Acceptance of Pain: Associations With Depression, Catastrophizing, and Functional Disability Among Children and Adolescents in an Interdisciplinary Chronic Pain Rehabilitation Program

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Objectives   The aims of this study were: (1) investigate relations between pain acceptance, depressive symptoms, catastrophizing, and functional disability in pediatric patients in an interdisciplinary chronic pain rehabilitation program, (2) examine changes in acceptance from pre- to posttreatment, and (3) test if changes in acceptance predict changes in depressive symptoms, catastrophizing, and functional disability from pre- to posttreatment.   **Methods**   112 participants, ages 11–18 years, completed the Chronic Pain Acceptance Questionnaire, Adolescent Version, Center for Epidemiological Studies-Depression-Children's Scale, Pain Catastrophizing Scale for Children, and Functional Disability Inventory on admission to and completion of the program.   **Results**   Significant and strong relations between acceptance, depression, catastrophizing, and functional disability were demonstrated. Participants demonstrated significant increases in acceptance and decreases in depression, catastrophizing, and functional disability. Finally, changes in acceptance significantly predicted changes in depressive symptoms, catastrophizing, and functional disability.   **Conclusions**   Pain acceptance is an important variable in the treatment of pediatric chronic pain.

Key words   acceptance; chronic pain; functional disability; rehabilitation.

Introduction

Between 11 and 38% of children and adolescents have chronic or recurrent pain, with nearly 25% of young people experiencing at least weekly headaches, the most commonly studied form of recurrent pediatric pain (King et al., 2011). Of perhaps even greater concern, the overall prevalence of pediatric chronic pain has increased during the past 20 years (King et al., 2011). It has been well-established that chronic pain in childhood affects several areas of emotional well-being, including depression (Kashikar-Zuck, Goldschneider, Powers, Vaught, & Hershey, 2001), anxiety (Kaczynski, Simons, & Claar, 2011), and quality of life (Hunfeld et al., 2001).

Research has additionally indicated that pediatric chronic pain may result in functional disability (Kashikar-Zuck, Vaught, Goldschneider, Graham, & Miller, 2002; Kashikar-Zuck et al., 2011), including impairment in school (Kashikar-Zuck et al., 2002; Logan, Simons, Stein, & Chastain, 2008; Simons, Logan, Chastain, & Stein, 2010) and social functioning (Simons et al., 2010). The increasing prevalence of pediatric chronic pain, combined with its impact on well-being and functioning, indicates the continued importance of research to identify factors that may protect adolescents with chronic pain from emotional distress and functional disability along with interventions to promote these protective factors.

Systematic reviews of the randomized controlled trials of psychological interventions for children and adolescents with chronic pain indicate that psychological therapies (cognitive–behavioral therapy, relaxation therapy, and biofeedback) have a positive effect on pain intensity in headache, abdominal pain, and fibromyalgia populations (Eccleston et al., 2002; Palermo, Eccleston, Lewandowski, Williams, & Morley, 2010), suggesting that the skills learned in these therapies may mitigate negative outcomes related to pediatric chronic pain. Although these therapies promote pain reduction for many patients, they may not lead to improved functioning (Palermo, 2009). Functioning is a particularly important outcome variable when working with pediatric pain patients who have long-standing pain that has not been alleviated by typical pain management techniques and continue to experience symptoms that result in emotional distress and functional disability. For this population, a greater focus on increasing functioning regardless of symptom relief is warranted (Wicksell, Melin, Lekander, & Olsson, 2009). Acceptance of pain is a relatively new concept that emphasizes functioning despite pain or other symptoms and therefore an important variable to explore within the realm of pediatric chronic pain.

