Graduate School Form 30
Updated 1/15/2015

PURDUE UNIVERSITY
GRADUATE SCHOOL
Thesis/Dissertation Acceptance

This is to certify that the thesis/dissertation prepared

By Megan M. Miller

Entitled
Psychosocial Aspects of Chronic Pain in a Clinical Pediatric Sample

For the degree of Master of Science

Is approved by the final examining committee:

Adam T. Hirsh
Chair
Kevin Rand
Tamika Zapolski

To the best of my knowledge and as understood by the student in the Thesis/Dissertation Agreement, Publication Delay, and Certification Disclaimer (Graduate School Form 32), this thesis/dissertation adheres to the provisions of Purdue University's "Policy of Integrity in Research" and the use of copyright material.

Approved by Major Professor(s): Adam T. Hirsh

Approved by: Nicholas Grahame 11/5/2015
Head of the Departmental Graduate Program Date

PSYCHOSOCIAL ASPECTS OF CHRONIC PAIN IN A CLINICAL PEDIATRIC SAMPLE

A Thesis

Submitted to the Faculty

of

Purdue University

by

Megan M. Miller

In Partial Fulfillment of the

Requirements for the Degree

of

Master of Science

December 2015

Purdue University

Indianapolis, Indiana

ACKNOWLEDGEMENTS

I would like to thank Adam T. Hirsh, Ph.D., for his encouragement and mentorship throughout this project. I would also like to express gratitude to my committee members, Kevin Rand and Tamika Zapolski, and study collaborator, Eric Scott for their feedback and guidance. Finally, I would like to thank my husband, family, and friends for their support and humor throughout this process.

TABLE OF CONTENTS

APPENDICES

ABSTRACT

Miller, Megan M.. M.S., Purdue University, December 2015. Psychosocial Aspects of Chronic Pain in a Clinical Pediatric Sample. Major Professor: Adam T. Hirsh.

Chronic pain, defined as pain lasting more than 3 months, is a common and costly health condition. Thirty-three percent of adults and upwards of 35% of children report experiencing pain due to various diseases, disorders, or accidents. Recent research has identified perceived injustice and anger as important constructs in an adult's pain experience and a possible focus for intervention efforts. The present study explored the extent to which perceived injustice and anger expression operate similarly in children with chronic pain as in adults. This was a retrospective analysis of data from 122 patients seeking treatment at a pediatric pain clinic. Results supported anger expression as a mediator in the relationship between perceived injustice and pain intensity but not psychological distress, suggesting that anger expression operates similarly in children as in adults with chronic pain. Unlike previous findings in adults with chronic pain, injustice did not moderate the relationship between pain intensity and psychological distress, suggesting that injustice operates differently in children with chronic pain compared to adults. The strong association between injustice and pain outcomes (i.e. pain intensity, quality of life, functional disability) suggests that injustice is an important construct to explore in the chronic pain experience of children.

CHAPTER 1. INTRODUCTION

Chronic pain, defined as pain occurring for more than 3 months, is a common and costly health condition. Globally, chronic pain is a major health problem with 1 in 5 people reporting moderate to severe levels of pain occurring for more than 3 months (World Health Organization, 2004). Within the United States an even greater percentage of adults are afflicted with chronic pain, with 1 in 3 adults reporting pain due to various diseases, disorders, or accidents. The problem will likely get worse as the prevalence of chronic pain increases as the population ages (Institute of Medicine, 2011). Chronic pain is also an important health problem in children and adolescents. In the community, prevalence rates of pain in children and adolescents range from 25-35%, with 5% of those children having moderate to severe pain. Similar to adults, prevalence rates for most types of pain increase with age in children and adolescents (Huguet & Miro, 2008; King et al., 2011).

The high rate of chronic pain comes at a marked cost to society and the individual. Pain results in high healthcare utilization with pain complaints accounting for 80% of physician visits (Gatchel, 2004). Frequent physician, emergency room, and hospital visits result in hours of work lost and days of work missed. In 2010, the annual value of lost productivity accounted for by pain in adults was between $297.4 and $335.5 billion

(Institute of Medicine, 2011). In adolescents with moderate to severe chronic pain, the annual cost to society is estimated to be $19 billion in healthcare costs and lost productivity for caregivers (Groenewald et al., 2014).

In addition to healthcare costs and lost work productivity, chronic pain comes at a psychological, physical, and social cost for patients. Psychological functioning is often affected by chronic pain. Depression is widespread among individuals with chronic pain and is associated with high levels of pain-related disability and decreased physical functioning for adults and children (Gauntlett-Gilbert & Eccleston, 2007; Kashikar-Zuck, Goldschneider, Powers, Vaught, & Hershey, 2001; McWilliams, Cox, & Enns, 2013; Brown, 1990). Kashikar-Zuck and colleagues (2001) found that depression, together with pain intensity, predicted functional disability in children with chronic pain. Along with depression, poor physical functioning and disability is a consistent outcome of chronic pain. Previous studies in adult and child populations found that increased pain intensity is associated with decreased physical functioning (Paananen, Taimela, & Auvinen, 2011; Peterson & Palermo, 2004; Logan and Scharff, 2005, Gauntlett-Gilbert & Eccleston, 2007; Kashikar-Zuck et al., 2001). Increased disability often negatively affects an individual’s social functioning through missed work and school (Huguet & Miro, 2008; United States Department of Labor; Institute of Medicine of the National Academies Report). In adult and child samples, a chronic pain diagnosis is associated with peer relationship deficits and poor social functioning (Becker et al., 1997; Kaskikar-Zuck et al., 2007; Forgeron et al., 2010). Children and adolescents with chronic pain frequently miss school, struggle with maintaining their grades, and can be ostracized by peers (Huguet & Miro, 2008).

The negative impact of chronic pain on an individual’s psychological, physical, and social functioning results in overall poorer quality of life when compared to individuals without chronic pain (Becker et al., 1997). Chronic pain patients’ quality of life in all domains (psychological, physical, and social functioning) is among the lowest observed for any medical conditions (Becker et al., 1997; Skevington, 1998). This decreased psychological, physical, and social functioning of both adults and children with chronic pain leads to an increase in healthcare and medication utilization (Huguet & Miro, 2008; Turk & Okifuji, 1997).

These high costs for adults and children with chronic pain are partially attributed to gaps in research, which result in a shortage of established effective therapies and contribute to patients routinely receiving inadequate care. Because of this, patients often seek additional treatment, which further contributes to the high utilization of healthcare services and lost productivity. Over the course of a child’s life, inadequate care for chronic pain results in an even greater cost to society (Institute of Medicine, 2011).

In order to address these gaps and determine the most effective treatments for chronic pain in adults and children, all facets of the pain experience must be explored. Through the lens of the biopsychosocial model, an individual’s pain experience is viewed as the result of the interaction of biological, psychological, and sociocultural variables (Turk & Flor, 1999). Therefore, in order to maximize treatment success, biological, psychological, and sociocultural dimensions must be considered to determine the important aspects shaping an individual’s pain experience (Gatchel, Peng, Peters, Fuchs, & Turk, 2007).

Several factors partially explain the relationship between chronic pain and poor outcomes. Catastrophizing, a coping style characterized by rumination, magnification, and helplessness cognitions, has been consistently found to negatively affect the pain experience in adults and children. Catastrophizing contributes to disability, depression, and poor quality of life. Previous studies found catastrophizing predicted disability above and beyond other characteristics of the individual including gender, age, or pain intensity (Asmundson, Noel, Petter, & Parkerson, 2012; Crombez et al., 2003). Greater catastrophizing is associated with increased pain intensity, occupational disability, and unemployment in adults (Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998; Jensen, Turner, Romano, & Karoly, 1991; Turk & Rudy, 1992). Catastrophizing may partially explain the relationship between pain intensity and depression in adult pain patients (Keefe, Brown, Wallston, & Caldwell, 1989; Wood, Nicholas, Blyth, Asghari, & Gibson, 2013). In children and adolescents, higher catastrophizing is associated with increased pain behaviors and depressive symptoms as well as decreased overall functioning (Lynch-Jordan, Kashikar-Zuck, Szabova, & Goldschneider, 2013). In summary, catastrophizing plays an important role in the pain experience for adults and children with chronic pain.

