ILLNESS UNCERTAINTY AND ATTRIBUTIONAL STYLE IN CHILDREN WITH JUVENILE RHEUMATIC DISEASES: AN EXAMINATION OF A COGNITIVE DIATHESIS-STRESS MODEL

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Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
December, 2005

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ACKNOWLEDGMENTS

I wish to express my sincere appreciation to my major advisor, Dr. John M. Chaney for his support, inspiration, intellect, and guidance. I want to also thank Dr. Chaney for providing me with the opportunity to expand my research experiences and knowledge, while encouraging and pushing me to venture beyond my comfort zone. I also wish to express my appreciation to my other committee members, Drs. Maureen Sullivan, Larry Mullins, and John Romans, whose assistance, guidance, and encouragement are also valued. My appreciation extends to Dr. Jim Jarvis, who provided the opportunity to work with him in his clinic and collect research data from his patients.

Additionally, I wish to convey my special gratitude and appreciation to my family, Pres, Marikay, Joel, Melody, and Seth White for not only their encouragement and support through this project, but also for their understanding, love, and support throughout my life. I wish to also thank my dearest friends, the Ya-Ya's, for helping me to keep the energy and enthusiasm needed to complete this project. Finally, I wish to convey a special thank you to my husband, Joe Rottinghaus, for his continual support, love, and encouragement to strive to become a better clinician, researcher, companion, and Christian.

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NOMENCLATURE

JRD	juvenile rheumatic disease
JRA	juvenile rheumatic arthritis
SLE	systemic lupus erythematosus
JAS	juvenile ankylosing spondylitis
JDMA	juvenile dermatomyositis
BSI	Brief Symptom Inventory
CUIS	Children's Uncertainty in Illness Scale
CASQ	Children's Attributional Style Questionnaire-Revised
CDI	Child Depression Inventory
ANOVA	one way analysis of variance

CHAPTER I

Introduction

Juvenile rheumatic diseases (JRD) are a heterogeneous group of autoimmune diseases, which include juvenile rheumatoid arthritis (JRA), systemic lupus erythematosus (SLE), juvenile ankylosing spondylitis (JAS), and juvenile dermatomyositis (JDMA). Although JRD comprise several different disease types, they have many common features including an unpredictable disease course with periods of remissions and relapses. In addition, the etiology of these diseases is largely unknown and no cure is available at this time. Children diagnosed with rheumatic diseases commonly experience pain, muscle weakness, fatigue, and functional disabilities (Cassidy & Petty, 2001; Schanberg et al., 2000).

The role of psychological variables in juvenile rheumatic diseases has been widely examined. It is believed that children and youth with JRD may be more susceptible to psychological complications due to the characteristics of the disease: physical deformity, disability, and chronicity. In addition, Patterson and Blum (1996) identify uncertain prognosis, invisibility of the condition, and a remitting disease course as additional risk factors for psychological distress. Given these disease experiences, it is not surprising that children with JRD are at increased risk for experiencing a host of psychosocial adjustment difficulties. For example, Vandvik (1990) found that 51% of

children diagnosed with various rheumatic diseases met criteria for a clinical diagnosis (most often dysthymic disorder) and 64% of the sample were experiencing some difficulties in psychosocial functioning. Schanberg and colleagues (2000) found that increases in both negative daily moods and daily stressful events were associated with reports of fatigue, stiffness, and decreases in daily activities. Social difficulties have also been observed in children with JRD (e.g., Timko, Stovel, Moos, & Miller, 1992b). Specifically, children diagnosed with JRD were shown to participate in fewer extracurricular activities (including activities involving their peers and family) than their siblings. Further, the children in this study viewed themselves as less popular and less attractive than their siblings.

In general, it appears children with JRD are at greater risk for adjustment problems. However, a number of studies across various pediatric chronic illness populations have indicated that disease variables alone do not account for the observed variance in psychological adjustment (Frank, Blount, & Brown, 1997; Bennett, 1994; Moos, 2002). In other words, children with similar levels of disease severity often demonstrate varying levels of adjustment problems, including depression and anxiety (Ennet, DeVellis, Earp, Kredich, Warren, & Wilhelm, 1991). These findings suggest that not merely the disease, but the manner in which children perceive the disease make significant contributions to psychological adjustment. Researchers have begun to emphasize the importance of examining the contributions of children's cognitive appraisals to psychosocial functioning in children with chronic illnesses (Cole & Turner, 1993; Jaworski, 1993; Mullins, Chaney, Balderson, & Hommel, 2000; Mullins, Chaney,

Pace, & Hartman, 1997; Rapoff & Lindsley, 2000; Schanberg, Lefebvre, Keefe, Kredich, & Gil, 1997).

One cognitive appraisal variable that has received a good deal of attention and appears to have particular relevance to the adjustment process in JRD is illness uncertainty. Illness uncertainty is defined as a cognitive state created when an event cannot be adequately structured or categorized because of a lack of sufficient cues (Mishel, 1984). Mishel's (1988) model of illness uncertainty suggests that individuals attempt to organize and make sense of illness experiences that are: 1) inherently ambiguous, 2) complex, 3) providing insufficient information or, 4) inaccurately predicting outcomes. In other words, individuals may develop a sense of uncertainty about future illness outcomes as a function of the ambiguous contingencies (i.e., adherence-improvement) frequently inherent in episodic and unpredictable illnesses like JRD.

To illustrate, because JRD are characterized as highly variable and unpredictable illnesses, greater perceived uncertainty about illness management and outcome are both highly likely and may constitute a significant stressor contributing to children's negative perceptions of their illness and to increased emotional distress. Moreover, repeated exposure to such behavior-outcome noncontingencies may result in less effective problem-solving and greater depression (e.g., Chaney, Mullins, Urtesky, Pace, Werden, & Hartman, 1999). Indeed, there appears to be a relationship between perceived illness uncertainty and mood disturbance, emotional distress, and anxiety (Bennett, 1994; Mast 1995).

Although no known study has examined the role of children's perceived illness uncertainty in adjustment to JRD, studies have demonstrated that perceived illness uncertainty/unpredictability is reliably associated with emotional difficulties across a number of pediatric chronic medical conditions (Mullins et al., 1997; Mullins, Chaney, Hartman, Albin, Miles, & Roberson, 1995a; Ireys, Werthamer-Larsson, Kolodner, & Gross, 1994). Because many features of illness uncertainty (e.g., ambiguity, predicting outcomes) are likely in JRD and can be addressed through clinical intervention, there appears to be a need for examining the role of this cognitive appraisal variable in children's adjustment to JRD.

Another cognitive appraisal variable that also appears relevant to the illness experience in JRD is attributional style. Specifically, attributional style is the manner in which individuals determine causality in a variety of situations (Peterson & Seligman, 1981a). In their initial cognitive reformulation of learned helplessness theory, Abramson and colleagues (1978), conceptualized causal searches as occurring along three primary dimensions: stable or unstable, global or specific, and internal or external. Research has demonstrated that individuals who repeatedly attribute negative events to internal, stable, and global causes experience greater levels of depression (Seligman, Abramson, Semmel, & Baeyer, 1979; Peterson & Seligman, 1981a; Peterson & Seligman, 1984).

The more recent hopelessness reformulation of learned helplessness theory (Abramson, Seligman, & Teasdale, 1989) suggests that learned helplessness does not automatically result from negative events alone. Instead, an individual's attributions regarding the noncontingency of the negative life event influences whether the individual will experience further feelings of helplessness. In other words, when individuals find

themselves in uncontrollable situations where their actions appear futile, they will initiate a search in an attempt to find the cause of the negative outcome. Symptoms of helplessness (e.g., depression, reduced problem-solving) are more likely to result in those individuals who conclude that their future actions will be ineffective in obtaining a favorable outcome, or in avoiding negative ones.

Investigations exploring the relationship between causal attributions and depression have demonstrated a significant relationship between pessimistic attributions and increased distress across a variety of populations (Alloy, Lipman, & Abramson, 1992; Seligman et al., 1979; Peterson & Seligman, 1981a; Peterson & Seligman, 1984). Both cross-sectional and longitudinal studies investigating causal attributions in children and adolescents have also demonstrated significant relationships between global, stable, and internal attributions for negative events and increased depressive symptoms (Garber & Hilsman, 1992; Nolen-Hoeksema, Girgus, & Seligman, 1986; Ostrander & Weinfurt, 1998; Schwartz, Kaslow, Seeley, & Lewinsohn, 2000; Seligman, Kaslow, Alloy, Peterson, Tanenbaum, & Abramson, 1984).

Further, studies have also examined the relationship between pessimistic attributions and adjustment in medically ill populations. For example, a study examining the relationship between causal attributions and health demonstrated a significant relationship between the belief that negative events are caused by internal, stable, and global factors and an increased risk for poor health, infectious diseases, and early mortality (Kamen & Seligman, 1989). A number of investigations exploring the relationship of causal attributions and adjustment in adults diagnosed with rheumatoid arthritis (RA) found that attributions for negative events are significantly related to

increased levels of depression (e.g., Chaney, et al., 1996; Hommel, Chaney, Mullins, Palmer, Wees, & Klein, 1998; Smith, Peck, Milano, & Ward, 1988). In addition, studies examining causal attributions in youth diagnosed with a chronic illness found that pessimistic causal attributions is a significant predictor of depressive symptoms (e.g., Schoenherr, Brown, Baldwin, & Kaslow, 1992; Frank, Blount, & Brown, 1997).

The information-processing explanation of learned helplessness proposed by Sedek & Kofta (1990) may further assist in understanding the manner in which depressive symptoms develop, particularly in children diagnosed with JRD. In contrast to traditional interpretations of helplessness (Abramson, Metalsky, & Alloy, 1989), this theory assumes that helplessness (e.g., depressive) symptoms result from uncontrollable situations because of heightened uncertainty and its subsequent interference with problem solving, rather than noncontingency transfer to future events. According to this theory, when individuals are faced with problem situations they engage in cognitive problem-solving activity (Kofta & Sedek, 1999). Under conditions of objective uncontrollability, however, this cognitive activity leads to heightened uncertainty despite investment of mental effort. As a result of prolonged exposure to such irreducible uncertainty, individuals experience a sense of cognitive exhaustion and increased negative emotions.

The information-processing model of helplessness appears particularly relevant to JRD populations given the highly unpredictable and variable nature of the diseases (Cassidy & Petty, 2001; Nicassio, Wallston, Callahan, Herbert, & Pincus, 1985). Children with JRD experience a great deal of uncertainty throughout their disease experience, which may constitute an additional source of stress for the child, resulting in greater negative perceptions about the illness. The resulting heightened susceptibility to

adjustment difficulties may provide the occasion for cognitive appraisal processes (e.g., attributional style) to impact children's emotional distress (i.e., cognitive diathesis-stress model).

Research has yet to examine a cognitive diathesis-stress conceptualization of adjustment in children diagnosed with JRD. From this perspective, attributional style could be viewed as a distal causal diathesis that creates a cognitive vulnerability to increased levels of psychosocial distress in the presence of a proximal stressor (e.g., illness uncertainty). Moreover, utilization of the information-processing model of helplessness (e.g., Sedek & Kofta, 1990) could help clarify conceptually the nature of illness uncertainty in the adjustment process in pediatric chronic illnesses in general, and in JRD more specifically.

Outline of Dissertation

It is clear that children diagnosed with JRD are at increased risk for depression due in part to the physical characteristics of the disease (David et al., 1994; Vandvik, 1990). However, it is also clear that disease variables alone are not sufficient to account for psychological adjustment problems seen in children with chronic illnesses (Frank et al., 1997; Bennett, 1994). These findings suggest the contribution of other intervening variables, such as cognitive appraisals, in determining emotional adjustment to the disease.

Two such appraisal mechanisms, illness uncertainty and attributional style, have received attention in the literature and appear relevant to the episodic disease course and unpredictable nature of JRD. Specifically, in situations characterized by a high degree of

perceived uncertainty like JRD, individuals are more likely to initiate causal searches to explain outcomes (Pittman & Pittman, 1980). Further, these causal attributions are believed to play important roles in determining emotional responses in future situations (Abramson et al., 1989). Indeed, studies in the chronic illness literature indicate that when salient behavior-illness contingencies are ambiguous (i.e., illness uncertainty), the causal explanations individuals utilize to explain these uncontrollable outcomes may become generalized to disease-unrelated events and subsequently influence emotional adjustment (e.g., Mullins et al., 1997).

Because JRD are characterized by a great deal of variability and unpredictability, the present study is designed to examine the influence of children's causal attributions for disease-unrelated events on depressive symptoms under varying levels of perceived illness uncertainty. Further, by utilizing the information-processing explanation of learned helplessness within a cognitive diathesis-stress model, results will help clarify some of the conceptual ambiguity regarding the specific nature of illness uncertainty in the adjustment process in pediatric chronic illness. It is anticipated that children's causal attributions for illness-unrelated events will combine with disease-specific appraisals of uncertainty to predict increased levels of children's depressive symptoms. Specifically, it is anticipated that children who endorse both increased pessimistic attributions and increased perceived illness uncertainty will report increased levels of depressive symptoms. This study will utilize Baron and Kenny's (1986) cognitive moderation perspective (see also Holmbeck, 1997) in examining both the direct and indirect (i.e., moderation) contributions of disease unrelated and disease related child cognitive appraisal variables to child depressive symptoms.

To accomplish this, a review of the current literature is presented, examining potential disease related and unrelated psychological variables associated with children's adjustment to JRD. Specific attention is given to the examination of cognitive appraisal variables, illness uncertainty and attributional style, and the particular relevance of these constructs to the adjustment process in JRD. Additionally, the utility of cognitive diathesis-stress models, with particular emphasis on the information-processing explanation of helplessness, is discussed as a framework for examining the relationship of child cognitive appraisal mechanisms and depressive symptoms in children with JRD.

CHAPTER II

Review of Literature

Epidemiology of Juvenile Rheumatic Diseases (JRD)

Juvenile rheumatic diseases (JRD) are a heterogeneous group of autoinflammatory diseases characterized by a variable, unpredictable disease course, and disabling nature. Juvenile rheumatoid arthritis (JRA), systemic lupus erythematosus (SLE), juvenile ankylosing spondylitis (JAS), and juvenile dermatomyositis (JDM) are different subtypes of JRD, but all are believed to be related to abnormal immunological control (Cassidy & Petty, 2001; Timko, Stovel, Moos, & Miller, 1992a). However, the specific etiology of these diseases is largely unknown and no cure is presently available. Vandvik (1990) stresses that the occurrences of these diseases are multifactorial, including genetic, immunological, and infectious triggers. In addition, Schanberg and colleagues (2000) propose trauma, psychological stress and mood as additional prompts to the causes of JRD. In general, findings suggest that there may be multiple pathways that result in a diagnosis of JRD, including abnormalities of immunologic regulation, psychological stress, trauma, hormonal abnormalities, and infection (Cassidy & Petty, 2001).

These juvenile rheumatic diseases have many common features, including an unpredictable disease course with periods of remission and relapse. Children diagnosed

with one of these rheumatic diseases commonly experience pain, muscle weakness, fatigue, and functional disabilities. There is also great variation in the rate of onset of the clinical manifestations of these diseases. In fact, making a diagnosis can take up to several months or years. Due to the minimal useful diagnostic tests available and the few distinct clinical signs of these diseases, rheumatology has been noted in the literature as a "gray area" of medicine (Cassidy & Petty, 2001).