Acceptance is a therapeutic intervention concept that is commonly recognized as a core part of ''contextual'' or ''Third-Wave'' cognitive–behavioral therapies such as Dialectical Behavior Therapy and Acceptance and Commitment Therapy (ACT) (Hayes, Follette, & Linehan, 2004). According to contextual models, avoidance of stimuli that cause discomfort and contribute to psychological distress can lead to difficulties behaving in ways that are consistent with one's goals and values. In contrast, acceptance involves a willingness to acknowledge and experience uncomfortable stimuli in an open and nonjudgmental way as they occur (Hayes, Strosahl, & Wilson, 2012; Robins, Schmidt, & Linehan, 2004). When practicing acceptance, individuals shift their focus from distress relief to distress tolerance and engagement in behaviors that are consistent with their values even while experiencing pain or difficult thoughts or emotions. Being able to choose how they behave in any given situation, rather than believing thoughts, emotions, or sensations dictate their behavior, is thought to lead to greater well-being, and improved functioning.

The impact of acceptance on well-being and functioning has been demonstrated in adults with chronic pain (McCracken & Vowles, 2006; McCracken, Vowles, & Eccleston, 2005) and a few pediatric chronic illness populations including adolescents and young adults with cystic fibrosis (Casier et al., 2011) and adolescents with juvenile idiopathic arthritis (Feinstein et al., 2011). In adolescents with mostly idiopathic types of chronic pain, increased acceptance of pain is related to greater self-efficacy, lower depression and anxiety, and greater adaptive functioning (McCracken, Gauntlett-Gilbert, & Eccleston, 2010; Wallace, Harbeck-Weber, Whiteside, & Harrison, 2011). In addition, there is preliminary evidence for the effectiveness of acceptance-based interventions on improved functioning in pediatric pain populations (e.g., Wicksell et al., 2009). The information on the role of acceptance in pediatric chronic pain is promising thus far. However, this research is in its infancy and many questions remain, including whether acceptance of pain can change subsequent to intervention.

In the pediatric pain rehabilitation center (PPRC) described in this study, adolescents with chronic pain participate in an intensive 3-week hospital-based outpatient interdisciplinary pain program delivered in a group format. Consistent with established best practices (Palermo, 2012) the pain program is based on the biopsychosocial model of pain (Schwartz, 1982), operant learning theory, and the cognitive–behavioral model (Turk, Swanson, & Tunks, 2008). The primary treatment outcome is improved functioning despite continued pain or associated symptoms, which is consistent with the concept of acceptance of pain. Adolescent participants and their parents are informed before starting the program that the goal of treatment is not to decrease pain but to increase coping skills, functioning, and quality of life. Thus, the setting provides an opportunity to measure pain acceptance before and after a treatment program that promotes functioning rather than symptom relief.

To the best of our knowledge, no studies have investigated whether acceptance of pain changes as part of pain rehabilitation treatment for adolescents, which is the primary purpose of the current study. In addition, we examine whether such changes are related to changes in primary outcome measures of functional disability, depressive symptoms, and pain catastrophizing. Outcome variables reflect several primary treatment targets of the PPRC. These variables are considered important treatment goals given their relationship to overall functioning. This study includes 112 participants whose data were used in secondary analyses of a larger treatment study ($n = 133$; Bruce et al., 2012). Although the findings of the outcome variables in the current study are consistent with the larger treatment study, statistics are slightly different because participants who did not complete the acceptance measure were not included in this study. Therefore, results of changes in the primary outcome variables are included in this study as well.

The first aim of the current study was to examine if pain acceptance is related to depressive symptoms, pain catastrophizing, and functional disability at baseline. It was expected that acceptance would be inversely related to each of these variables given previous research supporting these relations (Casier et al., 2011; Feinstein et al., 2011; Wallace et al., 2011; Wicksell, Melin, & Olsson, 2007). The second aim was to investigate whether pain acceptance increased following participation in a 3-week intensive outpatient program for pediatric chronic pain. It was expected that pain acceptance would significantly increase pre- to posttreatment, as interventions to improve functioning despite ongoing symptoms should facilitate pain acceptance. The final aim was to examine if change in acceptance predicts change in depressive symptoms, pain catastrophizing, and functional disability. It was hypothesized that increases in acceptance would be associated with decreases in each of these outcome variables.