Social relationships are also an important part of the pain experience. For adults, greater social support can help temper the relationship between stress and increasing pain intensity (Forrest, 2012). However, not receiving enough support from important individuals, such as a spouse or partner, can negatively affect pain outcomes such as depression (Cho, Zunin, Chao, Heiby, & McKoy, 2012). A similar relationship exists among children and parents. Claar and colleagues (2008) found that parental responding to child pain behaviors can affect the child's pain outcomes, in that a maladaptive parental response (i.e. discounting the child's pain) can result in an increase in negative pain outcomes (i.e. disability and anxiety) for the child. Additionally, parental coping is related to children's pain behaviors. Parents' level of catastrophizing is positively associated with adolescent pain behaviors. This may be due to the tendency of children to model parental coping behaviors, such that children who catastrophize often have parents whom catastrophize about their child's pain (Lynch-Jordan et al., 2013).

Expectations and beliefs about the self and the environment may play a critical role in the pain experience. The idea that the world is a just and fair place is commonly held among the general population; when that belief is violated, feelings of injustice can emerge (McParland & Knussen, 2010). In adult chronic pain patients, feelings of injustice play a role in shaping the pain experience. Sullivan and colleagues (2009) found that perceived injustice is associated with higher pain intensity, depression, and catastrophizing. In a recent study that controlled for the level of catastrophizing, pain intensity and depressive symptoms were positively related only at high levels of perceived injustice (Scott & Sullivan, 2012). Similarly, McParland & Knussen (2010) found that pain intensity positively predicted psychological distress only among individuals who viewed the world as unjust. Therefore, perceived injustice appears to negatively impact emotional reactions to pain such as depression. Additionally, perceived injustice has been linked to other emotions (Scott, Trost, Bernier, & Sullivan, 2013; Mikula, 1998). Anger is a common reaction to the perception of injustice and is associated with increased pain intensity, decreased quality of life and increased catastrophizing in chronic pain patients (Mikula, 1998; Burns et al. 2014; Wollaars, Post, Asbeck, & Brand, 2007; Muris et al., 2007). Recent research suggests anger mediates the relationship between perceived injustice and pain-related outcomes. Scott & Sullivan (2012) found that anger fully accounted for the relationship between perceived injustice and pain intensity, and partially mediated the relationship between perceived injustice and depressive symptoms in adults (Scott & Sullivan, 2012). These studies suggest that perceived injustice and anger are important in the adult pain experience.

Little is known about the role of injustice and anger in a child's pain experience. The parallel relationships between adult and child pain experiences highlighted above suggest a need to examine these constructs in children. Moreover, the unique relationship between child and parent should be considered in this context. Parents of children with chronic pain bear a considerable burden. Parents may have feelings of injustice about their child's condition (i.e., "It's not fair that *my child* is suffering like this.") and the burden of having a child with chronic pain (i.e., "It's not fair that *I* am suffering like this."). Similar to the relationship between parent and child use of catastrophizing, a parent's sense of injustice may be related to a child's sense of injustice and pain outcomes. Given the above, it is necessary to explore how injustice and anger fit into the child and adolescent pain experience.

With the high individual and societal cost of chronic pain, identifying the factors that play a role in the pain experience is crucial. Recent research suggests that perceived injustice and anger are two areas on which to intervene among adult chronic pain patients. Given the overlap in the child and adult chronic pain experience, it is plausible that important relationships found in adults are present and important for children. The current study will examine the role of injustice and anger among children with chronic pain and how the parent-child relationship is associated with these factors.

Hypotheses

Hypothesis 1: Among children with chronic pain, higher levels of perceived injustice will be associated with higher levels of disability, psychological distress, pain intensity, and catastrophizing and lower quality of life (Hyp 1a). Moreover, among children with chronic pain, pain intensity will be associated with psychological distress only at higher levels of perceived injustice (Hyp 1b).

Hypothesis 2: Among children with chronic pain, higher levels of anger expression will be associated with higher levels of perceived injustice, pain intensity, psychological distress, catastrophizing, and disability and lower quality of life (Hyp 2a). Moreover, among children with chronic pain, anger expression will mediate the relationship between perceived injustice and pain intensity (Hyp 2b) and the relationship between perceived injustice and psychological distress (Hyp 2c).

Hypothesis 3: Parent and child catastrophizing will be positively associated. Parent and child perceptions of injustice will be positively associated.

CHAPTER 2. METHODS

2.1 Sample

Participants were children and adolescents with chronic pain attending Riley Children's Hospital's Pain Clinic with their parent or guardian. Patients at this clinic have persistent pain related to chronic disease, injury, sports activity, or surgery. A primary care physician or specialist refers patients to the clinic for comprehensive chronic pain management services including anesthesiology, physical therapy, nutrition, and psychological services. To be included in this study, patients were between the ages of 8 and 18 (see Measures section below regarding IEQ reading level), attended Riley Pain Clinic for at least one appointment, spoke and read English, and were without developmental delay.

2.2 Measures

Patients and their parent or guardian completed a standard battery of forms as part of their initial visit to the clinic. The patient battery included questions about recent levels of pain, Functional Disability Inventory (FDI), Injustice Experiences Questionnaire (IEQ), Pediatric Anger Expression Scale III (PAES-III), Pain Catastrophizing Scale-Child Form (PCS-C), and the Pediatric Quality of Life Inventory (PedsQL). The parent battery included two versions of the IEQ; one referred to feelings of injustice in relation to oneself, and the other referred to feelings of injustice in relation to their child or adolescent. Additionally, parents or guardians completed the Pain Catastrophizing Scale-Parent Form (PCS-P) and the Pediatric Quality of Life Inventory (PedsQL) – Parent-Proxy Report.

2.2.1 Pain Form

Patients indicated on numeric rating scales ranging from 0 “no pain at all” to 10 “most pain ever” their current levels of pain.

2.2.2 Functional Disability

Functional disability was assessed using the Functional Disability Inventory (FDI) (Walker & Greene, 1991). The FDI is a 15-item self-report measure assessing the functional limitations of children and adolescents. It has proven to be a reliable measure in several different chronic pain populations (Claar & Walker, 2006; Reid, Lang, & McGrath, 1997; Vervoort, Goubert, Eccleston, Bijttebier, & Crombez, 2006). Patients identified on a scale ranging from 0 (“no trouble at all”) to 4 (“impossible”) how much trouble they have performing normal physical and daily tasks such as walking up stairs or sitting in class at school for a full day. The total score is calculated by summing the endorsed items, with higher scores reflecting greater disability. The FDI had good internal consistency (α=0.91) in the current sample.

2.2.3 Feelings of Injustice

Feelings of injustice were assessed using the Injustice Experiences Questionnaire (IEQ) (Sullivan et al., 2008). The IEQ is a reliable and valid 12-item measure assessing feelings of injustice (Rodero et al., 2012; Sullivan et al., 2008). Patient and parent dyads rated how frequently they identified with statements such as “it all seems so unfair” on a

5-point Likert scale ranging from 0 (“never”) to 4 (“all the time”). Parents were asked to complete two versions of the IEQ with one focused on their feelings of injustice about their child’s condition (child focused) and one focused on their own feelings of injustice (parent focused). The instructions for the child focused IEQ completed by parents or guardians read: “When your child experiences pain, it can have a profound effect on his/her life. Using the following scale, please indicate how frequently you experience these thoughts and feelings when you think about your child’s pain.” The instructions for the parent focused version of the IEQ read: “When your child has pain, it can have a profound effect on your life. When answering the following questions, please think about how your child’s pain has affected your life.”

Because the construct of injustice has only recently been examined in adult chronic pain samples, and the IEQ is a relatively new measure, its validity and reliability has not been established in a child or adolescent population. However, the IEQ is written at a 2nd grade reading level, which was determined by the Flesch Kincaid Grade Level Formula (Flesch, 1948). Therefore, the form was only administered to children who were ages 8 years and older, able to read and write English, and without developmental delay. Additionally, a clinic staff member was available to address any questions about the items. The total score is calculated by summing the Likert ratings for all questions. A total IEQ score of 30 has been suggested as a clinically meaningful cut off (Rodero et al., 2012). The IEQ total score for child and parent reported injustice was used for this study. The IEQ had good internal consistency for child (α=0.93) and parent reports (parent focused, α=0.92; child focused α=0.91) in the current sample.