Juvenile rheumatoid arthritis (JRA) is not only the most common rheumatic disease of childhood, but also one of the most common childhood chronic illnesses. The onset of JRA is typically before age 16 and can be as early as six months of age. The estimated prevalence rate of children diagnosed with JRA in the United States is approximately between 16 and 150 children per 100,000 individuals, girls being affected twice as often as boys (Cassidy & Petty, 2001). Juvenile rheumatic arthritis is an autoimmune disorder characterized by inflammation of the joints, pain, fatigue, morning stiffness, restricted movement, and functional impairment (Cassidy & Petty, 2001; Schanberg et. al, 2000). More specifically, the synovium, which is the protective lining of the joint, becomes inflamed and causes the membrane to thicken and increase the production of synovial fluid, which increases the pressure on the joint. Although the physiological process involved in this destructive inflammation are understood, its causes are unknown.

Individuals with JRA have arthritis in one or more joints, which is defined as swelling or effusion, or the presence of two or more of the following symptoms: limited range of motion, tenderness or pain during motion, or increased heat. In addition, the duration of the symptoms must persist longer than six weeks and other forms of juvenile

arthritis must be excluded. Lastly, the type of disease classification must be made during the first six months of onset between the three JRA subtypes: pauciarticular (also known as oligoarthritis), polyarticular, and systemic disease (Cassidy & Petty, 2001). Differential diagnosis depends on a number of factors, including the onset type (i.e., acute vs. chronic), pattern of joint involvement (i.e., number of joints, large vs. small joints), systemic involvement, and the frequency of seropositivity (i.e., rheumatoid factors, antinuclear antibodies) (Cassidy & Petty, 2001).

Pauciarticular JRA is characterized by arthritis in four or fewer joints and occurs in approximately 50 to 60 percent of children with JRA (Cassidy & Petty, 2001). In general, children show symptoms between one to three years of age, girls are affected five times more often than boys, and the arthritis usually involves larger joints (e.g., knee, hip) (Cassidy & Petty, 2001). Pauciarticular JRA is divided into two categories: early onset (one to five years of age) and late onset. In early onset, girls are four times more likely to be affected than boys, and 30-50% experience inflammation of the inner eye, which can result in severe, irreversible eye changes including loss of vision. Later onset pauciarticular JRA is more common in boys than in females, and it is less likely for the occurrence of chronic eye complications (Lovell, 1996). The prognosis for children diagnosed with pauciarticular JRA is excellent except for the possible damage children may experience in their eyesight (Cassidy & Petty, 2001).

Polyarticular JRA occurs in about 30 to 40 percent of children with JRA, can occur at any age, and affects girls three times more often than boys (Cassidy & Petty, 2001). Individuals diagnosed with polyarticular JRA experience arthritis in five or more joints. Onset of symptomology usually peaks at 1 to 3 years of age. Children with this

disease often experience fatigue, anorexia, protein-caloric malnutrition, anemia, growth retardation, delays in sexual maturation, and osteopenia. In addition, systemic features may occur; however, this is uncommon. Children with polyarticular JRA experience the affects of the arthritis in both the large and small joints of the body (e.g., knees, wrists, hands, ankles, feet, elbows, cervical spine, jaw, shoulders) (Kewman, Warschausky, & Engel, 1995). The prognosis of children diagnosed with polyarticular JRA is guarded to moderately good (Cassidy & Petty, 2001).

Systemic JRA can develop at any age, but most commonly occurs from 1 to 6 years of age and affects boys and girls equally. Approximately 10% to 20% of children diagnosed with JRA are classified as having the systemic form of the disease (Cassidy & Petty, 2001). This subtype is characterized by daily or twice daily intermittent fever spikes (>101 F) with frequent shaking chills and pink rheumatoid rashes, which may occur anywhere on the body and typically arise late in the day. Systemic JRA may include inflammation around the heart, increases in white blood cells and platelets, and enlargement of other internal organs (e.g., liver and spleen). Similar to individuals with polyarticular JRA, children diagnosed with systemic disease experience the affects of the arthritis in large and small joints (Kewman et al., 1995). The prognosis for an individual diagnosed with systemic JRA is moderate to poor (Cassidy & Petty, 2001).

Systemic lupus erythematosus (SLE), which is usually diagnosed in approximately 10% of children seen in pediatric rheumatology, is an episodic, multisystem, autoimmune disease characterized by muscle pain, weakness, fatigue, anorexia, morning stiffness, swelling, and limited range of motion; however, deformity and erosion of the bone is uncommon. It is estimated that the mean annual incidence of

SLE in the United States is approximately 0.53 to 0.60 children per 100,000 individuals (Cassidy & Petty, 2001). It is rare for children to be diagnosed with SLE before the age of five. SLE is usually diagnosed in adolescence and is five to eight times more common in girls than in boys (Emery, 1986; Cassidy & Petty, 2001). The only specific clinical sign is a "butterfly" rash, which occurs over the child's facial cheeks and bridge of the nose and occurs in one third to one half of children at the onset of the disease (Cassidy & Petty, 2001). In addition, ulcers may occur on the palate and in the nose, as well as temporary hair loss (Emery, 1986). A majority of the children with SLE experience arthritis, commonly affecting the small joints of the hands, wrists, elbows, shoulders, knees, and ankles (Cassidy & Petty, 2001). Systemic lupus can be extremely difficult to diagnose. In fact, the median time for diagnosis is 1.2 years (Silverman, 1993). Disease involvement may include some combination of the renal, cutaneous, neurological, pulmonary, vascular, cardiovascular, gastrointestinal, and endocrine systems. It is estimated that about half the children diagnosed with SLE will experience some central nervous system effects during the course of their illness (Chaney & Youll, 1994; Silverman, 1993). The prognosis for SLE has improved, but there is evidence that renal disease occurs in 60-90% of children with SLE. The most common causes of death in childhood lupus are infection, cerebritis, pancreatisis, and pulmonary hemorrhage (Emery, 1986).

Juvenile ankylosing spondylitis (JAS) is another class of juvenile rheumatic diseases affecting 10-15% of children diagnosed with JRD. Clinical criteria for a diagnosis of JAS include limited motion of the lumbar spine, pain or history of pain of the lumbar spine, and limited expansion of the chest (Cassidy & Petty, 2001). JAS occurs

more often in boys than girls (3:1 ratio) and is usually diagnosed before the age of 16 (Cassidy & Petty, 2001; Lovell, 1996). There is no known cause of JAS; however, there is often a strong familial occurrence of ankylosing spondylitis and related diseases in adults and children (Cassidy & Petty, 2001). Children usually experience episodic arthritis versus chronic, and the lower extremities are much more commonly affected (e.g., hips, knees, ankles, and feet) (Lovell, 1996). Children diagnosed with JAS usually experience arthritis in a limited number of joints (four or fewer); however, 25 percent of children experience arthritis in five or more joints (Cassidy & Petty, 2001). Symptoms associated with the back are usually absent at onset of JAS but become apparent during the course of the disease. Systemic involvement is rare; however, children may experience low-grade fevers (Cassidy & Petty, 2001).

Juvenile dermatomyositis (JDM) is another classification of rheumatic diseases characterized by acute and chronic inflammation of the striated muscle, skin, and gastrointestinal tract. More generally, JDM is a disease of the connective tissue, which occurs in approximately 1 in 200,000 individuals in the United States and occurs more frequently in girls. Onset is usually between four and fourteen years of age with the average age of onset at age seven (Cassidy & Petty, 2001). The cause of JDM is unknown; however, potential pathogenic mechanisms include abnormalities of cell-mediated immunity, immune complex disease, immunodeficiency, infection, and genetic predisposition. In addition, sun exposure has been associated with onset of the disease and exacerbation of symptoms (Cassidy & Petty, 2001). Children with JDM usually present with heliotrope discoloration of the eyelids, scaly rash, skin lesions, muscle weakness and atrophy, fatigue, malaise, weight lose, and fever. In addition, 25-50% of

children with JDM develop calcinosis, which consist of subcutaneous calcium deposits, and can result in physical disability. Children with JDM often experience muscle weakness in the proximal muscles: those in the shoulders, hips, neck, and abdominal. Children may be unable to rise from a sitting position or get out of bed without assistance. In addition, approximately eighty percent of children diagnosed with JDM develop pulmonary disease. The most frequently detected cardiac abnormalities are nonspecific electrocardiogram changes and murmurs. Long-term survival of children diagnosed with JDM is better than 90 percent, and children who receive early and adequate steroid treatment seem to have the most favorable outcome (Cassidy & Petty, 2001).

It is evident that JRD comprise a heterogeneous group of rheumatic diseases (e.g., varying joint involvement, fever, rashes, systemic involvement). However, the disease subtypes are also characterized by a number of similarities relevant to the present investigation. For example, all of the JRD subtypes have an unpredictable disease course with periods of remissions and relapses. In addition, the etiology of these diseases is largely unknown and there is no known cure. Children diagnosed with rheumatic diseases almost always experience pain, muscle weakness, fatigue, and functional disabilities (Cassidy & Petty, 2001). More importantly, in addition to the similarity in the physical presentation of these diseases, a number of studies have demonstrated similar psychosocial adjustment patterns among the varying subtypes of JRD (e.g., Timko, Stovel, Baumgartner, & Moos, 1995; Timko et al., 1992b; von Weiss et al., 2002).

Treatment Issues in JRD

Currently there is no known causal agent for JRD, nor no known cure for these diseases. Treatment aims include: controlling inflammation, pain, and range of motion, preventing joint deformities, maximizing functioning, as well as increasing and amplifying psychosocial adjustment. Additional treatment goals consist of increasing muscle strength and function, managing systemic involvement, and facilitating healthy nutrition and physical development. More specifically, immediate treatment goals consist of relieving discomfort, preserving physical function, preventing deformities, and controlling inflammation. Long-term goals include minimizing the side effects of the disease and treatment, promoting normal growth and development, rehabilitation, and education (Cassidy & Petty, 2001). In order to address these treatment goals, several modes of interventions are implemented. For example, children diagnosed with JRD may receive multiple medications and/or utilize resources and treatments from a number of medical specialists (e.g., pediatric rheumatologist, physical therapists, occupational therapist, nurse, nutritionist, psychologist, orthopedic surgeon). Some of the medications commonly utilized to treat JRD include: nonsteroidal anti-inflammatory drugs, gold hydroxychloroquine, antimalarial drugs, D-penicillamine, sulfasalazine, methotrexate, intravenous immunoglobulins, monoclonal antibody treatments, and corticosteroids (Cassidy & Petty, 2001; Kewman et al., 1995). These medications are primarily designed to control pain, preserve range of motion and function, and manage systemic complications (Cassidy & Petty, 2001).

Psychological Adjustment

As previously noted, chronic medical problems affect 9 to 14% of children in the United States (Bennett, 1994; Frank et al., 1998). There is also evidence to suggest that children diagnosed with a chronic illness are at increased risk for experiencing psychological distress (Frank, et al., 1998; Lavigne & Faier-Routman, 1993). Specifically, children diagnosed with chronic illnesses tend to be more vulnerable to internalizing types of adjustment problems (e.g., anxiety, depression) (Bennett, 1994; Lavigne & Faier-Routman, 1993). A meta-analysis of sixty studies across a variety of chronic illnesses concluded that 9% of youth with some type of chronic illness met criteria for either a major depressive disorder or an unspecified depressive disorder. This percentage is dramatically higher than the 1-5% incidence rates typically seen in comparable community samples (Bennett, 1994).

In addition to the daily stressors faced by all children, children with a chronic illness experience additional struggles (e.g., medical treatments, barriers to completing daily tasks, pain), that likely contribute to the increased levels of psychological distress. Siegel and Smith (1989) point out that children with chronic illnesses must also contend with feeling different from their peers, the reality of no longer having a healthy body, and potentially dealing with either perceived or real threats to one's life. In short, in addition to navigating the routine developmental demands faced by all children, chronically ill youth must face the added challenges of addressing their physical limitations, difficulties in adhering to treatment regimens, increased frequency of school absences, limited opportunities for socialization, feelings of helplessness, and increased dependency on others (Bennett, 1994; Sturge, Garralda, Boissin, Dore, & Woo, 1997).

Similar to other chronic illnesses, which are conceptualized as additional stressors faced by children (Kazak, 1989), research on JRD has demonstrated significant relationships between disease experiences and adjustment difficulties. In general, common disease experiences for children diagnosed with JRD include confronting physical disability, the feelings of isolation from their peers, increased dependency on their family, uncertainty about the future, and difficulties with the maintenance of a complicated medical regimen (Rapoff, 2000; Schanberg et al., 2000). These disease experiences have shown to be significantly related to increased levels of distress and adjustment problems in children diagnosed with JRD (e.g., Daltroy et al., 1992; Huygen, Kuis, & Sinnema, 2000; Timko et al., 1995; Varni, Wilcox, Hanson, & Brik, 1988). An additional long-term stressor that children with JRD face is awareness of an increased mortality rate compared to the general population (French, Mason, Nelson, O'Fallon, & Gabriel, 2001).

Given the number of additional stressors faced by children with JRD on a daily basis, it is not surprising that research has shown these children to be at increased risk for adjustment difficulties. David and colleagues (1994) found that 21% of a sample of 43 children with JRA were experiencing moderate to severe depression. Specifically, results indicated a significant linear trend between depression, disability, and an index of activities of daily living. Similar results were demonstrated in a sample of 98 school-aged children with recently diagnosed rheumatic disease. Findings revealed that 51% of the children met criteria for a clinical diagnosis (most often dysthymic disorder) and 64% of the sample were experiencing some type of difficulty in psychosocial functioning (Vandvik, 1990). Schanberg and colleagues (2000) examined 12 children diagnosed with

JRD over the course of a week utilizing diaries, which assessed daily mood, stressful events, and illness symptoms. Results indicated that child reports of negative daily moods and daily stressful events were significantly associated with increased reports of fatigue, stiffness, and decreases in daily activities.

Joyce and colleagues (1989) examined a sample of 50 children with systemic lupus erythmatosus and found a significant relationship between clinical disease activity and health status, which the researchers defined as a composite of physical, functional, and psychosocial variables. Specifically, they found a significant relationship between depression and the physical manifestations of SLE disease activity. In addition, the sample identified difficulties with depression, anxiety, physical activity, and social activity.

Research specifically examining the social functioning of children with JRD has demonstrated similar findings. Reiter-Purtill, Gerhardt, Vannatta, Passo, & Noll (2003) found that a significant number of children with JRA experience a greater risk for difficulties in peer relationships, particularly social withdrawal and social acceptance. Social difficulties were also observed in a sample of children with JRD (Timko et al., 1992b). Specifically, children diagnosed with JRD were involved in fewer extracurricular activities (including activities involving their peers and family) than their healthy siblings. Further, the children diagnosed with JRD in this study viewed themselves as less popular and less attractive than their siblings. In addition to the tendency for these children to be less involved in extracurricular activities, research has also shown that adolescents diagnosed with JRA miss on average 10 days of school days per year,

compared to their peers who miss an average of three days (Brace, Smith, McCauley, & Sherry, 2000).

In summary, children diagnosed with JRD appear to be at increased risk for experiencing greater difficulties across a variety of psychological and social domains (LeBovidge, Lavigne, Donenberg, & Miller, 2003; Noll, Kozlowski, Gerhardt, Vannatta, Taylor, & Passo, 2000). An examination of the JRD literature indicates that in addition to illness severity, a number of factors influence children's adjustment process (Ennett et al., 1991; Jaworski, 1993; Jacox, Meyerowitz, & Hess, 1993). Thus, it is crucial to not only examine the physical or medical aspects of the disease experience, but to also examine how children interpret or view the disease (Ennett et al., 1991). Thus, although the presence of a chronic illness sets the stage for experiencing psychological distress, it is also the case that a significant number of children do not experience adjustment difficulties to their illness.