Methods
Participants

The study sample consisted of 112 children and adolescents who consecutively participated in a 3-week outpatient rehabilitative program for chronic pain over a 2-year period. All patients during the study time-frame consented to participate in this study and completed several questionnaires before and on completing the treatment program. The requirements to qualify for the treatment program were as follows: (1) patients had to be struggling with chronic pain (3 months pain duration or longer), (2) their primary care provider needed to state that medical work-up was complete, and (3) chronic pain was interfering with functioning (usually school, social, sleep, eating, or mood). Patients were referred from specialty clinics from the same institution as well as outside health care providers. Patients were excluded if they did not complete the Chronic Pain Acceptance Questionnaire, Adolescent (CPAQ-A) Version ($n = 20$), were older than 18 years old ($n = 7$), or did not complete the program ($n = 5$). Participants were ages 11–18 years (mean $[M] = 15.47$, standard deviation $[SD] = 1.83$), 85 (76%) were female, and 99 (88%) identified as Caucasian. These demographics are consistent with pediatric pain populations reported in studies across the United States (e.g., Palermo, Wilson, Lewandowski, Toliver-Sokol, & Murray, 2011; Simons, Claar, & Logan, 2008) and in other countries (Wicksell et al., 2009). Participants had been diagnosed with a variety of chronic pain issues before arrival at the program, including problems in the following areas: abdominal (30%), headache (26%), generalized (25%), back/neck

(8%), extremity(ies) (7%), chest (2%), and pelvic area (2%). Pain duration ranged from 3 to 144 months ($M = 37$; $SD = 28$); average current pain intensity on a numeric rating scale (0–10) was 5.46 ($SD = 2.78$). Approximately one-fifth (20.4%) of the participants had a comorbid diagnosis of autonomic dysfunction and/or Postural Orthostatic Tachycardia Syndrome. Patients with these conditions often report an array of symptoms such as dizziness and syncope, fatigue and muscle weakness, nausea, abdominal and headache pain, and difficulties with concentration. For a more detailed discussion, see article by Johnson et al. (2010).

Treatment Program

All participants completed fifteen 8-hr days of a group pediatric outpatient interdisciplinary chronic pain rehabilitation program. Groups typically consisted of 10–15 patients. Participants and their parents (both separately and together) focused on goals related to functional restoration and learning how to adaptively self-manage chronic pain. Collaborative treatments by multiple providers included physicians, psychologists, nurses, physical therapists, and occupational therapists. In each 8-hr day, patients participated in 1 hr of relaxation (split into two sessions), physical therapy, occupational therapy, recreational therapy and family group and 3 hr of cognitive–behavioral groups. Parents participated in parent group 3 days each week for 2-hr sessions in addition to family groups. Nurse case managers and psychologists met with patients and families separate from the group to work on individual issues as needed. Cognitive–behavioral groups focused on pain management coping skills (e.g., distraction, positive self-talk), relaxation and biofeedback training, stress management, wellness instruction (e.g., sleep hygiene, healthy diet), chemical health education, exposure to physical activity, and activity pacing. Operant learning strategies such as elimination of pain behaviors and parent behaviors that may serve as secondary reinforcement for pain behavior were used throughout the program. Identification and treatment of comorbid psychiatric illnesses (e.g., depression, anxiety disorders) was also an important aspect of the program. In addition, tapering from opioid, muscle relaxant, and benzodiazepine medications were included as a treatment goal if appropriate. Discontinuation of further medical work-up and interventional procedures was strongly recommended.

Procedure

The current study is part of a larger on-going study to examine outcomes of participation in an intensive

interdisciplinary pediatric pain program. Study-related procedures were approved by the Institutional Review Board. A research coordinator and/or nurses in the program (from this point on, referred to as research assistants) obtained assent from children/adolescents and consent from their parents. Research assistants asked participants to complete several measures via an online survey site during admission to, and on completion of, the program. They explained that this information would be used for both clinical and research purposes. Parents were also asked to complete several questionnaires. Scores of 26 or higher on the Center for Epidemiological Studies-Depression-Children (CESD-DC) scale were considered clinically significant (Weissman, Orvaschel, & Padian, 1980). If participants demonstrated a score of 26 or higher on the CESD-DC at posttreatment, we discussed this result with participants and their parents and referrals for additional resources were made as appropriate.

Measures

Parents of participants completed several forms, although only a basic demographic and pain questionnaire was used in the current study. Participants completed several measures, described in more detail below.