2.2.4 Anger

Anger expression was assessed using the Pediatric Anger Expression Scale III (PAES-III), which is a reliable and valid 15-item measure that assesses state-like anger expression in children and adolescents (Jacobs, Phelps, & Rohrs, 1989; Hagglund et al., 1994). Questions are rated on a 3-point Likert scale (1- Hardly ever, 2- Sometimes, 3- Often) and concern the frequency with which individuals use a particular form of anger expression. The PAES-III can be divided into three subscales of anger-in, anger-out, and anger-control. The anger-in scale contains items related to turning anger inward such as "I hold my anger in." The anger-out scale contains items related to outwardly expressing anger such as "I do things like slam doors." The anger-control scale contains items related to one's ability to control anger such as "I can stop myself from losing my temper." Scores are calculated by summing the endorsed items for each subscale. The PAES anger-out scale had acceptable internal consistency (α=0.76) in the current sample. The PAES anger-in and anger-control scales had suboptimal internal consistency (α=0.68 and α=0.55, respectively) in the current sample. Consequently, only the anger-out scale was used in analyses.

2.2.5 Pain Catastrophizing

Pain catastrophizing was assessed using the Pain Catastrophizing Scale for Children and Parents (PCS-C/P). The PCS (child and parent version) is a 13-item questionnaire adapted from the Pain Catastrophizing Scale (PCS), which measures the degree to which individuals engage in rumination, magnification, and feelings of helplessness when in pain (Sullivan, Bishop, & Pivik, 1995). Questions were rated on a 5-point Likert type scale ranging from "not at all" to "extremely." The total score is calculated by summing all items, with higher scores indicating greater catastrophizing. The child version was created by simplifying the rating scale, rewording 1 item, and repeating the item stem of “when I am in pain” at the beginning of each item. The parent version was created to focus on the degree to which parents worry and catastrophize about their child’s pain. Previous studies found both the child and parent form to be reliable and valid measures (Crombez et al., 2003; Goubert, Eccleston, Vervoort, Jordan, & Crombez, 2006). The PCS-C/P total score was used for this study. The PCS had good internal consistency for child (α=0.92) and parent report (α=0.94) in the current sample.

2.2.6 Quality of Life

The Pediatric Quality of Life Inventory (PedsQL) - Generic Core Scales is a 23-item self-report measure that evaluates a child or adolescent’s quality of life over the past month. It is a reliable and valid measure frequently used in chronic health conditions (Powers, Patton, Hommel, & Hershey, 2003). Using a 5-point Likert scale ranging from “never” to “always,” individuals answered questions about physical (“It is hard for me to run”), emotional (“I feel sad or blue”), social (“I have trouble getting along with other kids”), and school functioning (“It is hard for me to pay attention in class”). The PedsQL is reversed scored, and scores are calculated by adding all items within each subscale, with higher scores indicating better quality of life. However, for the current study, items were not reversed scored in order to be consistent with the other measures (i.e. high scores signify worse outcomes) and ease the interpretability of the findings. A total scale score is calculated as the mean of all items on the measure. For the current study, the total scale score (child report) was used as an estimate of quality of life and the emotional functioning subscale (child report) was used as an estimate of psychological distress. The child reported PedsQL total (α=0.93) and emotional functioning subscale (α=0.82) scores had good internal consistency in the current sample.

2.3 Procedure

This study is a retrospective analysis of clinical data from the Riley Hospital Pain Clinic. Participants completed the measures during an initial or follow-up appointment as a routine part of the clinic visit. Patients and their parent/guardian completed forms electronically at the beginning, and if necessary, end of their clinic appointment. Prior to conducting analyses, all data were de-identified by clinic personnel to ensure compliance with HIPAA and PHI standards. This study was approved by IUPUI's Institutional Review Board.

2.4 Data analyses

Analyses were conducted in several stages. First, the data were examined for completeness (there were no missing data), normality, and to ensure all statistical assumptions for parametric tests were met. Next, Pearson's product moment correlations were calculated between variables specified in hypotheses 1-3. Hypotheses were supported if p-values less than .05 were obtained. Effect sizes were reported as an estimate of magnitude and clinical significance of the findings.

Hayes' regression based approach and the PROCESS macro (Hayes, 2013) was used for both the moderation and mediation analyses for hypotheses 1.b., 2.b and 2.c. For hypothesis 1.b, moderation was tested using the following steps: 1) standardize all variables, 2) create an interaction term for perceived injustice (moderator) and pain intensity (predictor) variables, and 3) using hierarchical regression, enter both perceived injustice and pain intensity in model 1 and the interaction term in model 2. If there is a significant change ($p \leq .05$) in the amount of variance accounted for between model 1 and model 2, then the hypothesized moderation is supported.

For hypotheses 2.b and 2.c, I conducted two mediation analyses using the PROCESS macro (Hayes, 2013). For both models, I examined the mediating role of anger expression (mediator) in the relationship between perceived injustice (independent variable) and pain intensity (dependent variable-model 1)/psychological distress (dependent variable-model 2). The direct (*c'*), indirect (*a*b*), and total effect of perceived injustice on pain intensity/psychological distress was determined by conducting three least square regressions to estimate the model (Figure 1). The least square regressions are as follows: 1) anger expression (mediator) is regressed onto perceived injustice (independent variable), producing *a;* 2) pain intensity or psychological distress (dependent variable; depending on the model) is regressed onto both anger expression (mediator) and perceived injustice (independent variable), producing *b* and *c'*; 3) pain intensity/psychological distress (dependent variable) is regressed on perceived injustice (independent variable), which yields the total effect of perceived injustice. The bootstrapping method was used to create a 95% bootstrap confidence interval to assess for statistical inference of the indirect effect. The data were resampled 10,000 times (with replacement) to calculate a 95% bootstrap confidence interval. Mediation is supported if zero is not included in the 95% bias-corrected bootstrap confidence interval, as this denotes that the indirect effect is statistically different than zero and the mediation effect is significant.

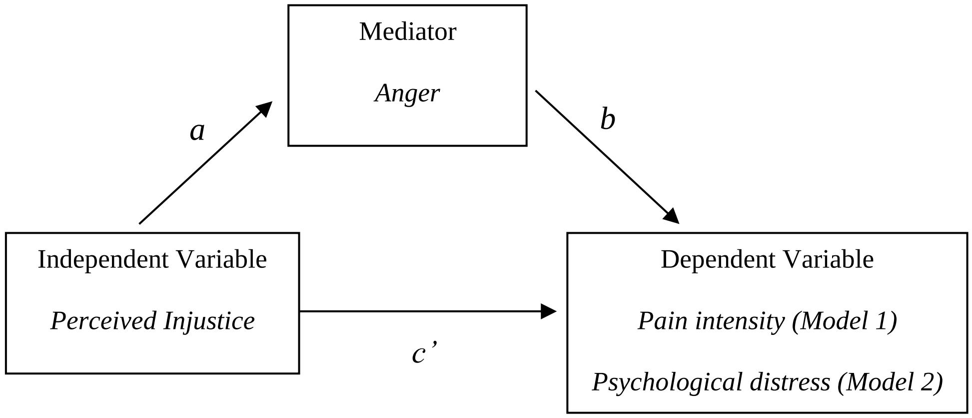


Figure 1. Basic Mediation Model

2.5 Power analysis

The targeted sample size of 154 participants was determined using G*Power (Faul, Erdfelder, Buchner, & Lang, 2007) and based on several criteria including effect size (.06; based on findings from Scott & Sullivan, 2012), power of 0.80, and constraining the probability of making a Type I error to 5%. One hundred and twenty two participants completed measures by the established deadline of December 24th, 2014. I moved forward with analyses based on the precedent set by Scott and Sullivan (2012)'s study which detected moderation effects in a sample of 107 individuals.

CHAPTER 3. RESULTS

3.1 Sample characteristics

The final sample consisted of 122 patients (Table 3.1). The sample was predominately female (70.5%) and white (92%). The majority of patients had multiple pain conditions (41.8%) or musculoskeletal pain (26.2%). Average age of the sample was approximately 15 years old (*SD*=2.09). At the time of assessment all participants were receiving care from the Riley Pain Clinic for a pain condition.

Table 3.1 Demographic Characteristics

N=122		n (%)	Mean (SD)
Sex			
	Male	36 (29.5)	-
	Female	86 (70.5)	-
Race			
	Caucasian	113 (92)	-
	African-American	5 (4)	-
	Hispanic	1 (1)	-
	Refused to report	3 (2)	-
Age		-	15.00 (2.09)
Pain Condition			
	Complex regional pain syndrome	13 (10.7)	-
	Migraine/headache	3 (2.5)	-
	Neuropathic	1(0.8)	-
	Musculoskeletal	32(26.2)	-
	Visceral	16(13.1)	-
	Multiple pain diagnoses	51(41.8)	-
	Other	6(4.9)	-

3.2 Measurement information

Descriptive information for all measures completed by patients is presented in Table 3.2.