Because there is not a direct relationship between chronic illness and maladjustment, it is necessary to understand the circumstances under which adverse effects are likely to develop. Specifically, this calls for the examination of intervening variables such as cognitive appraisals, in determining emotional adjustment to disease. Two such appraisal mechanisms, illness uncertainty and attributional style, have received attention in the literature and appear relevant to adjustment processes in JRD.

Child Cognitive Appraisal Variables

Illness Uncertainty

Illness uncertainty is one cognitive appraisal mechanism that appears to have an important role in adjustment to chronic medical conditions (Mishel, 1984; Mishel & Sorensen, 1991). Illness uncertainty is defined as a cognitive state created when an event cannot be adequately structured or categorized because of a lack of sufficient cues (Mishel, 1984). In other words, the decision-maker is unable to assign definite values to objects and events and/or is unable to accurately predict outcomes.

Illness uncertainty appears to have particular relevance to the adjustment process in children with JRD because as a group they are highly variable and unpredictable illnesses (Cassidy & Petty, 2001). From the outset, a great deal of uncertainty is involved in making an accurate diagnosis and timely referral to a rheumatology specialist. It can take several referrals and repeated medical visits before a diagnosis of JRD is confirmed. In fact, systemic lupus has been referred to as the "great imitator" and "great imposter" because early manifestations of the disease mimic other disorders (Kinahsi, 1983, p.19). Part of the difficulty stems from the fact that JRD diagnoses are determined clinically (i.e., through physical examination), because no definite medical test exists which can confirm their presence (Cassidy & Petty, 2001). It is also the case that the treatment regimen for a given child is surrounded by uncertainty, as there is no standard treatment protocol for JRD (Lovell, 1996). Treatment can range from oral anti-inflammatory medications (e.g., aspirin) to invasive injections. With respect to disease outcome, there

is no cure for JRD, but long-term survival is now more likely; however, the details of long-term survival are not certain (Lovell, 1996).

Mishel's (1988; 1990) model of illness uncertainty suggests that when individuals attempt to organize and make sense of illness experiences which are: (a) inherently ambiguous, (b) complex, (c) providing insufficient information, or (d) inaccurately predicting outcomes, illness uncertainty may result. In other words, individuals may develop a sense of uncertainty about future outcomes as a function of the ambiguous contingencies (i.e., adherence-improvement) frequently inherent in the clinical course of diseases like JRD. Moreover, there appears to be a strong relationship between uncertainty and mood disturbance, emotional distress, and anxiety (e.g., Bennett, 1994; Mast, 1995).

It is hypothesized that illness uncertainty can result if the individual does not form an appropriate cognitive schema for illness events. Specifically, Mishel (1988) proposed that symptom pattern, event familiarity, and event congruence provide the stimuli or needed information to reduce uncertainty. Symptom pattern refers to the degree to which the symptoms are perceived has having a pattern. If a pattern is not detected, for example, by examining the intensity, frequency, location or duration of the symptoms, these symptoms cannot be utilized to accurately appraise the disease experience. Event familiarity takes into consideration the degree to which the events are consistent or contain familiar cues. Lastly, event congruence refers to the consistency between the expected and actual disease experience. In general, for an illness-related event to be recognized and classified, the stimulus must be precise, recognizable, reliable, complete,

and limited in number with clear boundaries in regards to both temporal and physical contexts (Mishel, 1988).

Uncertainty theory emphasizes the idea that uncertain events are often appraised as being stressful (Mishel, 1984). Similar arguments were made by Lazarus & Folkman (1984) in their assertion that uncertainty results from the cognitive appraisal of an event, which either has an unclear outcome or the cues are insufficient, unfamiliar, contradictory, or too numerous to come to a conclusion. Indeed, research indicates that the degree of stress experienced varies as a function of individual's appraisal of the situation as a challenge versus a threat to one's well being, and as a function of loss or harm incurred (Siegel & Smith, 1989). Thus, uncertain events are believed to be stressful because the outcome is unclear, which inhibits both effective coping responses and assigning meaning to the events (Fritz, Williams & Amylon, 1988; Jessop & Stein, 1985; Mishel & Braden, 1988; Pless, 1984; Padilla, Mishel, & Grant, 1992).

Previous research across a number of chronic medical conditions has supported the presence of a relationship between the individual's cognitive appraisal of uncertainty and his/her emotional difficulties. Braden (1990) examined a sample of 396 individuals diagnosed with either rheumatoid arthritis or an arthritis-related condition. Results demonstrated that increased illness severity was related to increased uncertainty, which was also associated with reduced quality of life. Further, uncertainty was reduced in persons who actively sought information from a health care provider. Additionally, individuals who were more knowledgeable about the disease were found to be less depressed. Other findings in the literature indicate that when individuals are informed of the precise nature and diagnosis of their disease, uncertainty is reduced (Horner, 1997;

Kvist, Rajantie, Kvist, & Siimes, 1991). However, Christman (1990) emphasizes that even though the diagnosis may be certain, questions and uncertainties remain regarding treatment options and efficacy. In fact, studies have found results indicating that uncertainty can actually increase at the time of diagnosis as a function of ambiguities associated with the specific diagnosis (e.g., prognosis, treatment) (Cohen, 1993).

Research examining young adults with histories of childhood chronic illness found that the unpredictability of symptoms was positively correlated with psychological symptoms, and that one-third of the sample was at risk for mental health problems (Ireys et al., 1994). Another study examining older adolescents and young adults diagnosed with asthma demonstrated a significant relationship between illness uncertainty and levels of psychological distress. Specifically, as illness uncertainty increased, levels of reported psychological distress also increased (Mullins et al., 2000).

In summary, uncertainty appears to be an inherent component of the JRD disease process and is associated with multiple facets of JRD, including hospitalizations, diagnosis, treatment, disease course, and treatment outcome. Clearly, perceived uncertainty about illness management and outcome are both highly likely in JRD and may constitute a significant stressor contributing to children's negative perceptions of their illness and to increased emotional distress. Repeated exposure to such behavior-outcome noncontingency in chronic illness has been shown to result in less effective problem-solving and greater depression (e.g., Chaney et al., 1999).

Attributional Style and Learned Helplessness

In addition to illness uncertainty, another cognitive appraisal variable that has received a good deal of attention and appears to have particular relevance to the adjustment process in JRD is attributional style. Specifically, attributional style is the manner in which individuals determine causality across a wide range of life domains (Peterson & Seligman, 1981a), which influence the emotional distress they experience as a result (Gotlib & Abramson, 1999).

Abramson and colleagues (1978; 1989) propose a chain of events that potentially lead an individual to experience symptoms of helplessness depression. Specifically, this model focuses on situations that individuals perceive as negative life events. Described by Abramson and colleagues (1989), perceived negative life events can serve as "occasion setters" for people to experience depressive symptoms (pg. 360). The primary hypothesis of learned helplessness theory is that individuals make inferences about events. Specifically, the inferences that influence the development of depressive symptoms are the following: (1) inferences about the cause of the event (i.e., why the event occurred), (2) inferences about the consequences of the event, and (3) inferences about the self. The cause may be attributed predominantly to something about the person (internal) or something about the situation or circumstances (external). The cause of a situation may be seen as a factor that persists across time (stable) or it may be transient (unstable). Finally, the cause may be perceived as affecting a variety of outcomes (global) or just the particular event of concern (specific) (Abramson et al., 1989). According to this theory, the depressive explanatory style is the most concerning. In this case, individuals tend to attribute negative events to internal, stable, and global causes. In

other words, “it’s me, it’s going to last forever, and it’s going to affect everything I do” (Peterson & Seligman, 1984, pg. 350). Further, these explanations or conclusions are believed to influence future expectations regarding events and outcomes (Abramson et al., 1989). Since the development of the theory of helplessness, multiple investigations have been conducted to examine the relationship between causal attributions and depression. In general, findings suggest that individuals who make internal, stable, and global attributions for negative events are at greater risk for experiencing depression (e.g., Alloy, Peterson, Abramson, & Seligman, 1984; Frank et al., 1997; Mullins et al., 1995a; Mullins et al., 1997; Peterson, Bettes, & Seligman, 1985; Peterson & Seligman, 1984).

Research investigating children’s causal attributions suggests that by about age 8, children have fairly well established attributional tendencies (Nolen-Hoeksema et al., 1986; Seligman et al., 1984). Indeed, investigations exploring the relationship between causal attributions and depressive symptoms in children and adolescents have demonstrated findings similar to those in the adult literature (Garber & Hilsman, 1992; Ostrander & Weinfurt, 1998). For example, Seligman and colleagues (1984) found that children between the ages of 8 and 13 who attributed negative events to internal, stable, and global causes were more likely to report depressive symptoms than other children. Additional research examining the relationship between depressive symptoms, life events, and explanatory style of children across the course of one year also suggests that initial pessimistic explanatory style (internal, stable, and global attributions for negative events) was significantly related to later levels of depression (Nolen-Hoeksema et al., 1986).

Hankin and colleagues (2001) found similar results when examining adolescent high school students. Specifically, results indicated that adolescents with a depressogenic attributional style, who also experienced multiple stressful negative life events, reported the greatest levels of depression. Similar research examining a large sample of high school students found that pessimistic attributions were associated with psychological distress and impaired cognitive and interpersonal functioning (Schwartz et al., 2000). A meta-analysis reviewing the relationship between causal attributions and depressive symptoms in children and adolescents reliably found that youth characterized by a pessimistic attributional style (i.e., internal, stable, and global attributions for negative events) report greater depressive symptoms (Gladstone & Kaslow, 1995).

Investigations examining the contribution of causal attributions to adjustment in the medical context have also documented a number of significant findings. For example, Mullins and colleagues (1995a) examined a sample of 58 adults diagnosed with postpolio syndrome and found that both stable and global attributions for negative disease-unrelated events were significantly related to levels of distress. In addition, research has explored the relationship between pessimistic causal attributions and levels of depression in mixed groups of youth diagnosed with insulin-dependent diabetes mellitus, leukemia, or sickle-cell syndromes. Findings indicated that pessimistic causal attributions were significant predictors of depressive symptoms beyond the influence of disease variables (Schoenherr et al., 1992). A study examining children diagnosed with cancer (7 to 18 years old) found similar findings. Specifically, pessimistic attributions significantly contributed to the level of depressive symptomatology experienced by these children (Frank et al., 1997). Further, Johnson and colleagues (2001) found that children

diagnosed with chronic fatigue syndrome and multiple sclerosis showed significantly lower global attributions for positive events and significantly higher stable attributions for negative events compared to a healthy control group. In other words, these children tended to believe that the causes for good events would not generalize to other situations; on the other hand, the causes for negative events would always be present. In general, it appears that both adults and children diagnosed with a chronic illness experience greater depressive symptoms if they endorse pessimistic attributions for negative events, and that this attributional style may result from the presence of a chronic illness.

The important role of casual attributions in depression has been examined extensively in adults with rheumatoid arthritis (RA). Chaney and colleagues (1996) investigated 58 patients diagnosed with RA and found that attributions for negative events were significantly related to increased levels of depression. Similar relationships have been revealed in other samples of adults diagnosed with rheumatoid arthritis (Smith et al., 1988). Hommel and colleagues (1998) investigated disease-specific (arthritis helplessness) and disease unrelated (attributional style) appraisals in predicting levels of depression over the course of a year. Results indicated that initial pessimistic attributions significantly predicted depressive symptomatology one year later, whereas appraisals of RA helplessness did not. A similar longitudinal study investigating cognitive appraisals and depression in RA found that individuals who endorsed a general tendency to personalize negative events and hold pessimistic expectations for future outcomes were more prone to depressive symptoms at follow-up (Smith, Christensen, Peck, & Ward, 1994). Results suggest that causal attributions are reliably associated with depression in adults diagnosed with rheumatoid arthritis.

In general, research investigating the relationship between causal attributions and depression has demonstrated significant associations between pessimistic causal attributions and depression across multiple populations, including child samples (e.g., Garber & Hilsman, 1992; Ostrander & Weinfurt, 1998) and both pediatric (e.g., Johnson et al., 2001) and adult chronic illness populations (e.g., Chaney, et al., 1996; Hommel, et al., 1998). Surprisingly, however, research has yet to examine this relationship in children diagnosed with JRD. Similar to adult rheumatoid arthritis, JRD are highly variable and unpredictable illnesses. As a result, it is likely that these children will experience greater difficulty determining the causes or influencing factors relevant to their symptoms and disease course. And, it is under these conditions that causal searches are more likely to be initiated. Helplessness theory suggests that if individuals make pessimistic attributions for these situations, they are more likely to experience emotional distress, potentially leading to depressive symptoms (Abramson et al., 1978; 1989).

Cognitive Diathesis-Stress Model of Depression

Traditional Learned Helplessness Perspective

Both cognitive reformulations of learned helplessness theory (e.g., Abramson et al., 1978; 1989) are by their very nature diathesis-stress conceptualizations of emotional distress. In other words, pessimistic causal attributions are viewed as a cognitive vulnerability for depression, which is activated when an individual is faced with a negative life-event. Thus, distal cognitive vulnerabilities (diathesis) set the stage for potential attitudes or feelings to rise to the surface in the presence of specific proximal circumstances (stress). In this case, individuals' global, internal, and stable attributions

for negative events function as the diathesis or vulnerability for depression in response to certain proximal stressors (Alloy, Abramson, Metalsky, & Harlage, 1988; Alloy et al., 1992).

Research exploring the direct effects of causal attributions and stressful life events on depression has found that in some cases, causal attributions alone does not account for significant changes in depression levels. For example, one study demonstrated that even though children's causal attributions did not directly influence changes in later depressive symptoms, the combined influences of causal attributions and stress following a life event did predict increased depressive symptoms (Dixon & Ahrens, 1992). In other words, only in the presence of a stressful event did children's causal attributions influence levels of self-reported depression. Longitudinal research examining the relation between causal attributions and academic achievement further supports the idea that pessimistic attributions serve as a predisposing cognitive vulnerability (e.g., Gibb, Zhu, Alloy, & Abramson, 2002). Results of this study indicated that pessimistic causal attributions had no direct impact on students' levels of academic functioning. However, these same attributions in the presence of a proximal stressor (i.e., low levels of perceived academic ability) negatively influenced academic functioning.

An investigation of the relationship between undergraduate students' causal attributions and levels of depression found similar results (Peterson & Seligman, 1981b). Specifically an examination of college students' pre-existing causal attributions and depressive changes after taking a midterm exam indicated that neither the life event (mid-term) nor causal attributions independently led to depressive symptoms. Depressive symptoms were present only when students both attributed negative events to internal,

stable, and global causes and were dissatisfied with their grade. Hilsman and Garber (1995) found similar results when examining fifth and sixth grade students across three time periods (one week before report cards were distributed, the morning after children received report cards, and five days following receiving grade reports). Results indicated that depressive symptoms at Time 3 were influenced by the interaction of pessimistic attributions and the specific stressor (i.e., receiving a poor grade report). In general, these findings suggest that the presence of a pessimistic causal attributional style increases susceptibility to depression following exposure to stressful events.

