	-.15
Medical Cure	-.11	.06	-.12	-.01	.21	-.20	.08	-.10	.15	-.14	-.20
Medication	-.03	-.16	-.06	-.01	.00	.06	-.02	.05	-.14	-.04	.08
Emotion	-.06	-.06	-.30*	-.48***	-.26*	-.28*	-.38**	-.44***	-.14	-.31*	-.12
Disability	-.28*	-.26*	-.15	.05	-.13	-.04	.02	-.06	-.14	-.06	.11

* $p < .05$,

** $p < .01$;

*** $p < .001$