Table 3.2 Descriptive information for measures

Measures	Mean (SD)	Range
Injustice Experience Questionnaire		
Child report	19.03 (12.59)	0-47
Parent report about self	13.01 (9.75)	0-39
Parent report about child	25.43 (9.90)	0-45
Pediatric Anger Expression Scale-III	8.16 (2.34)	5-15
Pain intensity	4.61 (2.81)	0-10
Functional Disability Inventory	22.88 (12.21)	0-50
Pain Catastrophizing Scale		
Child report	26.36 (11.31)	0-52
Parent report	27.09 (11.26)	0-51
Pediatric Quality of Life Inventory		
Total scale[t]	48.08 (19.60)	1.09-93.48
Emotional functioning subscale[t]	32.13 (21.16)	0-95

[t] Higher scores indicate poorer quality of life/functioning

3.3 Study hypothesis 1: Injustice and pain factors/outcomes

A Pearson correlation was used to examine the relationship between perceived injustice (child report) and the following: functional disability, psychological distress, pain intensity, catastrophizing (child report), and quality of life (child report). Using the PROCESS macro (Hayes, 2013), a hierarchical multiple regression analysis was conducted to test whether perceived injustice moderated the relationship between pain and psychological distress.

3.3.1 Study hypothesis 1.a: Correlation analyses

Higher levels of child reported perceived injustice were associated with higher levels of disability ($r=.42$, $p<.001$), psychological distress ($r=.49$, $p<.001$), pain intensity ($r=.29$, $p=.001$), and child reported catastrophizing ($r=.58$, $p<.001$), as well as a lower child reported quality of life ($r=.60$, $p<.001$). Zero-order correlations for variables included in analyses are presented in Table 3.3.

3.3.2 Study hypothesis 1.b: Moderation analysis

Pain intensity and child reported perceived injustice were included in the first step of the moderation analysis and accounted for 25.5% of the variance in psychological distress ($F(3, 118)=12.78$, $p<.001$). Next, the variables were centered and an interaction term between pain intensity and perceived injustice (child report) was created and added to the regression model. The interaction between pain intensity and child’s level of perceived injustice did not account for a significant portion of additional variance in psychological distress suggesting that child reported perceived injustice does not moderate the relationship between pain intensity and psychological distress ($p=.83$, Table 3.4).

Table 3.3 Zero-order correlations among study variables

	1	2	3	4	5	6	7	8	9
1. IEQ Total - child	-								
2. PAES III - anger-out scale	0.40**								
3. Pain intensity	0.29**	-0.06							
4. PedsQL Total^t	0.60**	0.18	0.44**						
5. Peds QL Emot. Functioning Scale^t	0.49**	0.26**	0.22*	-0.80**					
6. PCS Total - child report	0.58**	0.19*	0.18*	0.49**	0.34**				
7. FDI	0.42**	-0.003	0.61**	-0.80**	0.51**	0.36**			
8. PCS Total - parent	0.14	0.14	0.11	0.18	0.11	0.14	0.08		
9. IEQ Total - about self	0.32**	0.18*	0.26**	0.21*	0.15	0.13	0.23*	0.62**	
10. IEQ Total - parent about child	0.29**	0.23*	0.23*	0.21*	0.12	0.09	0.15	0.68**	0.67**

Abbreviations: IEQ, Injustice Experiences Questionnaire, PAES III, Pediatric Anger Expression Scale-III, PedsQL, Pediatric Quality of Life Inventory, PCS, Pain Catastrophizing Scale.

^{t} Higher scores indicate poorer quality of life/functioning

* *p*<0.05

** *p*< 0.01

Table 3.4 Regression analysis examining the moderating role of perceived injustice on the relationship between pain intensity and psychological distress

DV: Psychological Distress	b	t	p	Lower CI	Upper CI	Δ R^2	p
Step 1, IEQ (child report)	0.80	5.62	<0.01	0.52	1.08	-	-
Step 2, pain intensity	0.81	1.31	0.19	-0.41	2.03	-	-
Step 3, IEQ (child report) x pain intensity	0.01	0.21	0.83	-0.09	0.11	0.00	0.83

3.4 Study hypothesis 2: Anger and pain factors/outcomes

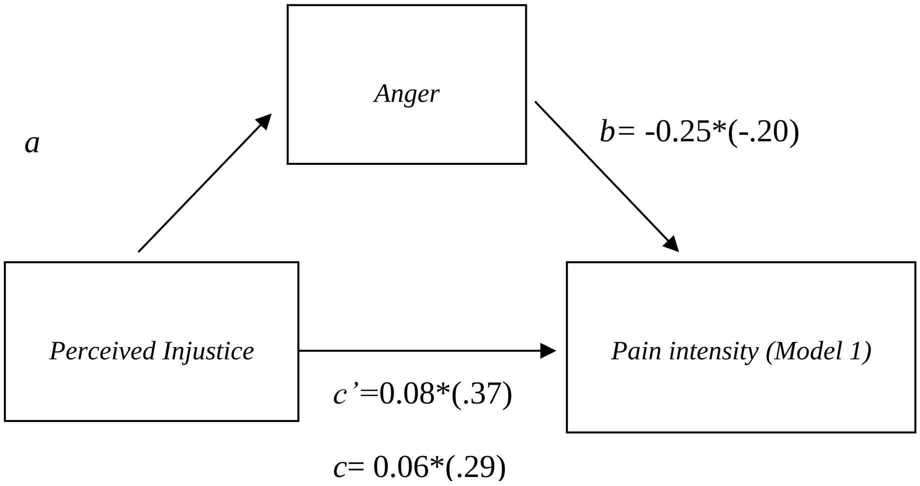
A Pearson correlation was used to examine the relationship between anger expression and the following: perceived injustice (child report), pain intensity, psychological distress, disability, quality of life, and catastrophizing (child report). The PROCESS macro (Hayes, 2013) was used to conduct two mediation analyses examining whether anger expression mediates the relationship between perceived injustice (child report) and pain intensity, as well as the relationship between perceived injustice (child report) and psychological distress. Figures 3.1 and 3.2 present the unstandardized and standardized (in parentheses) results of these analyses.

3.4.1 Study hypothesis 2.a: Correlation analyses

Greater anger expression was associated with greater child reported perceived injustice (r=.40, p<.001), psychological distress (r=.26, p=.004), and child reported catastrophizing (r=.19, p=.03). Anger expression was not associated with functional disability (p=.97), pain intensity (p=.52) or quality of life (p=.054).

3.4.2 Study hypothesis 2.b: Mediation analyses

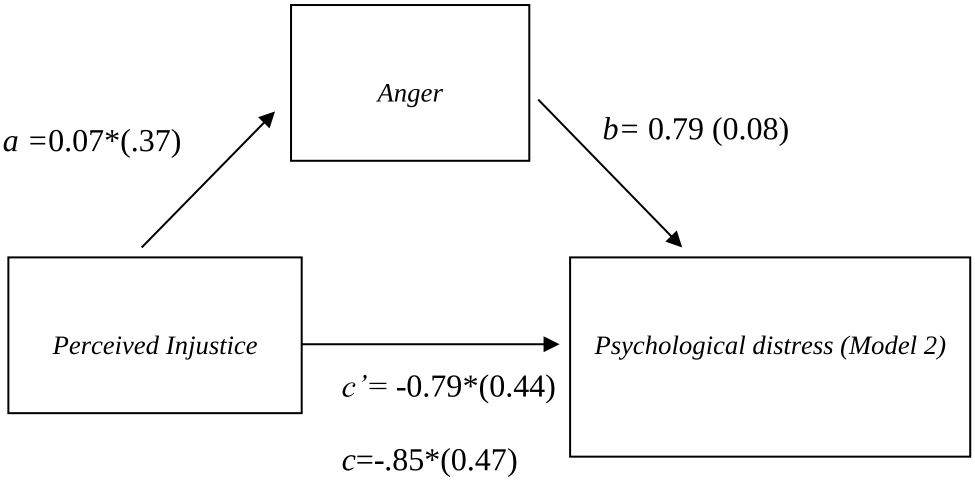
Greater perceived injustice was associated with greater anger expression (*a*=0.08). Controlling for the influence of perceived injustice, higher anger expression was associated with less pain intensity (*b*= -0.25). Perceived injustice (child report) was indirectly related to pain intensity through anger expression (point estimate of indirect effect: -0.02, 95% CI = -0.04 to -0.004). After accounting for the anger expression-mediated association, perceived injustice maintained a significant direct association with pain intensity (direct effect= 0.08, p<0.001, 95% CI = 0.04 to 0.12)



*p<0.05, standardized path coefficients in parentheses

Figure 3.1 Mediating role of anger expression in the relationship between perceived injustice and pain intensity.