The importance of examining cognitive appraisal-depression relationships from a diathesis-stress perspective in chronic illness populations has been emphasized by Burke & Elliot (1999). These authors suggest that depression in this population is best conceptualized as a product of both individuals' vulnerabilities for depression and environmental stressors. Investigations exploring the cognitive diathesis-stress model in chronic illness populations have found results consistent with classical helplessness theory (e.g., Chaney et al., 1996; Joiner, 2000; Mullins et al., 1997). For example, Mullins and colleagues (1997) investigated casual attributions and illness uncertainty in a test of the diathesis-stress model of adjustment in young adults with asthma. Results revealed a significant interaction between illness uncertainty and global negative attributions, suggesting that uncertainty moderated the relationship between causal attributions and adjustment. In other words, in the presence of increased illness uncertainty (proximal stressor), global attributions for negative events (diathesis) contributed to poorer psychological adjustment. Similarly, Chaney and colleagues (1996) examined the moderating influence of perceived illness control in the relationship

between causal attributions and depressive symptomatology in a sample of adults with rheumatoid arthritis. Findings revealed that those individuals who simultaneously made internal and global attributions for negative events and perceived poorer control over their illness were more likely to experience depressive symptoms.

In summary, the cognitive diathesis-stress interpretation of the attribution-depression relationship views causal attributions as a cognitive vulnerability for depression, which is activated when an individual is faced with a negative life-event. Attributions are hypothesized to function as a diathesis setting the stage for potential attitudes or feelings to rise to the surface in the presence of specific proximal circumstances (stress) (Alloy et al., 1988; 1992). The traditional learned helplessness interpretation of emotional distress postulates that prolonged contact with uncontrollable events interferes with the learning of new contingencies leading to learned helplessness symptoms (Abramson et al., 1989). It presumes that after individuals experience an uncontrollable situation, they develop an expectation of noncontingency in future situations.

An Alternative Perspective

The information-processing explanation of helplessness proposed by Sedek and Kofta (1990) may further assist in understanding the manner in which helplessness symptoms (particularly depression) develop in children diagnosed with JRD. Similar to traditional learned helplessness theory (e.g., Abramson et al., 1978), this theory also assumes that helplessness symptoms result from prolonged exposure to uncontrollable situations (Sedek & Kofta, 1990). However, unlike traditional helplessness

interpretations, the information-processing explanation suggests that the key ingredient to helplessness symptoms is the cognitive exhaustion and decreased problem solving that result from prolonged exposure to uncontrollable situations.

More specifically, the information-processing explanation states that when individuals are faced with problem situations, they engage in cognitive activity in an attempt to formulate possible hypotheses and gain more information that verifies or refutes possible solutions (Kofta & Sedek, 1999). In controllable situations, this cognitive activity serves to eliminate less viable solutions from the hypothesis pool and focuses in on more effective courses of action. Thus, uncertainty of the hypothesis set is reduced and perceived control over events is enhanced. In uncontrollable situations however, the individual receives inconsistent confirmatory and disconfirmatory information that does not allow for a reduction in the number of possible hypotheses, resulting in prolonged uncertainty. Ultimately, the individual does not gain meaningful information despite sustained cognitive effort, which results in cognitive exhaustion (Sedek & Kofta, 1990). According to this model, it is the irreducible uncertainty and cognitive exhaustion resulting from prolonged exposure to uncontrollability that contributes to the emotional and performance deficits characteristic of learned helplessness (Sedek & Kofta, 1990).

In short, unlike traditional interpretations of learned helplessness (LH) theory, which states that prolonged contact with uncontrollable events interferes with the learning of new contingencies leading to learned helplessness symptoms (Abramson et al., 1989), the information-processing model assumes that learned helplessness deficits result from sustained unproductive cognitive effort and an inability to reduce the uncertainty in possible effective solutions (Kofta & Sedek, 1999). Thus, classical LH

theory concludes that individuals develop an expectation of noncontingency after experiencing an uncontrollable situation, which is transferred forward to interfere with learning new contingencies in future situations. In contrast, the information-processing model postulates that in uncontrollable situations individuals persist unsuccessfully in cognitive activity that ultimately results in cognitive exhaustion and decreased problem solving.

Studies examining the information-processing explanation of helplessness have supported the hypotheses of this model. Kofta and Sedek (1990) examined individuals after undergoing informational helplessness training (IHT) and found that IHT was associated with symptoms of irreducible uncertainty, which resulted in performance deterioration, increased negative mood, and symptoms of cognitive exhaustion (i.e., a deficit in thinking, difficulties in decision making). Additionally, research comparing depressed individuals to participants pre-exposed to uncontrollability found that the two groups had similar impairments on cognitive tasks suggesting a hypothesized link between uncontrollability and depressive symptoms (von Hecker & Sedek, 1999).

Sedek, Kofta, and Tyazka (1993) also found that individuals pre-exposed to unsolvable discrimination problems spent less time seeking information, expressed less confidence in their decision criteria, and were less focused on their selected choice when faced with a subsequent difficult decision-making task. More recently, Kofta and Sedek (1999) examined the number of solutions generated by individuals after being given either a solvable or unsolvable discrimination task. At three different time points, participants were asked to indicate the most likely solution among a number of potential hypotheses. Results indicated greater uncertainty in the hypothesis set among participants

in the unsolvable task condition. These individuals were less likely to identify one favorite solution hypothesis and were less likely to reject other hypotheses from their set. In summary, these findings are consistent with the information-processing explanation of helplessness and suggest that individuals in uncontrollable situations experience an inability to diminish uncertainty despite cognitive efforts.

The information-processing model of helplessness appears particularly relevant to JRD populations given the variable nature of the diseases. Children with JRD experience a great deal of uncertainty with their disease, beginning with the ambiguities surrounding the initial diagnosis and continuing throughout the illness, which is often characterized by an episodic and unpredictable disease course (Cassidy & Petty, 2001). Because of the variable and unpredictable nature of JRD, greater uncertainty about illness management and disease outcome may result and constitute an additional source of stress for the child, resulting in greater negative perceptions of the illness. The resulting heightened susceptibility to adjustment difficulties may provide the occasion for pessimistic causal attributions to further impact children's emotional distress. The information-processing explanation of helplessness specifically examines the influence of uncertainty and appears to be a particularly relevant interpretation of cognitive diathesis-stress relationships in JRD populations.

CHAPTER III

The Present Study

Juvenile rheumatic diseases (JRD) are a group of autoimmune diseases, which include juvenile rheumatoid arthritis (JRA), systemic lupus erythematosus (SLE), juvenile ankylosing spondylitis (JAS), and juvenile dermatomyositis (JDMA). JRD are characterized by a variable and unpredictable disease course. Children diagnosed with JRD often experience physical disability and deformity, joint inflammation, pain, and functional impairment (Cassidy & Petty, 2001; Schanberg et al., 2000). Even though these rheumatic diseases are somewhat heterogeneous, JRD are characterized by similar disease presentations and have shown similar psychological adjustment patterns (e.g., LeBovidge et al., 2003; Hagglund et al., 2000; Timko et al., 1992b).

It is believed that children with JRD may be more susceptible to psychological complications due to the hallmark characteristics of the disease, including physical deformity, disability, and chronicity, as well as the uncertain diagnosis, prognosis, and treatment. In addition, children diagnosed with JRD experience periodic remissions and exacerbations that are difficult to predict (Vandvik & Hoyeraal, 1992). Currently there are no conclusive tests or accepted symptom presentations that can accurately predict the prognosis or long-term disease course of a child diagnosed with JRD (Cassidy & Petty, 2001).

In general, it appears that children with JRD are at greater risk for adjustment problems. Although a portion of adjustment difficulties can be linked to severity of symptoms, it is also the case that psychological adjustment to chronic illnesses is not accounted for by disease variables alone (Frank et al., 1997; Moos, 2002). In other words, children with similar levels of disease severity often demonstrate varying levels of adjustment problems, including depression and anxiety (Ennett et al., 1991). These findings suggest the contribution of other intervening variables, such as cognitive appraisals, in determining emotional adjustment to the disease. Two such appraisal mechanisms, illness uncertainty and causal attributions, have received attention in the literature and appear relevant to adjustment processes in JRD (Adams, Streisand, Zawacki, & Joseph, 2002; Zautra & Manne, 1992). Briefly, illness uncertainty is defined as a cognitive state created when one is unable to accurately predict the outcome because one is unable to structure or categorize an object or event due to insufficient cues (Mishel, 1984), and causal attributions are the way in which individuals explain or interpret the causes of events (Abramson et al., 1978).

Although a number of studies have demonstrated illness uncertainty as an important variable in the adjustment process in chronic illness, questions still remain regarding illness uncertainty at a conceptual level. In other words, it is apparent from the literature that illness uncertainty is a consistent predictor of psychological adjustment. However, relatively little is known regarding its precise relationship with other cognitive appraisal variables, and few attempts have been made to situate illness uncertainty within a theoretical framework. Perhaps, by viewing illness uncertainty as one variable in a family of illness specific cognitive stressors (e.g., perceived control, illness severity) and

examining its role within an empirically established framework, greater conceptual clarity can be obtained regarding its contribution to adjustment in pediatric chronic illness (see Burke & Elliott, 1999).

One such framework that appears relevant to JRD is the information-processing explanation of helplessness, which assumes that helplessness symptoms result from irreducible uncertainty in the face of uncontrollable situations (Sedek & Kofta, 1990). From the information-processing perspective, illness uncertainty may serve as a proximal stressor that magnifies the influence of distal cognitive diatheses on psychological adjustment. It may be that attributional style, in this instance, functions as a specific vulnerability to depression when children are faced with ambiguous behavior-outcome contingencies inherent in the disease process. This vulnerability sets the stage for adjustment difficulties to appear in the presence of a proximal stressor (i.e., illness uncertainty).

The present study was designed to examine a cognitive diathesis-stress model (Abramson et al., 1989; Alloy et al., 1988; 1992) of adjustment in children with JRD. The study was not attempting to support or refute the traditional learned helplessness approach (Abramson et al., 1978; 1989) versus the information-processing explanation of helplessness (Sedek & Kofta, 1990); however, given uncertainty is such an inherent component of JRD (e.g., diagnosis, treatment outcome, illness management), findings were conceptualized within the framework of the information-processing explanation of helplessness. In more detail, present study was designed to examine the influence of children's causal attributions for disease-unrelated events on depressive symptoms under varying levels of perceived illness uncertainty. Utilizing the information-processing

explanation of helplessness as a theoretical framework (Sedek & Kofta, 1990), it was anticipated that children's disease-specific appraisals of uncertainty would moderate the association between attributions for negative events and children's depressive symptoms. Specifically, it was anticipated that children who exhibit both increased pessimistic attributions and increased perceived illness uncertainty would report increased levels of depressive symptoms. This study utilized Baron and Kenny's (1986) cognitive moderation perspective (see also Holmbeck, 1997) in examining both the direct and indirect contributions of disease unrelated (i.e., causal attributions) and disease related (i.e., illness uncertainty) child variables to child depressive symptoms.

CHAPTER IV

Method

Participants and Procedure

Participants for this study were 50 children and adolescents (31 girls; 19 boys) between the ages of 9 and 17 years (M = 13.62, SD = 2.42), who had been diagnosed with one of the following juvenile rheumatic diseases: juvenile rheumatoid arthritis (JRA; n = 29), systemic lupus erythematosus (SLE; n = 12), juvenile dermatomyositis (JDM; n = 7), or juvenile ankylosing spondylitis (JAS; n = 2). The majority of the children were Caucasian (n = 22), followed by Native American (n = 13), Hispanic (n = 6), African American (n = 4), Biracial (n = 4), and Asian (n = 1).

Participants were recruited through the Pediatric Rheumatology Clinic at the Children's Hospital of Oklahoma. Institutional review board (IRB) approval for the protection of human participants was obtained, and written informed consent and assent were obtained from each participant, parent, or legal guardian (Appendixes C, D, and E). The inclusion criteria consisted of children who were between the ages of 9 and 17, were diagnosed with a JRD, and had symptoms lasting at least one year. Illness duration, which was calculated by subtracting the date of diagnosis from the date of participation, ranged from 0.04 to 15.73 years (M = 2.65, SD = 3.32). Although some children in the sample had a diagnosis for less than one year, they still qualified for the study if they had

active symptoms for at least one year. Children were excluded if they had comorbid cognitive deficits and/or a comorbid chronic illness. The pediatric rheumatologist verified the inclusion criteria before participants were contacted for solicitation.

At a scheduled physician visit, the rheumatologist conducted a semistandardized physical examination on all study participants. This examination included joint count measurements assessing the number of joints that were painful, tender and stiff, and range of motion. The rheumatologist provided physical disability ratings upon completion of the physical examination. Following the examination, participants and parents were given a questionnaire packet and asked to return packets via postage-paid mail. Participants were compensated monetarily with $10.00 per family.

Instruments

Physician-report Measures

The rheumatologist completed a *Provider Questionnaire* (Appendix F), which was designed to obtain disease information regarding diagnosis, date of symptom onset, date of diagnosis, current medications, and functional disability. The physician rated functional disability by classifying children into one of four functional classes. This study utilized the Steinbrocker revised criteria for the classification of global functional status in rheumatoid arthritis: Class I (completely able to perform usual activities of daily living: self care, vocational, and avocational), Class II (able to perform usual self-care and vocational activities, but limited in avocational activities), Class III (able to perform usual self-care activities but limited in vocational and avocational activities), and Class IV (limited in ability to perform usual self-care, vocational, and avocational activities)

(e.g., Hochberg Chang, Dwosh, Lindsey, Pincus, & Wolfe, 1992). Research has demonstrated the validity of this measure (e.g., David et al., 1994; Gerhardt et al., 2003; Hochberg et al., 1992) and revealed that this classification system is significantly correlated with joint count and patient-report of functional ability (Baildam, Holt, Conway, & Moron, 1995). The data for the present study suggested a relatively low level of functional disability (M = 1.48; SD = .61). Descriptive statistics are presented in Table 1.

Parent-report Measures

The *Brief Symptom Inventory* (BSI; Derogatis, 1993) is a 53-item questionnaire, which assesses global psychological adjustment in adults. Respondents rated the degree to which they have been distressed by each of the 53 psychological symptoms in the past week, ranging from 1 ("not a lot") to 4 ("extremely"). Samples of psychological symptoms assessed by the BSI include: pains in heart or chest, feeling hopeless about the future, and never feeling close to another person. A global severity index (GSI) was obtained by taking the sum of the scores and dividing by the number of items. The BSI has demonstrated acceptable internal consistency with alpha coefficients ranging from .71 to .85 (Derogatis, 1993). Further, the BSI has been utilized as a measure of parental emotional adjustment in a number of studies examining parent contributions to child adaptation to chronic illness (e.g., Mullins et al., 1991; 1995b; Wagner et al., 2003). Because parental distress has been shown to be an important determinant of psychosocial difficulties in chronically ill children (Dahlquist, 2003; Gerhardt et al., 2003; Helgeson, Janicki, Lerner, Barbarin, 2003; Jaworski, 1993; Jacox et al., 1993; Mullins et al., 1995b;

Power, Dahlquist, Thompson, & Warren, 2003; Thompson et al., 1992a; 1992b; Vandvik, 1990), the BSI was utilized as a covariate to control for the influence of parent distress on child adjustment. Cronbach's (1951) alpha for this sample was high ($\alpha = .97$).

Child-report Measures

A *Background Information Questionnaire* (Appendix G) was created to obtain information regarding patient's age, gender, and ethnicity.