Pain Intensity

Participants rated their current pain intensity on a numeric rating scale to measure pain levels from 0 (no pain) to 10 (worst pain imaginable). Such rating scales are commonly used to assess pain intensity and have been shown to have good reliability and validity in pediatric populations (Miró, Castarlenas, & Huguet, 2009; von Baeyer et al., 2009).

Acceptance of Pain

The CPAQ-A Version (McCracken et al., 2010) is a 20-item self-report measure of acceptance of chronic pain. Items are rated on a 5-point scale ranging from 0 (never true) to 4 (always true). CPAQ-A scores range from 0 to 80, with higher scores reflecting greater acceptance of pain. Examples of items include "When my pain increases, I can still do things I have to do" and "I can do activities even if I do not control my pain." Reliability and validity studies have demonstrated this scale has strong internal consistency and is related to functioning and psychological measures in expected directions (McCracken et al., 2010; Wallace et al., 2011). Cronbach's alpha in the current study was $\alpha = 0.87$ at pre-treatment and $\alpha = 0.91$ at posttreatment.

Depressive Symptoms

The CES-DC (Weissman et al., 1980) is a self-report measure of depressive symptoms with acceptable reliability and validity for adolescents (Faulstich, 1986; Roberts, Andrews, Lewinsohn, & Hops, 1990). Participants rated how much they experienced depressive symptoms on a 4-point scale ranging from 0 (not at all) to 3 (a lot). Total scores range from 0 to 60 with higher scores suggesting more frequent and severe depressive symptoms. General guidelines for interpretation are $16–20 = $ mild, $21–30 = $ moderate, and $\geq 31 = $ severe depressive symptoms. Cronbach's alpha in the current study was $\alpha = 0.94$ at pre-treatment and $\alpha = 0.95$ at posttreatment.

Pain Catastrophizing

Pain catastrophizing refers to exaggerated negative cognitions about anticipated or actual pain experiences (Sullivan et al., 2001). The Pain Catastrophizing Scale for Children (PCS-C) (Crombez et al., 2003) is a 13-item self-report questionnaire in which children indicate the frequency with which they have certain thoughts and feelings while they are in pain. Responses range from 0 (not at all) to 4 (extremely). Item examples include "When I am in pain, I worry all the time about whether the pain will end" and "When I am in pain, it's terrible and I think it's never going to get better." Total scores range from 0 to 52 with high scores indicating greater catastrophizing. The PCS-C has been shown to be reliable and valid for children and adolescents (Crombez et al., 2003; Vervoort, Eccleston, Goubert, Buysse, & Crombez, 2010). Cronbach's alpha in the current study was $\alpha = .92$ at pre-treatment and $\alpha = 0.94$ at posttreatment.

Functional Disability

The Functional Disability Inventory (FDI; Walker & Greene, 1991) is a well-established, 15-item, self-report measure that assesses difficulty in physical and psychosocial functioning due to health status. Respondents indicate the difficulty they experience engaging in activities of daily living in regard to home, school, and social tasks on a 5-point scale ranging from 0 (no trouble) to 4 (impossible). FDI scores range between 0 and 60, with $0–12 = $ none or minimal, $13–20 = $ mild, $21–29 = $ moderate, and $>29 = $ severe functional disability (Kashikar-Zuck et al., 2011). The FDI has good reliability, including test-retest reliability (Claar & Walker, 2006), and appears to be a valid measure of functional disability in pediatric patients with chronic pain (e.g., Gauntlett-Gilbert & Eccleston, 2007; Kashikar-Zuck et al., 2001). Cronbach's alpha in the current study was $\alpha = 0.87$ at pre-treatment and $\alpha = 0.93$ at posttreatment.