Higher levels of perceived injustice were associated with higher levels of anger expression (*a*=0.07). However, anger expression was not associated with child reported psychological distress after accounting for the relationship between perceived injustice and psychological distress (*b*= 0.79) indicating that anger expression does not mediate the relationship between perceived injustice and psychological distress.



*p<0.05, standardized path coefficients in parentheses

Figure 3.2 Mediating role of anger expression in the relationship between perceived injustice and psychological distress.

3.5 Study hypothesis 3: Child and parent catastrophizing and perceptions of injustice

Pearson correlations were used to examine the relationship between child and parent reported catastrophizing and perceptions of injustice. Child reported catastrophizing was not related to parent reported catastrophizing (r=.14, p=.12). Child reported perceptions of injustice were positively associated with parents' reported perceptions of injustice about themselves (r=.32, p=.001) and about their child's condition (r=.29, p<.001).

CHAPTER 4. DISCUSSION

The purpose of this study was to explore the extent to which injustice and anger expression are important factors in children with chronic pain and whether parental catastrophizing and perceived injustice was related to child catastrophizing and perceived injustice. Greater child reported perceived injustice was associated with several negative pain and psychosocial outcomes. However, unlike in adults with chronic pain, perceived injustice did not moderate the relationship between pain intensity and psychological distress. Additionally, greater anger expression was associated with negative psychological outcomes but not with reported levels of pain intensity, functional disability, and quality of life. Anger expression was supported as a mediator in the relationship between child reported perceived injustice and pain intensity but not in the relationship between child reported perceived injustice and psychological distress. Additionally, child reported perceived injustice corresponded with parents' perceived injustice about their own situation (parent focused) and about their child's pain (child focused).

Similar to previous investigations and as hypothesized (Hyp 1a), higher child reported perceived injustice was associated with other factors found to be important in the pain experience, such as greater catastrophizing, pain intensity, functional disability, psychological distress, and lower quality of life (Scott et al., 2012). Similar to findings in adults with chronic pain, this finding indicates that perceived injustice may be an important construct to measure and further explore in pediatric pain populations. In adults, perceived injustice has been linked with poor physical and mental health recovery over time. Given that children with chronic pain may have to suffer with pain for their lifetime, determining how perceived injustice operates in relation to pain outcomes is imperative.

Inconsistent with study hypotheses (Hyp 1b) and Scott and colleagues (2012), level (high vs. low) of perceived injustice did not moderate the relationship between pain intensity and psychological distress. The current results may differ from those found in adults with chronic pain for several reasons. One factor may be the wide range of ages (8-18) among study participants. In a previous study involving a vignette about a person receiving fair/unfair consequences for an action, first, third, and fifth graders understood the causality of an event and favored the fair outcome for the vignette character, implying they differentiate between just and unjust outcomes. However, compared to adults and older children (third and fifth graders), children in first grade made incorrect or illogical causal links between events and consequences in order to justify unjust consequences, which implies that perceptions of injustice are dynamic and continue to develop throughout childhood into adulthood (Jose, 1990). Additionally, research has found that gender differences in justice reasoning begin to develop in adolescence (McGillicuddy-De Lisi, De Lisi, & Gulik, 2008). In addition to older adolescents being more likely to favor fair outcomes when compared to younger adolescents, female participants showed a greater degree of differentiation in distributive justice reasoning based on relationship and contextual factors. Future research should investigate injustice across childhood and adolescence to determine whether and how age and gender affects the relationship between injustice and pain.

Consistent with previous literature, greater anger expression was associated with more psychological distress, perceived injustice, and catastrophizing (Mikula, 1998; Burns et al. 2014; Wollaars, Post, Asbeck, & Brand, 2007; Muris et al., 2007). Anger expression partially mediated the relationship between injustice and pain intensity. The results suggest that anger expression buffers the negative effects of perceived injustice on pain intensity. These findings require replication before strong conclusions can be made. However, anger expression may be a way for children and adolescents to cope with their experience of injustice, thereby reducing its effects on pain. Future studies need to examine other dimensions of the anger experience such as, anger control (“I control my temper”), anger reflection (“I talk to someone until I feel better”), and anger suppression (“I get mad inside but don’t show it”), to determine the extent to which they are associated with injustice and pain outcomes. Interestingly, anger expression was associated with pain intensity only after accounting for the relationship between injustice and pain intensity. This finding suggests the presence of an unmeasured moderator. Outward expressions of anger may differ by gender given the different societal norms for girls and boys (Thorne, 1993; Eder, 1995). To explore this possibility, the mediation analyses were re-run on a gender-split sample, with results suggesting that anger expression only mediates the relationship between perceived injustice and pain intensity for girls but not for boys. However due to the small and unbalanced sample sizes (boys N=36, girls N=86) and evidence to support only statistical trends (p-values ranged between .001 and .10), this finding should be interpreted with caution and examined more thoroughly in future work.

Inconsistent with previous literature and what was hypothesized (Hyp 2a & 2b); anger expression was not associated with reported levels of pain intensity, functional disability, and quality of life and did not mediate the relationship between injustice and psychological distress. There are several possible explanations for these findings. Previous research suggests a gender difference in anger expression among children. In one study, fifth grade boys reported significantly higher scores on the PAES-III anger-out scale than did fifth grade girls (Jacobs et al., 1989). However, using the same measure, Hagglund and colleagues (1994) did not find this gender difference. In an effort to explore whether the relationships among anger expression, injustice, pain intensity, quality of life, and psychological distress differ among boys and girls with chronic pain, additional analyses were performed. Increased child reported anger-control was associated with greater quality of life in female patients but not male patients. This difference may be related to gender differences in socialization pressures. For example, social norms encourage women and girls to put a greater emphasis on maintaining social relationships; thus, controlling anger may function to preserve and enhance interpersonal relationships (Ohbuchi et al., 2004). In addition to gender, developmental stage may alter how anger is expressed and reported (Underwood, Coie, & Herbsman, 1992). With increasing age, children may learn strategies to control or turn anger inward. Exploratory analyses found no significant relationships using either the anger-in or anger-control scales of the PAES measure, but due to the poor internal consistency of those scales within the current sample, these findings should be interpreted with caution. Future investigations should consider the developmental nature of anger and investigate whether and how the relationships examined herein change over the course of childhood development.

Parents' perceived injustice about their own situation (self-focused) and about their child's pain (child-focused) were associated with higher levels of child-reported perceptions of injustice. This result further supports the idea that the parent-child relationship is important in the child pain experience and mirrors previous findings regarding the use of catastrophizing between parents and children with chronic pain (Lynch-Jordan et al., 2013). Morality and a sense of justice/fairness are developed through socialization and interactions with others. Parents serve as the initial and a dominant source of socialization throughout a child's development (Smetana, 1999). Therefore a child's interpretation of life events as just or unjust likely mirrors their parent's interpretation of these same life events. The parent-child relationship could serve as a pathway to intervene on in order to enhance pain-related outcomes. Several parent-focused interventions have proved successful in chronic pain. Focusing on operant techniques, such as having parents minimize their response to pain complaints and encourage adaptive behavior, have been effective in reducing child reported pain in headache, abdominal, musculoskeletal pain conditions (Palermo, Eccleston, Lewandowski, Williams, & Morley, 2010). Providing parents with psychoeducation about injustice and its relationship to a child's pain outcomes could be beneficial in reducing a maladaptive focus on injustice in the child. Given the novelty of research on injustice in the context of the pain experience, particularly in children, future investigations should explore how parent perceptions of injustice about their child's situation and their own experience interact with a child's perception of injustice to further elucidate possible mechanisms and intervention targets.

Inconsistent with previous literature, parental catastrophizing was not associated with child catastrophizing. In addition to the current study, only two other studies have examined the relationship between child and parent catastrophizing (Lynch-Jordan et al., 2013; Pielech et al., 2014). Both previous studies found a significant relationship between child and parent catastrophizing. My finding suggests that this relationship may not be as stable as previously thought. However, my results should be interpreted with caution since caregiver status (primary or secondary) of the parent/caregiver completing the forms was not measured. If the parent/caregiver who completed the forms was not the primary caregiver, then the relationship between parent catastrophizing and child catastrophizing may be weaker given that the parent may not deal with the child's condition or have as much regular contact with the child on a day-to-day basis.