The *Children's Depression Inventory* (CDI; Kovacs, 1992) is a 27-item self-report measure that provided a severity rating of depressive symptomatology. Each of the items on the CDI is a group of three statements that combine to measure the severity of a single depressive symptom on a 0 to 2 scale. For each item the child is asked to choose the sentence that best describes him/her. For example, the child either chooses "I am sad once in a while," " I am sad many times," or " I am sad all the time." A total score was derived by summing the items for an overall rating of depressive symptomatology, ranging from 0 to 54. Even though the CDI includes a wide range of symptoms other than strictly diagnostic symptoms of depression (Compas, 1997), this measure was used as the primary outcome variable. Reasons for this decision include the ease of administration of the CDI and past research has utilized the CDI as a measure of depressive symptomatology in children with a chronic illness (e.g., Mullins et al., 1995b), including samples of children diagnosed with JRD (Gartstein, Short, Vannatta, & Noll, 1999; Schanberg et al., 2000; von Weiss et al., 2002). The CDI has been shown to be a reliable measure, with internal consistencies ranging from .71 to .87 (Joiner, 2000; Kovacs, 1992) and test-retest reliabilities range from .72 to .81 (Joiner, 2000; Kovacs, 1992). The CDI

has also been adequately validated as a measure of depressive symptomatology in children by demonstrating acceptable construct and concurrent validity (Kovacs, 1992). Cronbach's alpha for the entire sample in present study was high ($\alpha = .91$). Examination of developmental influences on instrument reliability revealed moderate internal consistency reliability for children ages 9 to12 (Cronbach's $\alpha = .76$) and high internal consistency for older children between 13 and 17 ($\alpha = .93$).

The *Children's Uncertainty in Illness Scale* (CUIS; Mullins & Hartman, 1995) is a 23-item self-report measure adapted version of the Mishel Uncertainty in Illness Scale-Community Form (Mishel, 1983). Mishel's (1983) form is designed for use by chronically ill persons or families of chronically ill persons as a measure of illness uncertainty. The CUIS was designed to be developmentally appropriate for children and adolescents and is a self-report measure of the child's perceived uncertainty about the course, prognosis, and treatment of his/her illness. Children are asked to rate items on a five-point scale, ranging from 1 ("very true") to 5 ("very false"). Items examine the four components of illness uncertainty (ambiguity, uncertainty, lack of information, and unpredictability). Sample items include: "I don't know why I have to do each of the treatments," "I don't know if my illness is getting better or worse," and "I never know how I will feel, I have good days and bad days." A single composite score was derived from the CUIS ranging from 23 to 115, with higher composite scores reflecting greater illness uncertainty. Research across varying samples of children with chronic illnesses has demonstrated the CUIS to be a reliable measure, with internal consistencies ranging from .86 to .89 (Hartman, Mullins, Hoff, & Chaney, 2001; Hoff, Mullins, Chaney, Hartman, & Domek, 2002; White, 2002). Cronbach's alpha for the entire sample was

high (α = .93). Cronbach's alpha for both age groups (9-12 and 13-17) was high (α's = .91 and .94, respectively).

The *Children's Attributional Style Questionnaire-Revised* (CASQ-R; Kaslow & Nolen-Hoeksema, 1991; c.f., Kaslow, Tannenbaum, & Seligman, 1978) is a 24-item questionnaire used to assess attributional style in children. The items measure the extent to which the participant explains causes of events across the three dimensions of attributional style (i.e., internality, stability, and globality). Respondents were given twelve positive and twelve negative hypothetical events (e.g., "You get an 'A' on a test."), each followed by a binary causal explanation. Throughout the measure for a given item, two dimensions of attributional style (i.e., internal, stable, and global) are held constant while the third is altered. Subscales were formed by summing the scores across the appropriate questions for each of the three causal dimensions, separately for positive events and for negative events. Because causal attributions for positive events are not central to helplessness theory (Abramson et al., 1989), only negative attribution dimensions were examined. The composite attribution scale has been demonstrated to be more reliable than the individual scales (Sweeny, Anderson, & Bailey, 1986); thus, the composite negative attribution scale was examined in addition to the three separate attribution subscales (i.e., internal, stable, global).

A meta-analysis examining the association between attributional style and depressive symptoms in children, provided support for the construct validity of the CASQ as an index of depressive attributional style (Gladstone & Kaslow, 1995). Psychometric analyses of the CASQ reveal that the scale has moderate internal consistency reliabilities for overall composite scales (.48 - .67) and fair test-retest

reliability (.56) (Joiner, 2000; Schwartz, Kaslow, Seeley, & Lewinsohn, 2000; Spence, Sheffield, & Donovan, 2002; Thompson, Kaslow, Weiss, & Nolen-Hoeksema, 1998). Research suggests that these test-retest reliabilities tend to increase with age (Gladstone & Kaslow, 1995). Cronbach's alpha for entire sample was moderate ($\alpha = .60$) for the composite negative scale. Cronbach's alpha for the internal, stable, and global attribution dimensions were .44, .30, and .23, respectively. Cronbach's alpha for the composite negative scale was low for children ages 9 to 12 ($\alpha = .22$) and moderate for children 13 to 17 ($\alpha = .67$). Cronbach's alpha for the internal, stable, and global attribution dimensions were .17, -.11, and -.02, respectively in the younger age group (9-12). Cronbach's alpha for the internal, stable, and global attribution dimensions in the older age group (13-17) were .56, .43, and .24, respectively.

Hypotheses and Research Questions

Primary Hypothesis

Because varying levels of illness uncertainty were hypothesized to increase or decrease the likelihood that children's causal attributions for negative events would influence children's depression, illness uncertainty was examined as a potential moderator in the causal attribution-child depression relationship. Four separate hierarchical multiple regression equations were constructed in which depressive symptoms on the CDI served as the dependent variable (DV). In each of the regression equations, age, functional class, disease subtype, and BSI were entered as covariates on Step 1. On Step 2, illness uncertainty scores from the CUIS and an attribution dimension (composite negative, internal negative, stable negative, or global negative) from the

CASQ-R were entered. On Step 3, the interaction of CUIS and CASQ-R scores was entered. To minimize multicollinearity, both the CUIS and CASQ-R scores were centered by subtracting the group mean of these variables from their respective raw values (see Aiken & West, 1991).

Statistical analyses were guided by Baron and Kenny's (1986) cognitive moderation perspective (see also Holmbeck, 1997) (see Figure 1). The determination of illness uncertainty as a moderator in the pessimistic attributional style-child depression relationship involved:

1. Regressing the DV (CDI) on both the IV (an attribution dimension [i.e., Composite Negative Scale (CONNEG), Internal Negative (INTNEG), Stable Negative (STBNEG), or Global Negative (GLONEG)] and the potential moderator (CUIS).
2. Regressing the DV (CDI) on the interaction term or product of the IV (CASQ-R attribution dimension) and the moderator (CUIS).

Research Question

Because increased levels of illness uncertainty may contribute to pessimistic attributions and subsequently to greater child distress, causal attributions were examined as a potential mediator in the illness uncertainty-child depression relationship (see Figure 2). A series of hierarchical multiple regression equations were constructed, in which CDI depression is the dependent variable (DV). Similar to the regressions examining the primary hypothesis, each series of regressions addressed a different attribution dimension (composite negative, internal negative, stable negative, or global negative). Determining

whether causal attributions mediated the illness uncertainty-child depression relationship involved:

1. Regressing the DV (CDI) on the IV (CUIS)
2. Regressing the DV (CDI) on the potential mediator (an attribution dimension [i.e., Composite Negative Scale (CONNEG), Internal Negative (INTNEG), Stable Negative (STBNEG), or Global Negative (GLONEG)].)
3. Regressing the potential mediator (an attribution dimension) on the IV (CUIS)
4. Regressing simultaneously the DV (CDI) on both the IV (CUIS) and the mediator (an attributional dimension)

To satisfy criteria for mediation:

1. The IV (CUIS) must be significantly associated with the DV (CDI).
2. The potential mediator (attributional dimension) must be significantly related to the DV (CDI).
3. The IV (CUIS) must be significantly associated with the potential mediator (attributional dimension).
4. When the mediator and the IV are simultaneously entered into the equation, the mediator contributes independent variance to the DV and the IV's influence on the DV is significantly reduced. To determine whether this reduction in variance is significant, Sobel's (1982) potential mediation method will be used.

Power analysis revealed that in order to detect a medium effect size at the .05 level with an estimated average correlation equal to .50, thirty-four participants were needed (Stevens, 2002). Thus, the fifty participants obtained should be sufficient to detect a medium effect size at the .05 level.

CHAPTER V

Results

Analyses

Preliminary Analyses

Several one way analysis of variance (ANOVA) tests were conducted to test for potential effects of ethnicity (Caucasian vs. non-Caucasian), recruitment method (mail vs. clinic), or disease subtype (JRA vs. non-JRA) on child depressive symptoms (CDI). Results yielded no significant differences in child reported depressive symptoms as a function of ethnicity ($F(1,49) = .001$, $p = .98$) or recruitment method ($F(1,49) = .32$, $p = .58$). However, child depressive symptoms was found to vary as a function of disease subtype ($F(1, 49) = 7.41$, $p < .01$). Based on these analyses, participants were collapsed ethnicity and recruitment method. Disease subtype (JRA vs. non-JRA) was utilized as a covariate in the primary analyses.

Further, both age and parent distress were significantly associated with CDI depressive symptoms (see Table 2), and were subsequently utilized as covariates in the primary analyses. Although no significant correlation was found between physician ratings of functional ability and depressive symptoms, functional class was also utilized as a covariate in the present study based on theoretical rationale and on findings in the

extant literature. Specifically, prior research has indicated that children diagnosed with JRD are at increased risk for depression due in part to the physical characteristics of the disease (e.g., David et al., 1994; Vandvik, 1990). Thus, functional class was included in the primary analyses to provide a more conservative test of anticipated relationships.

Primary Analyses

Hypothesis. Because varying levels of illness uncertainty may increase or decrease the likelihood that children's causal attributions for negative events will influence children's depressive symptoms, illness uncertainty was examined as a potential moderator in the causal attributions-child depression relationship. To determine whether illness uncertainty moderated the causal attributions-child adjustment relationship, the Attribution Dimension x CUIS interaction term must be significantly associated with the CDI, after controlling for the Attribution Dimension and CUIS main effects (see Baron and Kenny, 1986; Holmbeck, 1997).

Four separate hierarchical regression equations were constructed to test moderation. On step 1 of each equation age, disease subtype, physician rated functional class, and ratings of parental distress were entered. On Step 2 the CUIS total score was entered simultaneously with an attribution dimension [i.e., Composite Negative Scale (COMNEG), Internal Negative (INTNEG), Stable Negative (STBNEG), or Global Negative (GLONEG)]. On Step 3, a separate child illness uncertainty x attribution dimension interaction term was entered [(CUIS x COMNEG), (CUIS x INTNEG), (CUIS x STBNEG), or (CUIS x GLONEG)]. To minimize multicollinearity, both the CUIS and CASQ-R scores were centered by subtracting the group mean of these variables from

their respective raw values (see Aiken & West, 1991). Results revealed significant main effects for composite attributions and each of the three attribution dimensions on CDI depressive symptoms [COMNEG ($F(1,44) = 37.58$, $p < .001$); INTNEG ($F(1,44) = 8.03$, $p < .01$); STBNEG ($F(1,44) = 15.63$, $p < .001$); GLONEG ($F(1,44) = 33.20$, $p < .001$). Results of the regression analyses also revealed a significant CUIS x attribution interaction for the global attribution dimension ($F(1,42) = 9.52$, $p < .01$). The CUIS x GLONEG interaction effect on CDI depressive symptoms accounted for an additional 7% of incremental variance (see Table 3). Results support CUIS as a moderator in the global negative attribution-child adjustment relationship, indicating that greater illness uncertainty increased the magnitude of the relationship between pessimistic global attributions and child depressive symptoms.

Post-hoc Analysis

Guided by Holmbeck (2002), analyses were conducted to further examine the significance of the interaction between pessimistic global attributions and child perceived illness uncertainty on child depressive symptoms. Specifically, post-hoc probes examined whether the simple slopes (slopes of the regression lines) of cognitive attributions were significantly different from zero under high versus low levels of illness uncertainty. In order to gain this information, a series of statistical tests were conducted to compute the simple slopes. Initially, the GLONEG (predictor) and CUIS (moderator) were centered by subtracting the grand mean from the value of each participant [($GLONEG_{Centered}$ = GLONEG - .74); ($CUIS_{Centered}$ = CUIS – 67.02)]. Centering of the variables was completed to reduce multicollinearity between the predictor and interaction terms. Next,

two new conditional moderators (HICUIS and LOCUIS) were constructed to examine the conditional effects of the GLONEG (predictor) on the CDI (outcome). The conditional moderator terms were computed by adding and subtracting the standard deviation [HICUIS = CUIS – (.18.50); LOCUIS = CUIS – (-18.50)]. Finally, two new interaction variables were created, which incorporated each of the new conditional variables (i.e., HICUIS X GLONEG; and LOCUIS X GLONEG).

Once these new variables were created, two separate post-hoc regressions were conducted, each including the GLONEG main effect, one of the conditional CUIS variables (HICUIS or LOCUIS), and the interaction of the GLONEG and the conditional CUIS variable (HICUIS X GLONEG or LOCUIS X GLONEG) (see Table 4). The first regression equation examined the conditional effects of GLONEG (predictor) on CDI (outcome) under conditions of high uncertainty. Specifically, on step 1 of the equation, age, disease subtype, physician rated functional class, and parental distress were entered. On step 2, the $GLONEG_{Centered}$, HICUIS, and HICUIS X GLONEG interaction term were entered simultaneously. Results revealed a significant HICUIS X GLONEG interaction effect on CDI depressive symptoms ($t(1) = 6.41$, $p < .001$), indicating a significant effect on child depressive symptoms when CUIS was 1 SD above the mean.

A similar hierarchical regression was constructed to formulate the slope for the low CUIS condition. On step 1, age, disease subtype, physician rated functional class, and parental distress were entered. On step 2, the $GLONEG_{Centered}$, LOCUIS, and LOCUIS X GLONEG interaction term were entered simultaneously. Results revealed a significant effect on CDI depressive symptoms ($t(1) = 5.14$, $p < .001$), indicating a significant effect on child depressive symptoms when CUIS is 1 SD below the mean.

Equations for the regression lines were constructed to facilitate the plotting of the regression lines. Following are the regression equations for high CUIS (1 *SD* above the mean) and low CUIS (1 *SD* below the mean), respectively:

$$CDI_{est} = .065\ (HICUIS) + 11.14\ (GLONEG) + .14\ (HICUISXGLONEG) + 10.24$$

$$CDI_{est} = .065\ (LOCUIS) + 5.87\ (GLONEG) + .14\ (LOCUISXGLONEG) + 7.85$$

The regression lines were then plotted by substituting high GLONEG (*SD* = .85) and low GLONEG (*SD* = -.85) into each equation (see Figure 3).

Research Question

Because increased levels of illness uncertainty may contribute to pessimistic attributions and subsequently to greater child distress, causal attributions were examined as a potential mediator in the illness uncertainty-child depression relationship. To determine whether pessimistic attributions mediated the observed illness uncertainty-child depression relationship, several criteria had to be satisfied (see Baron and Kenny, 1986; Holmbeck, 1997): (1) the predictor variable (CUIS) must be significantly associated with the outcome variable (CDI), (2) the potential mediator (Attribution Dimension) must be significantly related to the outcome variable (CDI), (3) the predictor variable (CUIS) must be significantly correlated with the potential mediator (Attribution Dimension), and (4) when the predictor (CUIS) and mediator (Attribution Dimension) are entered simultaneously, the previously significant relationship between the predictor (CUIS) and outcome (CDI) must no longer be significant.