Results
Statistical Plan

First, to examine the relationship of pain acceptance to psychological functioning and disability, correlations were run. Then, to examine if changes in acceptance, functional disability, depressive symptoms, and pain catastrophizing from pre- to posttreatment were significant, paired *t*-tests were conducted. To investigate if change in acceptance predicted change in treatment outcome variables (i.e., functional disability, depressive symptoms, and catastrophizing), a series of hierarchical regressions analyses were conducted. Before running regression analyses, preliminary statistics were run to evaluate if any demographic or pain variables should be included as covariates in the regression analyses. Results from *t*-tests identified no gender differences in pain acceptance, depressive symptoms, pain catastrophizing, or functional disability at posttreatment. Age was significantly related only to functional disability at posttreatment ($r = -.250$, $p < .01$) and was therefore included in the regression analyses for predicting changes in functional disability. Pain duration was not related to any of the variables at posttreatment. However, pain intensity was significantly correlated with pain acceptance ($r = -.295$, $p < .01$), depressive symptoms ($r = .314$, $p < .001$), pain catastrophizing ($r = .293$, $p < .01$), and functional disability ($r = .425$, $p < .001$) and was therefore included in each of the regression analyses.

Dependent variables for the regression models were the posttreatment values of functional disability, depressive symptoms, and catastrophizing. For the models testing if change in acceptance predicts change in depressive symptoms and pain catastrophizing, pain intensity was entered in the first step of each analysis, the baseline score for pain acceptance was entered as the second step, and the baseline score of each outcome variable was entered as the third step. Then, change in acceptance (calculated using residualized change scores; Cohen, Cohen, West, & Aiken, 2003) was entered as step 4. For the model testing if change in acceptance predicts change in functional disability, pain intensity was entered in the first step, age was entered as the second step, baseline pain acceptance was entered as the third step, baseline functional disability was entered as the fourth step, and change in acceptance was entered as step 5.

Relations Between Pain Acceptance, Depressive Symptoms, Pain Catastrophizing, and Functional Disability

As hypothesized, pain acceptance was significantly and inversely related to functional disability ($r = -.50$, $p < .001$, CI [−.63, −.35]), depressive symptoms ($r = -.57$, $p < .001$, CI [−.68, −.43]), and pain catastrophizing ($r = -.42$, $p < .001$, CI [−.56, −.26]) at baseline (pretreatment).

Changes From Pre- to Posttreatment

To examine if changes in acceptance, functional disability, depressive symptoms, and pain catastrophizing from pre- to posttreatment were significant, paired *t*-tests were conducted. Participants demonstrated a significant increase in pain acceptance from pre- to posttreatment (see Table I). They also reported significant decreases in functional disability, depressive symptoms and pain catastrophizing (see Table I). Pre- to posttreatment changes in functional disability, depressive symptoms, and pain catastrophizing have been previously published (Bruce et al., 2012). However, results for these variables are also presented in this article because the current study sample ($n = 112$) is slightly different than the primary outcome sample ($n = 133$) due to excluding those who did not complete the CPAQ-A.

Change in Acceptance as a Predictor in Change in Depressive Symptoms, Pain Catastrophizing, and Functional Disability

Consistent with our hypotheses, change in acceptance was a significant predictor of change in depressive symptoms, pain catastrophizing, and functional disability after accounting for pain intensity and age as indicated. See Table II. Note that negative betas indicate that increases in pain acceptance predict decreases in depressive symptoms, pain catastrophizing, and functional disability.

Discussion

The first aim of this study was to provide further support for the importance of pain acceptance in the baseline functioning of adolescents with chronic pain. Consistent with previous findings (McCracken et al., 2010; Wallace et al., 2011), the participants in this study demonstrated strong relationships between pain acceptance and depressive symptoms, pain catastrophizing, and functional disability before treatment. Given the growing body of evidence supporting this finding, low pain acceptance may be seen as an important risk factor in developing functional disability and psychological distress for adolescents with chronic pain. Thus, it may be useful for clinicians in pediatric chronic pain clinics to assess pain acceptance and to include this concept as a target of therapeutic interactions.