This study has several limitations. First, all constructs were assessed using self-report measures, which are subject to social desirability and the assumption that subjects are able to think about their psychosocial experiences and accurately report on them. Additionally, the IEQ has not been validated for use in child chronic pain populations. Though the IEQ has adequate reliability and validity in adults with chronic pain and was found to have excellent reliability in the present sample (α=.93), it has not been validated in a child or adolescent population, which should be considered when interpreting the findings. Future studies should continue to investigate the reliability and validity of IEQ for use in children with chronic pain. Second, all patients were from a single Midwestern clinic, which limits the geographical diversity of the sample. Third, given that the sample included a wide-range of pain conditions, generalizability to any specific pain population is limited. Fourth, parent pain condition, parent caregiver status (primary vs. secondary), socioeconomic status, and religion were not assessed and therefore relationships between these and included variables could not be analyzed. Lastly, more reliable and comprehensive measures for anger expression and psychological distress may produce different results. In the current sample, the PAES measure lacked strong internal consistency for the anger-in and anger-control scales, which limited the analyses and the confidence with which to interpret findings. As for psychological distress, a measure that pinpoints a particular type of distress, such as depression (i.e. Children's Depression Inventory) or anxiety (Multidimensional Anxiety Scale for Children), may have better elucidated the relationships between injustice, pain, and emotional experience in children with chronic pain.

This is the first investigation to assess injustice and anger expression in the pain experience of children. These results suggest that injustice is an important construct in children with chronic pain given its strong relationship with other pain-related factors (i.e. pain intensity, catastrophizing, quality of life, psychological distress, functional disability) but may operate differently in children with chronic pain compared to adults. Also, the findings suggest that anger expression in children operates similarly as it does in adults for some relationships (injustice and pain intensity) but not for others (injustice and psychological distress). Further investigation is needed to determine how both injustice and anger expression operate in children and the extent that parent perceptions of injustice influence child perceptions of injustice. This study represents a first step in determining whether interventions specifically targeting perceived injustice and anger could be valuable in children with chronic pain, which may lead to research that improves care and decreases burden to individuals and society (Institute of Medicine, 2011).

REFERENCES

REFERENCES

Asmundson, G. J. G., Noel, M., Petter, M., & Parkerson, H. A. (2012). Pediatric fear-avoidance model of chronic pain: Foundation, application and future directions. *Pain Research Management*, *17*(6), 397–405.

Becker, N., Bondegaard Thomsen, A., Olsen, A. K., Sjøgren, P., Bech, P., & Eriksen, J. (1997). Pain epidemiology and health related quality of life in chronic non-malignant pain patients referred to a Danish multidisciplinary pain center. *Pain*, *73*(3), 393–400. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9469530 on September 15th, 2014.

Brown, G.K. (1990). A causal analysis of chronic pain and depression. *Journal of Abnormal Psychology*, *99*(2), 127-137.

Burns, J. W., Gerhart, J. I., Bruehl, S., Peterson, K. M., Smith, D. A., Porter, L. S., … Keefe, F. J. (2014). Anger arousal and behavioral anger regulation in everyday life among patients with chronic low back pain: Relationships to patient pain and function. *Health Psychology*. Advance online publication. doi:10.1037/hea0000091

Cho, S., Zunin, I. D., Chao, P. J., Heiby, E. M., & McKoy, J. (2012). Effects of pain controllability and discrepancy in social support on depressed mood among patients with chronic pain. *International Journal Of Behavioral Medicine*, *19*(3), 270-279. doi:10.1007/s12529-011-9175-4

Claar, R. L., Simons, L. E., & Logan, D.E. (2008). Parental response to children’s pain: the moderating impact of children's emotional distress on symptoms and disability. *Pain*, *138*(1), 172–9. doi:10.1016/j.pain.2007.12.005

Claar, R.L. & Walker, L.S. (2006). Functional assessment of pediatric pain patients: Psychometric properties of the functional disability inventory. *Pain, 121*, 77-84.

Crombez, G., Bijttebier, P., Eccleston, C., Mascagni, T., Mertens, G., Goubert, L., & Verstraeten, K. (2003). The child version of the pain catastrophizing scale (PCS-C): a preliminary validation. *Pain*, *104*(3), 639–646. doi:10.1016/S0304-3959(03)00121-0

Eder, D. (1995). *School Talk: Gender and Adolescent Culture.* New Brunswick N.J.: Rutgers University Press.

Faul, F., Erdfelder, E., Lang, A.G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191.

Flesch, R. (1948). A new readability yardstick. *Journal Of Applied Psychology*, *32*(3), 221-233. doi:10.1037/h0057532

Forgeron, P. A, King, S., Stinson, J. N., McGrath, P. J., MacDonald, A. J., & Chambers, C. T. (2010). Social functioning and peer relationships in children and adolescents with chronic pain: A systematic review. *Pain Research & Management : The Journal of the Canadian Pain Society*, *15*(1), 27–41. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2855293&tool=pmcentrez&rendertype=abstract on September 29th, 2014.

Forrest, D.A. (2012). *Day-to-day stress-pain relationships among fibromyalgia patients: Negative emotion mediation and social support moderation changes over time* (Doctoral dissertation). Retrieved from PsycINFO (AAI3533962)

Gatchel, R. J. (2004). Comorbidity of chronic pain and mental health disorders: The biopsychosocial perspective. *American Psychologist, 59,* 795–805. Appendices

Gatchel, R. J., Peng, Y. B., Peters, M. L., Fuchs, P. N., & Turk, D. C. (2007). The biopsychosocial approach to chronic pain: Scientific advances and future directions. *Psychological Bulletin, 133*(4), 581-624. doi: 10.1037/0033-2909.133.4.581

Gauntlett-Gilbert, J., & Eccleston, C. (2007). Disability in adolescents with chronic pain: Patterns and predictors across different domains of functioning. *Pain, 131*(1-2), 132–41. doi:10.1016/j.pain.2006.12.021

Goubert, L., Eccleston, C., Vervoort, T., Jordan, A., & Crombez, G. (2006). Parental catastrophizing about their child's pain. The parent version of the Pain Catastrophizing Scale (PCS-P): A preliminary validation. *Pain*, *123*(3), 254–63. doi:10.1016/j.pain.2006.02.035

Groenewald, C. B., Essner, B. S., Wright, D., Fesinmeyer, M. D., & Palermo, T. M. (2014). The economic costs of chronic pain among a cohort of treatment-seeking adolescents in the United States. *The Journal of Pain*, *15*(9), 925-933.

Hagglund, K. J., Clay, D. L., Frank, R. G., Beck, N. C., Kashani, J. H., Hewett, J., … Cassidy, J. T. (1994). Assessing anger expression in children and adolescents. *Journal of Pediatric Psychology*, *19*(3), 291–304.

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Methodology in the social sciences: The Guilford Press, NY.

Huguet, A., & Miró, J. (2008). The severity of chronic pediatric pain: An epidemiological study. *The Journal of Pain*, *9*(3), 226–36. doi:10.1016/j.jpain.2007.10.015

Institute of Medicine, (2011). *Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research.* The National Academies Press: Washington, DC.

Jacobs, G., Phelps, M., & Rohrs, B. (1989). Assessment of anger expression in children: The pediatric anger expression scale. *Personality and Individual Differences*, *10,* 59–65. Retrieved from http://www.sciencedirect.com/science/article/pii/0191886989901785 on October 1st, 2014.

Jensen, M., Turner, J., Romano, J., & Karoly, P. (1991). Coping with chronic pain: A critical review of the literature. *Pain*, *47*, 249–283. Retrieved from http://www.sciencedirect.com/science/article/pii/030439599190216K on September 26th, 2015.

Jose, P. E. (1990). Just-World Reasoning in Children's Immanent Justice Judgments. *Child Development*, *61*(4), 1024–1033.

Kashikar-Zuck, S., Goldschneider, K. R., Powers, S. W., Vaught, M. H., & Hershey, A. D. (2001). Depression and functional disability in chronic pediatric pain. *The Clinical Journal of Pain*, *17*(4), 341–9. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11783815 on October 15th, 2014.

Kashikar-Zuck, S., Lynch, A. M., Graham, T. B., Swain, N. F., Mullen, S. M., & Noll, R. B. (2007). Social functioning and peer relationships of adolescents with juvenile fibromyalgia syndrome. *Arthritis and Rheumatism*, *57*(3), 474–80. doi:10.1002/art.22615

Keefe, F. J., Brown, G. K., Wallston, K. A., & Caldwell, D. S. (1989). Coping with rheumatoid arthritis pain: catastrophizing as a maladaptive strategy. *Pain, 37*(1), 51–6. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/2726278 on September 15th, 2014.