The first criterion for mediation required that a significant association exist between child perceived illness uncertainty (predictor) and child depressive symptoms (outcome). Results failed to reveal a significant effect for child perceived illness

uncertainty ($F(1,44) = .06$, $p = .80$) on child depressive symptoms, after controlling for age, disease subtype, physician rated functional class, and parental distress. Consequently, no further analyses were conducted examining the mediating role of attributional style. Results did not support pessimistic attributional style as a mediator in the illness uncertainty-child depression relationship.

Exploratory Analyses

Further analyses examined whether developmental level affected the adjustment process to JRD. Specifically, analyses examined whether the significant findings regarding attributions [i.e., Composite Negative Scale (COMNEG), Internal Negative (INTNEG), Stable Negative (STBNEG), and Global Negative (GLONEG)] and CDI child depressive symptoms remained significant when the sample was divided into two age groups [i.e., children (age 9-12, $n = 18$) and adolescents (age 13-17, $n = 32$)]. In addition, analyses examined whether the interaction of pessimistic global attributions and child perceived illness uncertainty on child depressive symptoms remained significant for children and adolescents, separately. Descriptive statistics of each age group are presented in Table 5.

Similar to the primary analyses, four separate hierarchical regression equations were constructed for each age group. On step 1 of each equation age, disease subtype, physician rated functional class, and ratings of parental distress were entered. On Step 2 the CUIS total score was entered simultaneously with an attribution dimension [i.e., Composite Negative Scale (COMNEG), Internal Negative (INTNEG), Stable Negative (STBNEG), or Global Negative (GLONEG)]. On Step 3, a separate child illness

uncertainty x attribution dimension interaction term was entered [(CUIS x COMNEG), (CUIS x INTNEG), (CUIS x STBNEG), or (CUIS x GLONEG)]. To minimize multicollinearity, both the CUIS and CASQ-R scores were centered by subtracting the group mean of these variables from their respective raw values (see Aiken & West, 1991). For adolescents (age 13-17), results revealed significant main effects for composite attributions and each of the three attribution dimensions on CDI depressive symptoms [COMNEG ($F(1,26) = 24.72$, $p < .001$); INTNEG ($F(1,26) = 5.06$, $p < .05$); STBNEG ($F(1,26) = 12.57$, $p < .01$); GLONEG ($F(1,26) = 25.74$, $p < .001$). Results of the regression analyses also revealed a significant CUIS x attribution interaction for the global attribution dimension ($F(1,24) = 9.74$, $p < .01$) (see Table 6). However, for children (age 9-12) findings were quite different from those revealed in the primary analyses. Specifically, results revealed significant main effects for only the composite attribution score and one of the three attribution dimensions on CDI depressive symptoms [COMNEG ($F(1,12) = 7.29$, $p < .05$); GLONEG ($F(1,12) = 6.29$, $p < .05$). Results of the regression analyses also revealed a non-significant CUIS x attribution interaction for the global attribution dimension ($F(1,10) = 2.57$, $p = .14$) (see Table7).

Post-hoc probes were conducted to further examine the significance of the interaction of pessimistic global attributions and child perceived illness uncertainty on child depressive symptoms for adolescents. Statistical tests identical to those in the primary analyses were conducted to compute the simple slopes, create two new conditional moderators, and create two new interaction variables.

Once these new variables were created, two separate post-hoc regressions were conducted, each including the GLONEG main effect, one of the conditional CUIS

variables (HICUIS or LOCUIS), and the interaction of the GLONEG and the conditional CUIS variable (HICUIS X GLONEG or LOCUIS X GLONEG) (see Table 6). The first regression equation examined the conditional effects of GLONEG (predictor) on CDI (outcome) under conditions of high uncertainty. Specifically, on step 1 of the equation, age, disease subtype, physician rated functional class, and parental distress were entered. On step 2, the $GLONEG_{Centered}$, HICUIS, and HICUIS X GLONEG interaction term were entered simultaneously. Results revealed a significant HICUIS X GLONEG interaction effect on CDI depressive symptoms ($t(1) = 6.34$, $p < .001$), indicating a significant effect on child depressive symptoms when CUIS was 1 SD above the mean (see Table 8).

A similar hierarchical regression was constructed to formulate the slope for the low CUIS condition. On step 1, age, disease subtype, physician rated functional class, and parental distress were entered. On step 2, the $GLONEG_{Centered}$, LOCUIS, and LOCUIS X GLONEG interaction term were entered simultaneously. Results revealed a significant effect on CDI depressive symptoms ($t(1) = 5.51$, $p < .001$), indicating a significant effect on child depressive symptoms when CUIS is 1 SD below the mean.

Equations for the regression lines were constructed to facilitate the plotting of the regression lines. Following are the regression equations for high CUIS (1 *SD* above the mean) and low CUIS (1 *SD* below the mean), respectively:

$$CDI_{est} = .128\ (HICUIS) + 13.62\ (GLONEG) + .17\ (HICUISXGLONEG) + 25.08$$

$$CDI_{est} = .128\ (LOCUIS) + 7.29\ (GLONEG) + .17\ (LOCUISXGLONEG) + 20.21$$

The regression lines were then plotted by substituting high GLONEG (*SD* = .93) and low GLONEG (*SD* = -.93) into each equation (see Figure 4).

In summary, results revealed main effect relationships between the three primary attribution dimensions (global negative, stable negative, and internal negative) and

depressive symptoms. Further, although no main effect of illness uncertainty on CDI depressive symptoms was observed, results supported illness uncertainty as a moderator in one attribution-depression relationship in adolescents. Specifically, primary analyses revealed that illness uncertainty served as a moderator in the global negative attribution-depression relationship, indicating that greater illness uncertainty increased the magnitude of the relationship between pessimistic global attributions and depressive symptoms. Despite post-hoc analyses indicating that global negative attributions were associated with depressive symptoms under both high and low conditions of illness uncertainty, regression results demonstrated that the effect of global negative attributions on depressive symptoms was enhanced under conditions of high illness uncertainty. In other words, despite the significant main effect of global negative attributions on depressive symptoms, additional variance in depressive symptoms was contributed when high illness uncertainty was taken into account.

Additional analyses examining the possible influence of developmental level in the adjustment process to JRD indicates that the results more appropriately reflect adolescents' (age 13-17) disease experience. Specifically, examination of children between the ages of 13 and 17 revealed main effect relationships between the three primary attribution dimensions (global negative, stable negative, and internal negative) and depressive symptoms. Results also supported illness uncertainty as a moderator in the global negative attribution-depression relationship. However, for children (age 9-12) results revealed significant main effects for only the global attribution dimension on CDI depressive symptoms and results revealed a non-significant CUIS x attribution interaction for the global attribution dimension.

CHAPTER VI

Discussion

The purpose of the present study was to examine the influence of children's causal attributions for disease-unrelated events on depressive symptoms under varying levels of perceived illness uncertainty in a sample of children diagnosed with juvenile rheumatic disease. Utilizing the information-processing explanation of helplessness as a theoretical framework (Sedek & Kofta, 1990), it was anticipated that children's disease-specific appraisals of uncertainty would moderate the association between attributions for negative events and children's depressive symptoms. Specifically, it was hypothesized that children who exhibited both increased pessimistic attributions and increased perceived illness uncertainty would report increased levels of depressive symptoms.

Partial support for the primary hypothesis was found. Illness uncertainty served as a moderator in the global negative attribution-child depression relationship, indicating that greater illness uncertainty significantly increased the magnitude of the relationship between pessimistic global attributions and child depressive symptoms. The majority of the results, however, revealed direct relationships between pessimistic attributions and depressive symptoms. All three primary attribution dimensions (i.e., global negative, stable negative, and internal negative) demonstrated significant relationships with depressive symptoms. In general, results are consistent with previous studies that have

examined the relationship between causal attributions and depression in children (Garber & Hilsman, 1992; Ostrander & Weinfurt, 1998; Seligman et al., 1984) and more specifically, pediatric populations (Frank et al., 1997; Johnson et al., 2001, & Schoeherr et al., 1992).

Results examining illness uncertainty revealed no main effect of illness uncertainty on depressive symptoms, which eliminated the examination of uncertainty as a mediator in the attribution-depression relationships. The failure of illness uncertainty to demonstrate a significant relationship with depressive symptoms is contrary to the bulk of the findings in the pediatric chronic illness literature (e.g., Mullins et al., 1997; Mullins et al., 1995a; Ireys et al., 1994). One possible explanation for the lack of significant findings may be that children with juvenile rheumatic diseases habituate to or become desensitized to the experience of illness uncertainty. Desensitization is said to occur when an individual becomes insensitive or nonreactive after long or repeated exposure to distressing or aversive stimuli (Wolpe, 1958; 1995). To illustrate, children with JRD are repeatedly exposed to illness uncertainty within multiple facets of the disease experience (e.g., hospitalizations, diagnosis, treatment regimens and outcomes; Lovell, 1996). It could be that through these repeated exposures of illness uncertainty, these children become desensitized or nonreactive; thus, learn to respond effectively in these situations and do not experience adjustment difficulties.

Although this may explain the absence of a main effect for child perceived illness uncertainty on child depressive symptoms, it does not account for the finding that child perceived illness uncertainty moderated the global negative attribution-child depression relationship. Perhaps the most parsimonious explanation can be found within the context

of both the information-processing and attributional explanations of helplessness. To illustrate, the information processing explanation of helplessness would suggest that chronic exposure to aversive behavior-outcome noncontingency actually increases uncertainty through repeated unproductive problem-solving attempts and ultimately cognitive exhaustion (e.g., Kofta & Sedek, 1999). Subsequently, increased uncertainty in the face of illness provides the opportunity for mood problems to come to fruition in the presence of specific predisposing cognitive diatheses (i.e., pervasive causal explanations for negative life events). Although the present study did not examine cognitive exhaustion, previous research has demonstrated that exposure to experimental noncontingency produces uncertainty, which results in cognitive exhaustion and, more importantly, increased negative mood (e.g., Kofta & Sedek, 1990; 1999; Hecker & Sedek, 1999; Sedek et al., 1993).

Nevertheless, the observation that the relationship between global negative attributions and child depressive symptoms was enhanced under conditions of increased child perceived illness uncertainty provides one possible explanation of the specific mechanisms by which illness unrelated cognitive vulnerabilities interact with illness-specific stressors to impact child depressive symptoms. Specifically, results suggest that pervasive negative attributions serve as a cognitive vulnerability that is activated when children are faced with a significant stressor in their environment, such as illness uncertainty. In other words, children who believe that the cause of negative events applies to a wide variety of outcomes (i.e., affects everything I do) are more likely to experience emotional distress in the presence of illness uncertainty. These findings provide support for a cognitive diathesis-stress view (Abramson et al., 1989; Alloy et al.,

1988; 1992) of adjustment in children with JRD and suggest the need for examining children's perceptions of illness, as well as children's cognitive appraisals for events across different life domains.

Limitations and Strengths

Results of the present study need to be considered in the context of three methodological limitations. First, there are several related limitations that may have been introduced into the study as a function of exclusive reliance on self-report measures. A potential consequence of single-method measurement is that observed associations between the variables under study were simply spurious correlations due to shared method variance and not due to the predicted associations between the variables (Coyne & Gotlib, 1983). This concern is somewhat attenuated by the nonsignificant correlation observed between the CUIS and the CDI. Thus, the absence of a significant relationship between these two self-report measures provides some measure of confidence that the observed significant associations were not due simply to method variance.

Perhaps more importantly, a larger issue was revealed in the exploratory analyses examining developmental trends in the data. To illustrate, all three primary attribution dimensions (i.e., global negative, stable negative, and internal negative) demonstrated significant relationships with depressive symptoms for the group of children between the ages of 13 and 17. However, for those children between the ages of 9 and 12, only one primary attribution dimension (global negative) revealed a significant relationship with depressive symptoms. Although the lack of significant findings for the younger group may be due to insufficient power as a function of the small sample size (n = 18) observed

for this age group, it is possible that the differences in findings across developmental levels may have resulted from self-report measurement issues in the younger age group. Researchers have suggested that self-report measures may not be suitable for younger children who have limited verbal abilities, which hinders their capability to fully comprehend and communicate the disease experience (La Greca & Lemanek, 1996; Russo, Lehn, & Berde, 1993). Moreover, the accuracy of self-report measures depends on children's acquisition of cognitive and language skills, as well as self-awareness, which is not believed to be fully developed until adolescence (Harter, 1990). Because children under the age of 11 have difficulty answering complex questions (Schniering, Hudson, & Rapee, 2000), it is possible that the cognitive demands or language requirements of the self-report measures exceeded the capacity of the younger children.

This may have also influenced reliabilities and subsequently the validity of the Children's Attributional Style Questionnaire. Consistent with previous studies utilizing the CASQ-R, internal reliability for both the composite score and the individual attribution dimensions were low (e.g., Hankin et al., 2001; Hilsman & Garber, 1995; Schwartz et al., 2000; Spence, Sheffield, & Donovan, 2002). Subsequently, the low to moderate reliabilities cast some doubt on the validity of the findings. Although the low reliabilities may have been due to the fact that each subscale is derived from only four items, it is also likely that the requirements of the instrument go beyond younger children's cognitive abilities. For example, the global subscale measures children's perceptions regarding event stability or the degree to which the child believes that the causes of one negative event are far-reaching to other events. This subscale examines multiple different life domains (e.g., social situations, accidents, academic, and sports

ability) that encompass both events over which a child may perceive greater control (e.g., academic) and events that may be construed as less controllable (e.g., friends treating them badly). Children may not be able to make meaningful distinctions between such a wide array of events that represent varying degrees of personal control.

Second, it is also important to note that these findings do not provide information regarding the causal nature of the relationships among the variables. In other words, although negative attribution dimensions were conceptualized as accounting for significant variance in child depressive symptoms (i.e., predisposing cognitive antecedents), it is possible that existing depressive symptoms actually preceded pessimistic attributions. It will be important for future research to examine the temporal nature of the relationship between child depressive symptoms and causal attributions in children with JRD.

Third, the interpretation and generalization of the results to the larger JRD population is limited given the participants were recruited from only one clinic, housed in a teaching hospital setting. It is possible that the sample does not represent the larger population of children with JRD who do not attend these types of clinics. Additionally, because no comparisons could be made between participants and non-participants, there is the potential for a self-selection bias on psychological and/or disease variables, which could have resulted in a more homogenous sample of children than would be seen in the larger JRD population. However, the sample did represent the broader JRD population in terms of approximating the 2:1 female to male gender ratio (31 female, 19 male) typically seen in JRD samples. Further, the sample was comprised of participants representing a wide range of ethnic groups (44% Caucasian, 26% Native American, 12% Hispanic, 8%

African American, 8% Biracial, and 2% Asian), compared to other studies that were comprised of predominantly Caucasian participants (e.g., Ireys et al., 1994; Kronenberger & Thompson, 1992; Thompson, 1994b). Lastly, the percent of children that met clinically significant levels of depression in this sample was 42%, which is comparable to previous studies of youth with JRD (e.g., David et al., 1994; Vandvik, 1990).

Despite these limitations, this study adds to the literature in the following ways. First, the present findings highlight the importance of extending statistical analysis beyond main effect examinations of the data and exploring the interrelationships among variables associated with adjustment (Holmbeck, 2002). Had the analyses not proceeded beyond examining the main effects, conclusions and interpretations of the data would have been incomplete. Specifically, the main conclusion of the study would have been that illness uncertainty is not an important variable influencing the experience of depressive symptoms in children with JRD. However, by examining the indirect nature of relationships among variables, illness uncertainty was found to play a role in child depressive symptoms by enhancing the relationship between global negative attributions and child depressive symptoms.