Table I. *Pre- and Posttreatment Variables Means and Standard Deviations and Results of t-Tests*

Variable	Pretreatment $M \pm SD$	Posttreatment $M \pm SD$	t-statistic	p	$d*$	CI
Acceptance	36.43 ± 15.13	52.43 ± 17.30	12.24	<.001	0.98	13.41–18.59
Functional disability	23.84 ± 11.57	12.79 ± 11.05	11.77	<.001	0.97	9.19–12.91
Depressive symptoms	25.61 ± 13.68	15.69 ± 12.23	9.35	<.001	0.76	7.82–12.02
Pain catastrophizing	26.93 ± 11.69	17.01 ± 12.12	8.39	<.001	0.83	7.58–12.26

*Rough estimates for interpretation of effect sizes are as follows: .20 = small, .50 = medium, .80 = large (Cohen, 1988; Durlak, 2009).

Table II. *Hierarchical Regression Analyses: Change in Acceptance Predicting Change in Criterion Variables (N = 112)*

Dependent variable posttreatment	Model	β	ΔR^2	Adjusted R^2
Functional disability	Pain intensity	.425***	.180	.173
	Pain intensity	.388***	.026	.191
	Age	−.164		
	Pain intensity	.353***	.105	.291
	Age	−.186*		
	Pain acceptance Time 1	−.326***		
	Pain intensity	.149	.142	.432
	Age	−.207**		
	Pain acceptance Time 1	−.098		
	Functional disability Time 1	.493***		
	Pain intensity	.032	.117	.550
	Age	−.175**		
	Pain acceptance Time 1	−.094		
	Functional disability Time 1	.525***		
	Change in acceptance	−.362***		
Depressive symptoms	Pain intensity	.314**	.098	.090
	Pain intensity	.278**	.143	.227
	Pain acceptance Time 1	−.380***		
	Pain intensity	.180*	.188	.413
	Pain acceptance Time 1	−.077		
	Depressive symptoms Time 1	.543***		
	Pain intensity	.066	.141	.549
	Pain acceptance Time 1	−.118		
	Depressive symptoms Time 1	.494***		
	Change in acceptance	−.397***		
Pain catastrophizing	Pain intensity	.293**	.086	.077
	Pain intensity	.281**		
	Pain acceptance Time 1	−.123		
	Pain intensity	.198*	.152	.223
	Pain acceptance Time 1	.044		
	Pain catastrophizing Time 1	.419***		
	Pain intensity	.088	.116	.335
	Pain acceptance Time 1	.032		
	Pain catastrophizing Time 1	.420***		
	Change in acceptance	−.356***		

*$p < .05$, **$p < .01$, ***$p < .001$.

This study is the first to illustrate that pain acceptance can change, assumingly due to pediatric pain rehabilitation treatment. Magnitude estimates described by Cohen (1988) indicate the improvements in pain acceptance demonstrated in this study are large. However, as this study did not include a control group, it is not possible to be certain that the changes in pain acceptance occurred due to participation in the pain program. It is possible such changes could occur due to the passage of time alone. Although plausible, the latter explanation does not seem as likely given that the participants in this study had been struggling with chronic pain and functional disability for long durations of time and there is some evidence in the adult literature to suggest that pain acceptance does not spontaneously change over time. McCracken et al. (2005) found that for adults with chronic pain, acceptance of pain did not change before treatment, but did significantly change after treatment in an intensive interdisciplinary pain rehabilitation program. Nonetheless, the findings presented in this article are preliminary and future studies that include a control group would provide more convincing evidence that changes in pain acceptance are due to treatment.

Finally, the current study demonstrated that changes in acceptance during the program accounted for 11–13% of the variance in observed improvements in functional disability, depressive symptoms, and pain catastrophizing, even after controlling for effects of pain and age where appropriate. These findings are interesting given an increasing emphasis on identifying underlying processes associated with improvements in pain and, perhaps more importantly, functioning for children and adolescents with chronic pain (Palermo, 2011; Wicksell, Olsson, & Hayes, 2011). Research with adults has also supported the importance of acceptance to treatment outcomes including depression and pain catastrophization (Vowles & McCracken, 2010; Vowles, McCracken, & Eccleston, 2007). However, it is important to note that due to the methods of this study, it is not possible to know the direction of effects for these findings. It is also possible that changes in functional disability, depressive symptoms, and pain catastrophizing lead to changes in pain acceptance. However, we conceptualized the findings with the former explanation due to theories on the role of acceptance in overall functioning for pain patients. Acceptance is specified as a mediator between pain and functioning within the ACT model (Dahl, Wilson, Luciano, & Hayes, 2005; McCracken, 2005).