King, S., Chambers, C. T., Huguet, A., MacNevin, R. C., McGrath, P. J., Parker, L., & MacDonald, A. J. (2011). The epidemiology of chronic pain in children and adolescents revisited: A systematic review. *Pain*, *152*(12), 2729–38. doi:10.1016/j.pain.2011.07.016

Logan, D. E., & Scharff, L. (2005). Relationships between family and parent characteristics and functional abilities in children with recurrent pain syndromes: An investigation of moderating effects on the pathway from pain to disability. *Journal of Pediatric Psychology*, *30*(8), 698–707. doi:10.1093/jpepsy/jsj060

Lynch-Jordan, A. M., Kashikar-Zuck, S., Szabova, A., & Goldschneider, K. R. (2013). The interplay of parent and adolescent catastrophizing and its impact on adolescents' pain, functioning, and pain behavior. *The Clinical Journal of Pain, 29*(8), 681–8. doi:10.1097/AJP.0b013e3182757720

McGillicuddy-De Lisi, A. V., De Lisi, R., & Van Gulik, K. (2008). The effects of grade level, context, and family type on male and female adolescents' distributive justice reasoning. *Journal of Adolescence, 31*, 107–124. doi:10.1016/j.adolescence.2007.05.003

McParland, J., & Knussen, C. (2010). Just world beliefs moderate the relationship of pain intensity and disability with psychological distress in chronic pain support group members. *European Journal of Pain*, *14*(1), 71–76. doi:10.1016/j.ejpain.2008.11.016

McWilliams, L. A., Cox, B. J., & Enns, M. W. (2003). Mood and anxiety disorders associated with chronic pain: an examination in a nationally representative sample. *Pain*, *106*(1-2), 127–133. doi:10.1016/S0304-3959(03)00301-4

Mikula, G. (1998). The role of injustice in the elicitation of differential emotional reactions. *Personality and Social Psychology Bulletin,* 24(7). Retrieved from http://psp.sagepub.com/content/24/7/769.short on September, 17th, 2014.

Muris, P., Meesters, C., Van Den Hout, A., Wessels, S., Franken, I., & Rassin, E. (2007). Personality and temperament correlates of pain catastrophizing in young adolescents. *Child Psychiatry and Human Development*, *38*, 171–181. doi:10.1007/s10578-007-0054-9

Ohbuchi, K. I., Tamura, T., Quigley, B. M., Tedeschi, J. T., Madi, N., Bond Michael H., & Mummendey, A. (2004). Anger, blame, and dimensions of perceived norm violations: Culture, gender, and relationships. *Journal of Applied Social Psychology*, *34*(8), 1587–1603. doi:10.1111/j.1559-1816.2004.tb02788.x

Paananen, M., Taimela, S., & Auvinen, J. (2011). Impact of self-reported musculoskeletal pain on health-related quality of life among young adults. *Pain Medicine, 12*(1), 9–17. doi:10.1111/j.1526-4637.2010.01029.x

Palermo, T. M., Eccleston, C., Lewandowski, A. S., Williams, A. C. D. C., & Morley, S. (2010). Randomized controlled trials of psychological therapies for management of chronic pain in children and adolescents: An updated meta-analytic review. *Pain*, *148*(3), 387–397. doi:10.1016/j.pain.2009.10.004

Peterson, C. C., & Palermo, T. M. (2004). Parental reinforcement of recurrent pain: The moderating impact of child depression and anxiety on functional disability. *Journal of Pediatric Psychology*, *29*(5), 331–41. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/15187172 on October 21st, 2014.

Pielech, M., Ryan, M., Logan, D., Kaczynski, K., White, M. T., & Simons, L. E. (2014). Pain catastrophizing in children with chronic pain and their parents: Proposed clinical reference points and reexamination of the Pain Catastrophizing Scale measure. *Pain*, *155*(11), 2360-2367.

Powers, S. W., Patton, S. R., Hommel, K. A., & Hershey, A. D. (2003). Quality of life in childhood migraines: Clinical impact and comparison to other chronic illnesses. *Pediatrics, 112*(1), e1-e5.

Reid, G. L., Lang, B. A., & McGrath, P. J., (1997). Primary juvenile fibromyalgia: Psychological adjustment, family functioning, coping, and functional disability. *Arthritis and Rheumatology*, *40*, 752-760.

Rodero, B., Luciano, J. V., Montero-Marin, J., Casanueva, B., Palacin, J. C., Gili, M.,… Garcia-Campayo, J. (2012). Perceived injustice in fibromyalgia: Psychometric characteristic of the Injustice Experience Questionnaire and relationship with pain catastrophizing and pain acceptance. *Journal of Psychosomatic Research*, *73*, 86-91. doi:10.1016/j.jpsychores.2012.05.011

Scott, W., & Sullivan, M. (2012). Perceived injustice moderates the relationship between pain and depressive symptoms among individuals with persistent musculoskeletal pain. *Pain Research & Management*, *17*(5), 335–40. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3465094&tool=pmcentrez&rendertype=abstract on September 13th, 2014.

Scott, W., Trost, Z., Bernier, E., & Sullivan, M. J. L. (2013). Anger differentially mediates the relationship between perceived injustice and chronic pain outcomes. *Pain*, *154*(9), 1691–8. doi:10.1016/j.pain.2013.05.015

Skevington, S. M. (1998). Investigating the relationship between pain and discomfort and quality of life, using the WHOQOL. *Pain*, *76*(3), 395–406. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9718258 on October 17th, 2014.

Smetana, J. G. (1999). The role of parents in moral development: A social domain analysis. *Journal of Moral Education*, *28*, 311–321. doi:10.1080/030572499103106

Sullivan, M. J. L., Adams, H., Horan, S., Maher, D., Boland, D., & Gross, R. (2008). The role of perceived injustice in the experience of chronic pain and disability: Scale development and validation. *Journal of Occupational Rehabilitation*, *18*(3), 249–61. doi:10.1007/s10926-008-9140-5

Sullivan, M. J. L., Bishop, S. R., & Pivik, J. (1995). The Pain Catastrophizing Scale: Development and validation. *Psychological Assessment, 7*, 524-532.

Sullivan, M. J., Stanish, W., Waite, H., Sullivan, M., & Tripp, D.A. (1998). Catastrophizing, pain, and disability in patients with soft-tissue injuries. *Pain*, *77*(3), 253–60. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9808350 on October 17th, 2014.

Sullivan, M. J. L., Thibault, P., Simmonds, M. J., Milioto, M., Cantin, A. P., & Velly, A. M. (2009). Pain, perceived injustice and the persistence of post-traumatic stress symptoms during the course of rehabilitation for whiplash injuries. *Pain*, *145*(3), 325–31. doi:10.1016/j.pain.2009.06.031

Thorne, B. (1993). *Gender Play: Girls and Boys at School*. New Brunswick, N.J.: Rutgers University Press.

Turk, D. C. & Flor, H. (1999). Chronic Pain: A behavioural perspective. In R.J. Gatchel & D.C. Turk (Eds). *Psychosocial Factors in Pain: Critical Perspective* (pp. 18-34). New York, NY: Guilford Press

Turk, D. C., & Okifuji, A. (1997). Evaluating the role of physical, operant, cognitive, and affective factors in the pain behaviors of chronic pain patients. *Behavior Modification*, *21*(3), 259–280. doi:10.1177/01454455970213001

Turk, D. C., & Okifuji, A. (2002). Psychological factors in chronic pain: Evolution and revolution. *Journal of Consulting and Clinical Psychology*, *70*(3), 678–690. doi:10.1037//0022-006X.70.3.678

Turk, D. C., & Rudy, T. E. (1992). Cognitive factors and persistent pain: A glimpse into pandora’s box. *Cognitive Therapy and Research*, *16*(2), 99–122. doi:10.1007/BF01173484

Underwood, M. K., Coie, J. D., & Herbsman, C. R. (1992). Display rules for anger and aggression in school-age children. *Child Development*, *63*(2), 366–380. doi:10.1111/j.1467-8624.1992.tb01633.x

Vervoort, T., Goubert, L., Eccleston, C., Bijttebier, P., & Crombez, G. (2006). Catastrophic thinking about pain is independently associated with pain severity, disability, and somatic complaints in school children and children with chronic pain. *Journal of Pediatric Psychology, 31*, 674-683.

Walker, L. S., & Greene, J. W. (1989). Children with recurrent abdominal pain and their parents: More somatic complaints, anxiety, and depression than other patient families? *Journal of Pediatric Psychology*, *14*(2), 231–43. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/2754574 on September 6th, 2014.