Additionally, the present study examined illness uncertainty on a conceptual level. Specifically, previous literature has demonstrated that illness uncertainty is a consistent predictor of psychological adjustment; however, relatively little is known regarding its precise relationship with other cognitive appraisal variables, and few attempts were made to situate illness uncertainty within a theoretical framework. From a cognitive diathesis-stress perspective, findings suggest that illness uncertainty may serve as a proximal stressor that activates predisposing cognitive vulnerabilities (i.e., causal attributions)

resulting in increased depressive symptoms. Further, the information-processing explanation of helplessness provides some clarity to understanding the conceptual nature of illness uncertainty as it relates to uncontrollability.

Implications and Recommendations for Future Research

Results of the present study have several important treatment implications, particularly for older children and adolescents with JRD. Although the present findings do not provide causal explanations for the directions by which the causal attributions and depressive symptoms are related, the finding that increased levels of pessimistic causal attributions were related to increased child reported depression suggests the need to focus on examining this cognitive variable in the adjustment process. Specifically, interventions should focus on minimizing pervasive negative attributions by increasing positive experiences in disease unrelated areas of their lives (e.g., school, social domains, household chores). Interventions could also include cognitive-behavioral interventions that increase problem solving and challenge maladaptive (e.g., catastrophizing) cognitions and provide opportunities for consistent positive reinforcement through scheduling pleasant and rewarding activities.

Results of the present study also suggest the importance of interventions that focus on decreasing perceived illness uncertainty. This appears particularly important, yet challenging given the fact that uncertainty and unpredictability are hallmark features of JRD. Because uncertainty appears to be an inherent component of all aspects of JRD and is associated with multiple facets of the chronic illness experience, interventions should focus on communicating this to the child and his/her parents to assist them in establishing

more realistic expectations regarding the variable and unpredictable disease course, treatment, and outcome of JRD. This could help guide the child's and the family's assumptions about the disease and health care experiences. Cognitive-behavioral interventions that assist children to identify aspects of their disease over which they can exert more control (e.g., medication adherence) versus those that are less controllable (e.g., disease course) may also prove beneficial (cf. Chaney et al., 1996).

Recommendations for future research include examining JRD populations comprised of larger sample sizes, ideally from multiple sites. This would allow for a more heterogeneous representation of the JRD population. Additionally, it would be beneficial to examine key cognitive appraisal variables longitudinally, which may help better explain long-term adjustment in children diagnosed with JRD. Specifically, research should examine how causal attributions, illness uncertainty, and other possible child cognitive appraisal variables impact child adjustment to disease over time. It would also be beneficial to examine these variables longitudinally with respect to their influence on disease outcome (e.g., treatment adherence, functional ability, etc.).

Subsequent investigations should continue to examine differences in causal attributions-child adjustment relationships across developmental stages. Results of the present study also suggest that it is important to examine the reliability and validity of measures utilized with children at different developmental levels and to use age-appropriate assessment strategies. Similarly, more research is needed to examine the psychometric properties of the Children's Attributional Style Questionnaire-Revised (Kaslow & Nolen-Hoeksema, 1991). Future studies should examine the degree to which

children can make fine cognitive distinctions between events characterized by varying degrees of control that may be confounded in this measure.

Finally, this line of research would benefit tremendously from experimental studies examining the information-processing model of helplessness (Kofta & Sedek, 1999). Specifically, research should examine children with JRD who are exposed to response-noncontingent feedback to determine the relationships between cognitive exhaustion, irreducible uncertainty, and depressive symptoms.

In general, results of the present study provide support for a growing body of literature demonstrating the important role of children's cognitive appraisals in psychosocial functioning, particularly in children with chronic illnesses (e.g., Jaworski, 1993; Mullins et al., 1997; 2000; Rapoff & Lindsley, 2000; Schanberg et al., 1997). The present findings are also consistent with the extant literature demonstrating significant associations between pessimistic causal attributions and children's depression. Importantly, the present study examined both the direct and indirect roles of cognitive appraisal mechanisms, highlighting the importance of examining not only the main effects of variables, but also the interrelationships between variables in determining children's psychological adjustment to illness.

REFERENCES

Abramson, L.Y., Metalsky, G.I., & Alloy, L.B. (1989). Hopelessness depression: A theory-based subtype of depression. *Psychological Review, 96*(2), 358-372.

Abramson, L.Y., Seligman, M.E., & Teasdale, J.D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87*(1), 49-74.

Aiken, L.S. & West, S.G. (1991). Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage Publications.

Alloy, L.B., Abramson, L.Y., Metalsky, G.I., Hartlage, S. (1988). The hopelessness theory of depression: Attributional aspects. *British Journal of Clinical Psychology, 27,* (5-21).

Alloy, L.B., Lipman, A.J., & Abramson, L.Y. (1992). Attributional style as a vulnerability factor for depression: Validation by past history of mood disorders. *Cognitive Therapy and Research, 16*(4), 391-407.

Alloy, L.B., Peterson, C., Abramson, L.Y., & Seligman, M.E. (1984). Attributional style and the generality of learned helplessness. *Journal of Personality and Social Psychology, 46*(3) 681-687.

Baildam, E.M, Holt, P.J.L., Conway, S.C., & Morton, M.J.S. (1995). The association between physical function and psychological problems in children with juvenile chronic arthritis. *British Journal of Rheumatology, 34,* 470-477.

Baron, R.M. & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and SocialPsychology, 51*(6), 1173-1182.

Bennett, D.S. (1994). Depression among children with chronic medical problems: A meta-analysis. *Journal of Pediatric Psychology*, *19*(2), 149-169.

Brace, M.J., Smith, M.S., McCauley, E., & Sherry, D.D. (2000). Family reinforcement of illness behavior: A comparison of adolescents with chronic fatigue syndrome, juvenile arthritis, and healthy controls. *Developmental and Behavioral Pediatrics 21*(5)*,* 332-339.

Braden, C.J. (1990). A test of the self-help model: Learned response to chronic illness experience. *Nursing Research, 39*(1), 41-47.

Burke, P., & Elliot, M. (1999). Depression in pediatric chronic illness: A diathesis-stress model. *Psychosomatics: Journal of Consultation Liaison Psychiatry, 40*(1), 5-17.

Cassidy, J.T., & Petty, R.E. (2001). *The textbook of pediatric rheumatology (4th ed.)*. Philadelphia: W.B. Saunders.

Chaney, J.M., Mullins, L.L., Urtesky, D.L, Doppler, M.J., Palmer, W.R., Wess, S.J., et al., (1996). Attributional style and depression in rheumatoid arthritis: The moderating role of perceived illness control. *Rehabilitation Psychology, 3,* 205-223.

Chaney, J.M., Mullins, L.L., Urtesky, D.L., Pace, T.M., Werden, D., & Hartman, V.L. (1999). An experimental examination of learned helplessness in older adolescents and young adults with long-standing asthma. *Journal of Pediatric Psychology, 24*(3), 259-270.

Chaney, J.M. & Youll, L.K. (1994). Systemic lupus erythmemaosus: Psychological issues. In R.A. Olsen, L.L. Mullins, J.B. Gibson, & J.M. Chaney (Eds). *The Sourcebook of Pediatric Psychology* (167-176). Boston, MA: Allyn & Bacon.

Christman, N.J. (1990). Uncertainty and adjustment during radiotherapy. *Nursing Research, 39*(1), 17-20.

Cohen, M.H. (1993). The unknown and the unknowable-managing sustained uncertainty. *Western Journal of Nursing Research, 15*(1), 77-96.

Cole, D.A., Tram, J.M., Martin, J.M., Hoffman, K.B., Ruiz, M.D., Jacquez, F.M., et al. (2002). Individual differences in the emergence of depressive symptoms in children and adolescents: A longitudinal investigation of parent and child reports. *Journal of Abnormal Psychology, 111*(1), 156-165.

Cole, D.A., & Turner, J.E. (1993). Models of cognitive mediation and moderation in child depression. *Journal of Abnormal Psychology, 102*(2), 271-281.

Compas, B.E. (1997). Depression in children and adolescents. In E.J. Mash & L.G. Terdal (Eds.), *Assessment of Childhood Disorders* (pp. 197-229). New York, NY: Guilford Press.

Coyne, J. & Gotlib, I. (1983). The role of cognition in depression: A critical review. *Psychological Bulletin, 94*, 472-505.

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297-334.

Dahlquist. L.M. (2003). Commentary: Are children with JRA and their families at risk or resilient? *Journal of Pediatric Psychology, 28*(1), 45-46.

Daltroy, L.H., Larson, M.G., Eaton, H.M., Patridge, A.J., Pless, I.B., Rodgers, M.P., et al. (1992). Psychosocial adjustment in juvenile arthritis. *Journal of Pediatric Psychology, 17*(3), 277-289.

David, J., Cooper, C., Hickey, L., Lloyd, J., Dore, C., McCullough, C., et al. (1994). The functional and psychological outcomes of juvenile chronic arthritis in young adulthood. *British Journal of Rheumatology, 33*, 876-881.

Derogatis, L.R. (1993). *The brief symptom inventory: Administration, scoring, and procedures manual*. Minneapolis, MN: National Computer Systems, Inc.

Dixon, J.F., & Ahrens, A.H. (1992). Stress and attributional style as predictors of self-reported depression in children. *Cognitive Therapy and Research, 16*(6), 623-634.

Emery, H. (1986). Clinical aspects of systemic lupus erythematosus in childhood. *Pediatric Rheumatology, 33*(5), 1177-1190.

Ennett, S.T., DeVillis, B.M., Earp, J.A., Kredich, D., Warren, R.W., & Wilhelm, C.L. (1991). Disease experience and psychosocial adjustment in children with juvenile rheumatoid arthritis: Children's versus mother's reports. *Journal of Pediatric Psychology, 16*, 557-568.

Frank, R.G., Beck, N.C., Parker, J.C., Kanshani, J.H., Elliott, T.R., Haut, A.E., et al. (1988). Depression in rheumatoid arthritis. *The Journal of Rheumatology, 15*(6), 920-925.

Frank, C.N., Blout, R.L., & Brown, R.T. (1997). Attributions, coping, and adjustment in children with cancer. *Journal of Pediatric Psychology, 22*(4), 563-576.

Frank, R.G., Hagglund, K.J., Schopp, L.H., Thayer, J.F., Vieth, A.Z., Cassidy, J.T., et al. (1998). Disease and family contributors to adaptation in juvenile rheumatoid arthritis and juvenile diabetes. *Arthritis Care and Research, 11*(3), 166-176.

French, A.R., Mason, T., Nelson, A.M., O'Fallon, W.M., & Gabriel, S.E. (2001). Increased mortality in adults with a history of juvenile rheumatoid arthritis. *Arthritis and Rheumatism, 44*(3), 523-527.

Fritz, G., Williams, J., & Amylon, M. (1988). After treatment ends: Psychosocial sequelae in pediatric cancer survivors. *American Journal of Orthopsychiatry, 58*, 552-561.

Garber, J., & Hilsman, R. (1992). Cognitions, stress, and depression in children and adolescents. *Child and Adolescent Psychiatric Clinics of North America, 1*(8), 129-167.

Gartstein, M.A., Short, A.D., Vannatta, K., Noll, R.B. (1999). Psychological adjustment of children with chronic illness: An evaluation of three models. *Developmental and Behavioral Pediatrics, 20*(3), 157-163.

Gerhardt, C.A., Vannatta, K., McKellop, M., Taylor, J., Passo, M., Reiter-Purtill, J., et al. (2003). Brief report: Child-rearing practices of caregivers with and without a child with juvenile rheumatoid arthritis: Perspectives of caregivers and professionals. *Journal of Pediatric Psychology, 28*(4), 275-279.

Gerhardt, C.A., Vannatta, K., McKellop, M., Zeller, M., Taylor, J., Passo, M. et al. (2003). Comparing parental distress, family functioning, and the role of social support for caregivers with and without a child with juvenile rheumatoid arthritis. *Journal of Pediatric Psychology, 28*(1), 5-16.

Gibb, B.E., Zhu, L., Alloy, L.B. & Abramson, L.Y. (2002). Attributional styles and academic achievement in university students: A longitudinal investigation. *Cognitive Therapy and Research, 26*(3), 309-315.

Gladstone, T.R.G. & Kaslow, N.J. (1995). Depression and attributions in children and adolescents: A meta-analytic review. *Journal of Abnormal Psychology, 23*(5), 597-606.

Gotlib, I.H. & Abramson, L.Y. (1999). Attributional theories of emotion. In T. Dalgleish & M. Power (Eds.), *Handbook of Cognition and Emotion* (pp. 613-636). New York, NY: Wiley.

Hankin, B.L., Abramson, L.Y., & Siler, M. (2001). A prospective test of the hoplessness theory of depression in adolescence. *Cognitive Therapy and Research, 25*(5), 607-632.

Hartman, V.L., Mullins, L.L., Hoff, A.L., & Chaney, J.M. (2001). *Factor structure and reliability of the Child Uncertainty in Illness Scale.* Presented at the Florida Conference on Child Health Psychology.

Harter, S. (1990). Issues in the assessment of self-concept of children and adolescents. In A.M. La Greca (Ed.), *Through the eye of the child: Obtaining self-reports from children and adolescents* (pp. 292-325). Boston, MA: Allyn & Bacon.

Helgeson, V.S., Janicki, D., Lerner, J., & Barbarin, O. (2003). Brief report: Adjustment to juvenile rheumatoid arthritis: A family systems perspective. *Journal of Pediatric Psychology, 28*(5), 347-353.

Hilsman, R. & Garber, J. (1995). A test of the cognitive diathesis-stress model of depression in children: Academic stressors, attributional style, perceived competence, and control. *Journal of Personality and Social Psychology, 69*(2), 370-380.

Hochberg, M.C., Chang, R.W., Dwosh, I., Lindsey, S., Pincus, T., & Wolfe, F. (1992). The American college of rheumatology 1991 revised criteria for the classification of global functional status in rheumatoid arthritis. *Arthritis and Rheumatism, 35*(5), 498-502.

Hoff, A.L., Mullins, L.L., Chaney, J.M., Hartman, V.L., & Domek, D. (2002). Illness uncertainty, perceived control, and psychological distress among adolescents with type I diabetes. *Research and Theory for Nursing Practice: An International Journal, 16*(4), 223-236.

Holmbeck, G.N. (1997). Toward terminological, conceptual, and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology, 65*(4), 599-610.

Holmbeck, G.N. (2002). Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. *Journal of Pediatric Psychology, 27*(1), 87-96.

Hommel, K.A., Chaney, J.M., Mullins, L.L., Palmer, W., Wees, S., & Klein, H. (1998). The Relative contributions of attributional style and arthritis helplessness to depression in rheumatoid arthritis: a longitudinal investigation. *International Journal of Rehabilitation and Health, 4*(1), 59-67.

Horner, S.D. (1997). Uncertainty in mothers' care for their ill children. *Journal of Advanced Nursing, 26,* 658-663.

Huygen, A.C.J., Kuis, W., & Sinnema, G. (2000). Psychological, behavioural, and social adjustment in children and adolescents with juvenile chronic arthritis. *Annuals of Rheumatic Disease, 59*, 276-282.

Ireys, H.T., Werthamer-Larsson, L.A., Kolodner, K.B., & Gross, S.S. (1994). Mental health of young adults with chronic illness: The mediating effect of perceived impact. *Journal of Pediatric Psychology, 19*(2), 205-222.