From a clinical perspective, it certainly seems as if one of the factors that differentiate patients with chronic pain who are more disabled from others who are higher functioning is their relative focus on finding a particular diagnosis that will lead to a medical treatment to ''fix'' the pain. This phenomenon has been described previously (Eccleston & Malleson, 2003; LaChapelle, Lavoie, & Boudreau, 2008). Comparatively, pain acceptance involves letting go of the struggle to fix chronic pain, which subsequently allows people to focus on other goals in their life. Changes in functioning and psychological variables described in this study are thought to occur at least partially because as pain acceptance increases, avoidance of activities because of pain decreases and the ability to be more functional (e.g., going to school, engaging in social activities) contributes to greater psychological well-being and quality of life (Dahl et al., 2005). However, at this point, these theories are speculative in nature and additional studies are needed to investigate the direction of relationships among these important variables.

In other studies and clinical programs, treatments that are meant to increase pain acceptance specifically target these concepts using processes specified by ACT (e.g., Dahl et al., 2005; Hayes et al., 2012). In the current study, though, participants demonstrated changes in pain acceptance after participating in an interdisciplinary pediatric pain rehabilitation program that did not use ACT techniques or directly target ACT processes. Rather, acceptance was targeted by placing emphasis on increasing functioning even while experiencing pain or other symptoms. Indeed, many traditional behavioral and cognitive–behavioral techniques for pain can serve to increase pain acceptance under certain circumstances (e.g., Hayes & Duckworth, 2006; Wicksell, Dahl, Magnusson, & Olsson, 2005). Also, other treatments incorporated within the rehabilitation setting, such as activity exposure through physical therapy, may build pain acceptance through practice engaging in a variety of behaviors when having pain. These other behaviors then compete with the highly practiced behavior of pain avoidance, a key component of dysfunction.

Limitations

The findings of this study should be interpreted in light of a few limitations. The current study did not include a control group, and so changes in acceptance due to the passage of time or other variables not related to the treatment cannot be fully ruled out. Also, in the absence of multiple data points collected during treatment, it is not possible to fully confirm that changes in acceptance led to the treatment outcome changes rather than the other way around. The results do build on previous work demonstrating that improved psychological flexibility (a different, but related ACT concept) may mediate improvements in functioning

following participation in ACT for chronic pain (Wicksell et al., 2011); however, this area of study is new and requires additional research before conclusions can be reached.

Finally, while similar to that reported from other pediatric pain clinics and treatment programs, this sample was from a single PPRC and participants were predominantly Caucasian, female, and from the United States. It is unclear to what extent these results would generalize to adolescents treated at other pain rehabilitation centers or from different backgrounds. Studies with sufficient sample size to compare young boys and girls, and including more members of racial/ethnic minorities, are needed to better understand whether pain acceptance carries similar importance across diverse pediatric populations with chronic pain.

Future Directions

As research regarding the role of acceptance in pediatric chronic pain is at its infancy, there are many aspects to explore in future studies. Other variables that are thought to be related to acceptance include anxiety and avoidance behaviors so these concepts could be examined as well. In addition, acceptance is thought to be related to psychological flexibility, so it would be interesting to investigate if interdisciplinary and cognitive–behavioral treatments for pediatric chronic pain influence this construct as well. Finally, as the role of parents are important to consider in the conceptualization and treatment of pediatric chronic pain, it would be fascinating to examine if parent variables influence adolescent's acceptance of pain.

Conclusions

The literature demonstrating that pain acceptance is an important concept in chronic pain is growing, with less information available regarding pediatric populations. The current study is consistent with previous research indicating pain acceptance is related to important aspects of functioning including depressive symptoms and functional disability. In addition, this study illustrates that adolescents tend to show increased pain acceptance after participating in a pain rehabilitation program focused on improved functioning. Further, increases in pain acceptance are associated with concurrent improvements in depressive symptoms, pain catastrophizing, and functional disability. Incorporating strategies to more directly target acceptance may improve outcomes, especially for highly disabled patients.

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