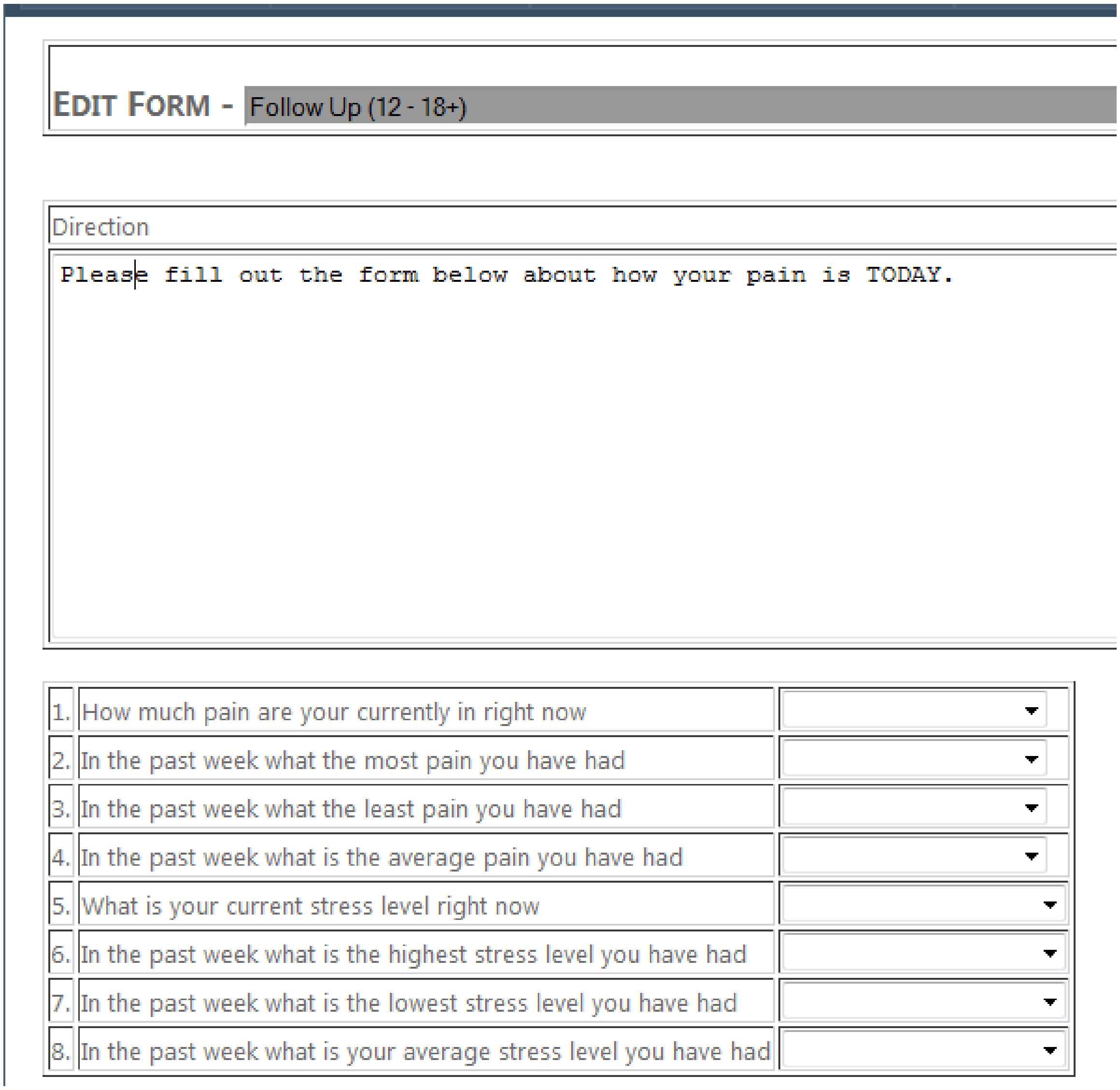
Wollaars, M. M., Post, M. W. M., van Asbeck, F. W. A, & Brand, N. (2007). Spinal cord injury pain: the influence of psychologic factors and impact on quality of life. *The Clinical Journal of Pain*, *23*(5), 383–391. doi:10.1097/AJP.0b013e31804463e5

Wood, B. M., Nicholas, M. K., Blyth, F., Asghari, A., & Gibson, S. (2013). Catastrophizing mediates the relationship between pain intensity and depressed mood in older adults with persistent pain. *The Journal of Pain*, *14*(2), 149–57. doi:10.1016/j.jpain.2012.10.011

World Health Organization (2004, October 11). World health organization supports global effort to relieve chronic pain. World Health Organization News Center. Retrieved from http://www.who.int/mediacentre/news/releases/2004/pr70/en/ on October 1st, 2014.

APPENDICES

Appendix A Pain Follow-Up Form



EDIT FORM - Follow Up (12 - 18+)

Direction

Please fill out the form below about how your pain is TODAY.

1.	How much pain are your currently in right now	
2.	In the past week what the most pain you have had	
3.	In the past week what the least pain you have had	
4.	In the past week what is the average pain you have had	
5.	What is your current stress level right now	
6.	In the past week what is the highest stress level you have had	
7.	In the past week what is the lowest stress level you have had	
8.	In the past week what is your average stress level you have had	

Appendix B Injustice Experiences Questionnaire – Child Form

When you experience pain, it can have a profound effect on your life. This scale was designed to assess how your pain has affected your life.

Listed below are twelve statements describing different thoughts and feelings that you may experience when you think about your pain. Using the following scale, please indicate how frequently you experience these thoughts and feelings when you think about your pain.

0 = never 1 = rarely 2 = sometimes 3 = often 4 = all of the time

1. ______ Most people don’t understand how severe my condition is.
2. ______ My life will never be the same.
3. ______ I am suffering because of someone else’s negligence.
4. ______ No one should have to live this way.
5. ______ I just want to have my life back.
6. ______ I feel that this has affected me in a permanent way.
7. ______ It all seems so unfair.
8. ______ I worry that my condition is not being taken seriously.
9. ______ Nothing will ever make up for all that I have gone through.
10. ______ I feel as if I have been robbed of something very precious.
11. ______ I am troubled by fears that I may never achieve my dreams.
12. ______ I can’t believe this has happened to me.

Appendix C Injustice Experiences Questionnaire – Parent Report

When your child has pain, it can have a profound effect on your life. This scale was designed to assess how your child's pain has affected your life.

Listed below are twelve statements describing different thoughts and feelings that you may experience when you think about your child's pain. Using the following scale, please indicate how frequently you experience these thoughts and feelings when you think about your child's pain. Some of these items may be difficult to answer, but your responses are completely confidential and there are no right or wrong answers.

When answering the following questions, please think about how your child's pain has affected your life.

0 = never 1 = rarely 2 = sometimes 3 = often 4 = all of the time

1. _____ Most people don't understand how severe my situation is as a result of my child's condition.
2. ______ Because of my child's pain, my life will never be the same.
3. ______ I am suffering because of someone else's negligence.
4. ______ I should not have to live this way.
5. ______ I just want to have my life back.
6. ______ I feel that this has affected me in a permanent way.
7. ______ It all seems so unfair.
8. ______ I worry that my situation is not being taken seriously.
9. ______ Nothing will ever make up for all that I have gone through.
10. ______ I feel as if I have been robbed of something very precious.
11. ______ I am troubled by fears that I may never achieve my dreams.
12. ______ I can't believe this has happened to me.

Appendix D Injustice Experiences Questionnaire – Parent Report About Child

When your child experiences pain, it can have a profound effect on his/her life. This scale was designed to assess how your child's pain has affected his/her life.

Listed below are twelve statements describing different thoughts and feelings that you may experience when you think about your child's pain. Using the following scale, please indicate how frequently you experience these thoughts and feelings when you think about your child's pain.

0 = never 1 = rarely 2 = sometimes 3 = often 4 = all of the time

---

1. ______ Most people don't understand how severe the condition is.
2. ______ My child's life will never be the same.
3. ______ My child is suffering because of someone else's negligence.
4. ______ My child should not have to live this way.
5. ______ I just want my child to have his/her life back.
6. ______ I feel that this has affected my child in a permanent way.
7. ______ It all seems so unfair.
8. ______ I worry that my child's condition is not being taken seriously.
9. ______ Nothing will ever make up for all that my child has gone through.
10. ______ I feel as if my child has been robbed of something very precious.
11. ______ I am troubled by fears that my child may never achieve his/her dreams.
12. ______ I can't believe this has happened to my child.