Jacox, R.F., Meyerowitz, S., & Hess, W.D. (1993). A genetic, clinical, and psychological study of nine sets of monozygotic twins, discordant for rheumatic arthritis. M*anitoba Medical Review, 46*(8), 522-523.

Jaworski, T.M. (1993). Juvenile rheumatoid arthritis: Pain-related and psychological aspects and their relevance for assessment and treatment. *Arthritis Care and Research, 6*(4), 187-196.

Jessop, D., & Stein, R. (1985). Uncertainty and its relation to the psychological correlates of chronic illness in children. *Social Science and Medicine, 20,* 552-561.

Johnson, S.K., Lange, G., Tiersky, L., DeLuca, J., & Natelson, B.H. (2001). Health-related personality variables in chronic fatigue syndrome and multiple sclerosis. *Journal of Chronic Fatigue Syndrome, 8*(3-4), 41-52.

Joiner, T.E. (2000). A test of the hopelessness theory of depression in youth psychiatric inpatients. *Journal of Clinical Child Psychology, 29(*2), 167-176.

Joyce, J., Berkebile, C., Hastings, C., Yarboro, C., & Yocum, D. (1989). Health status and disease activity in systemic lupus erythematosus. *Arthritis Care & Research, 2*(2), 65-69.

Kamen, L.P. & Seligman, M.E. (1989). Explanatory style and health. *Health Psychology,* 73-84.

Kaslow, N.J., & Nolen-Hoeksema, S. (1991). *Children's Attributional Questionnaire-Revised*. Unpublished manuscript, Emory University, Atlanta, GA.

Kaslow, N.J., Tannenbaum, R.L., & Seligman, M.E.P. (1978). *The KASTAN-R: A children's attributional style questionnaire. (KASTAN-R-CASQ).* Unpublished manuscript. University of Pennsylvania.

Kazak, A.E. (1989). Families of chronically ill children: a systems and social-ecological model of adaptation and challenge. *Journal of Consulting and Clinical Psychology, 57*(1), 25-30.

Kewman, D.G., Warschausky, S.A., & Engel, L. (1995). Juvenile rheumatoid arthritis and neuromuscular conditions: Scoliosis, spinal cord injury, and muscular dystrophy. In M.C. Roberts (Ed). *Handbook of Pediatric Psychology: 2nd Edition* (384-402). New York, NY: The Guilford Press.

Kinashi, R. (1983). Systemic lupus erythematosus: The psychological dimension. *Canada's Mental Health*, 19-22.

Kofta, M. & Sedek, G. (1999). Uncontrollability as irreducible uncertainty. *European Journal of Social Psychology, 29,* 577-590.

Kovacs, M. (1992). *Children's Depression Inventory Manual*. Toronto, Ontario: Multi-Health Systems, Inc.

Kronenberger, W.G., & Thompson, R.J. (1992). Psychological adaptation of mothers of children with spina bifida: Association and dimensions of social relationships. *Journal of Pediatric Psychology, 17*(1), 1-14.

Kvist, S.B.M., Rajantie, J., Kvist, M., & Siimes, M.A. (1991). Aggression: The dominant psychological response in children with malignant diseases. *Psychological Reports, 68,* 1139-1150.

La Greca, A.M. & Lemanek, K.L. (1996). Editorial: Assessment as a process in pediatric psychology. *Journal of Pediatric Psychology, 21*(2), 137-151.

Lavigne, J.V. & Faier-Routman, J. (1993). Correlates of psychological adjustment to pediatric physical disorders: A meta-analytic review and comparison with existing models. *Developmental and Behavioral Pediatrics, 14*(2), 117-123.

Lazarus, R. S, & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer.

LeBovidge, J.S., Lavigne, J.V., Donenberg, G.R., & Miller, M. (2003). Psychological adjustment of children and adolescents with chronic arthritis: A meta-analytic review. *Journal of Pediatric Psychology, 28*(1), 29-39.

Lovell, D.J. (1996). Juvenile rheumatoid arthritis and juvenile spondyloarthropatheis. *Primer on Rheumatic Diseases*. 393-398.

Mast, E.M. (1995). Adult uncertainty in illness: A critical review of research. *Scholarly Inquiry for Nursing Practice: An International Journal, 9*(1), 3-23.

Mishel, M.H. (1983). Adjusting the fit: Development of uncertainty scales for specific clinical populations. *Western Journal of Nursing Research, 5*(4), 355-370.

Mishel, M.H. (1984). Perceived uncertainty and stress in illness. *Research Nursing and Health, 7,* 163-171.

Mishel, M.H. (1988). Uncertainty in illness. *Image: Journal of Nursing Scholarship, 20*(4), 225-232.

Mishel, M.H. (1990). Reconceptualization of the uncertainty in illness theory. *Journal of Nursing Scholarship, 22*(4), 256-262.

Mishel, M.H., & Braden, C. (1988). Finding meaning: Antecedents of uncertainty in illness. *Nursing Research, 37*, 98-127.

Mishel, M.H., & Sorenson, D.S. (1991). Uncertainty in gynecological cancer: A test of the mediating functions of mastery and coping. *Nursing Research, 40*(3), 167-171.

Moos, R. H. (2002). Life stressors, social resources, and coping skills in youth: Application to adolescents with chronic disorders. *Journal of Adolescent Health, 30S*, 22-29.

Mullins, L.L., Chaney, J.M., Balderson, B., & Hommel, K.A. (2000). The relationship of illness uncertainty, illness intrusiveness, and asthma severity to depression in young adults with long-standing asthma. *International Journal of Rehabilitation and Health, 5*(3), 177-186.

Mullins, L.L., Chaney, J.M., Hartman, V.L., Albin, K., Miles, B., & Roberson, S. (1995a). Cognitive and affective features of postpolio syndrome: Illness uncertainty, attributional style, and adaptation. *International Journal of Rehabilitation and Health, 4*(1), 211-222.

Mullins, L.L., Chaney, J.M., Hartman, V.L., Olson, R.A., Youll, L.K., Reyes, S., et al., (1995b). Children and maternal adaptation to cystic fibrosis and insulin-dependent diabetes mellitus: Differential patterns across disease states. *Journal of Pediatric Psychology, 20*(2), 173-186.

Mullins, LL, Chaney, J.M, Pace, T.M. & Hartman, V.L. (1997). Illness uncertainty, attributional style, and psychological adjustment in older adolescents and young adults with asthma. *Journal of Pediatric Psychology, 22*(6), 871-880.

Mullins, L.L., & Hartman, V.L. (1995). *Children's uncertainty in illness scale.* Unpublished manuscript.

Mullins, L.L., Olson, R.A., Reyes, S., Bernardy, N., Huszti, H.C., & Volk, R.J. (1991). Risk and resistance factors in the adaptation of mothers of children with cystic fibrosis. *Journal of Pediatric Psychology, 16*(6), 701-715.

Nicassio, P.M., Wallston, K.A., Callahan, L.F., Herbert, M., & Pincus, T. (1985). The measurement of helplessness in rheumatoid arthritis: The develeopment of the arthritis helplessness index. *Journal of Rheumatology 12*, 462-467.

Nolen-Hoeksema, S., Girgus, J.S., Seligman, M.E. (1986). Learned helplessness in children: A longitudinal study of depression, achievement, and explanatory style. *Journal of Personality and Social Psychology, 51*(2), 435-442.

Noll, R.B., Kozlowski, K., Gerhardt, C., Vannatta, K., Taylor, J., & Passo, M. (2000). Social, emotional, and behavioral functioning in children with juvenile rheumatoid arthritis. *Arthritis and Rheumatism, 43*(6), 1387-1396.

Ostrander, R. & Weinfurt, K.P. (1998). The role of age, family support, and negative cognitions in the prediction of depressive symptoms. *School Psychology Review, 27*(1), 121-138.

Padialla, G.V., Mishel, M.H & Grant, M.M. (1992). Uncertainty, appraisal, and quality of life. *Quality of Life Research, 1,* 155-165.

Patterson, J. & Blum, R.W. (1996). Risk and resilience among children and youth with disabilities. *Archives of Pediatrics and Adolescents, 150,* 692-698.

Peterson, C., Bettes, B.A., & Seligman, M.E. (1985). Depressive symptoms and unprompted causal attributions: Content analysis. *Behavior Research and Therapy, 23*(4), 379-382.

Peterson, C. & Seligman, M.E. (1981a). Helplessness and attributional style in depression: Part I. *Tidsskrift for Nrsk Psykologforening, 18,* 3-18.

Peterson, C. & Seligman, M.E. (1981b). Helplessness and attributional style in depression: Part II. *Tidsskrift for Nrsk Psykologforening, 18,* 53-59.

Peterson, C. & Seligman, M.E. (1984). Causal explanations as a risk factor for depression: Theory and evidence. *Psychological Review, 91*(3) 347-374.

Pittman, T., & Pittman, N. (1980). Deprivation of control and the attribution process. *Journal of Personality and.SocialPsychology, 39*(3),377-389.

Pless, B.I. (1984). Clinical assessment: Physical and psychological functioning. *Pediatric Clinics in North America, 31*(1), 33-45.

Power, T.G., Dahlquist, L.M., Thompson, S.M., & Warren, R. (2003). Interactions between children with juvenile rheumatoid arthritis and their mothers. *Journal of Pediatric Psychology, 28*(3), 213-221.

Radloff, L.S. (1991). The use of the Center of Epidemiologic Studies Depression Scale in adolescents and young adults. *Journal of Youth and Adolescence, 20,* 149-168.

Rapoff, M.A. (2000) Facilitating adherence to medical regimens for pediatric rheumatic diseases: Primary, secondary, and tertiary prevention. In D. Drotar (Ed.), *Promoting adherence to medical treatment in chronic childhood illness: Concepts, methods, and interventions* (pp. 329 – 345). Mahwah, NJ: Lawrence Earlbaum.

Rapoff, M.A., & Lindsley, C.B. (2000). The paint puzzle: A visual and conceptual metaphor for understanding and treating pain in pediatric rheumatic disease. *Journal of Rheumatology, 58* (suppl), 29-33.

Reiter-Purtill, J., Gerhardt, C.A., Vannatta, K., Passo, M.H., & Noll, R. B. (2003). A controlled longitudinal study of the social functioning of children with juvenile rheumatoid arthritis. *Journal of Pediatric Psychology, 28*(1), 17-28.

Russo, D.C., Lehn, B.M., & Berde, C.B. (1993). Pain. In T.H. Ollendick & M. Hersen (Eds.), *Handbook of child and adolescent assessment* (pp. 413-438). Allyn & Bacon, Boston: MA.

Schanberg, L.E., Lefebvre, J.C., Keefe, F.J., Kredich, D.W., & Gil, K.M. (1997). Pain coping and the pain experience in children with juvenile chronic arthritis. *Pain, 73*, 181-189.

Schanberg, L.E., Sandstrom, M.J., Starr, K., Gil, K.M., Lefebvre, J.C., Keffe, F.J., et al. (2000). The relationship of daily mood and stressful events to symptoms in juvenile rheumatic disease. *Arthritis Care and Research, 13*(1), 33-41.

Schniering, C.A., Hudson, J.L. & Rapee, R.M. (2000). Issues in the diagnosis and assessment of anxiety disorders in children and adolescents. *Clinical Psychology Review, 20*(4), 453-478.

Schoenherr, S.J., Brown, R.T., Baldwin, K., & Kaslow, N.J. (1992). Attributional styles and psychopathology in pediatric chronic-illness groups. *Journal of Clinical Child Psychology, 21*(4) 380-387.

Schwartz, J.A., Kaslow, N.J., Seeley, J., & Lewinsohn, P. (2000). Psychological, cognitive, and interpersonal correlates of attributional change in adolescents. *Journal of Clinical Child Psychology, 29*(2), 188-198.

Sedek, G., & Kofta, M. (1990). When cognitive exertion does not yield cognitive gain: Toward an informational explanation of learned helplessness. *Journal of Personality and Social Psychology, 58*(4), 729-743.

Sedek, G., Kofta, M., & Tyszaka (1993). Effects of uncontrollability on subsequent decision making: Testing the cognitive exhaustion hypothesis. *Journal of Personality and Social Psychology, 65*(6), 1270-1281.

Seligman, M.E.P., Abramson, L.Y., Semmel, A., & Baeyer, C.V. (1979). Depressive attributional style. *Journal of Abnormal Psychology, 88*(3) 242-247.

Seligman, M.E., Kaslow, N.J., Alloy, L.B., Peterson, C., Tanenbaum, R.L. & Abramson, L.Y. (1984). Attributional style and depressive symptoms among children. *Journal of Abnormal Psychology, 93*(2) 235-238.

Siegel, J.L, & Smith, K.E. (1989). Children's strategies for coping with pain. *Pediatrician, 16,* 110-118.

Silverman, E. (1993). Pediatric lupus. *Lupus Canada Bulletin, 3*(1), 1-4.

Smith, T.W., Christensen, A.J., Peck, J.R., & Ward, J.R. (1994). Cognitive distortion, helplessness, and depressed mood in rheumatoid arthritis: A four-year longitudinal analysis. *Health Psychology, 13*(3), 213-217.

Smith, T.W., Peck, J.R., Milano, R.A., & Ward, J.R. (1988). Cognitive distortion in rheumatoid arthritis: Relation to depression and disability. *Journal of Consulting and Clinical Psychology, 56*(3), 412-416.

Sobel, M.E. (1982). Asymptotic confidence intervals for indirect effects in structural equations models. In S. Leinhard (Ed.), *Sociological methodology* (pp. 290-312). San Francisco: Jossey-Bass.

Spence, S.H., Sheffield, J., Donovan, C. (2002). Problem-solving orientation and attributional style: Moderators of the impact of negative life events on the development of depressive symptoms in adolescence? *Journal of Clinical Child Psychology, 31*(2), 219-229.

Stevens, J.P. (2002). Repeated measures anaylsis. In J.P. Stevens (Ed.), *Applied multivariate statistics for the social sciences* (pp. 493-555). Mahwah, NJ: Lawrence Erlbaum.

Sturge, C., Garralda, M.E., Boissin, M., Dore, C.J., & Woo, P. (1997). School attendance and juvenile chronic arthritis. *British Journal of Rheumatology, 36*, 1218-1223.

Sweeney, P., Anderson, K., & Bailey, S. (1986). Attributional style in depression: A meta-analytic review. *Journal of Personality and Social Psychology, 50,* 974-991.

Thompson, M., Kaslow, N.J., Weiss, B., & Nolen-Hoeksema, N. (1998). Children's attributional style questionnaire-revised: Psychometric examination. *Psychological Assessment, 10*(2), 166-170.

Thompson, R.J., Gustafson, K.E., George, L.K., & Spock, A. (1994b). Change over a 12-month period in the psychological adjustment of children and adolescents with cystic fibrosis. *Journal of Pediatric Psychology Special Issue: Chronic illness, 19*(2), 189-203.

Thompson, R.J., Gustafson, K.E., Hamlett, K.W., & Spock A. (1992a). Psychological adjustment of children with cystic fibrosis: The role of child cognitive processes and maternal adjustment. *Journal of Pediatric Psychology, 17*(6), 741-755.

Thompson, R.J., Gustafson, K.E., Hamlett, K.W., & Spock A. (1992b). Stress, coping, and family functioning in the psychological adjustment of mothers of children and adolescents with cystic fibrosis. *Journal of Pediatric Psychology, 17*(5), 573-585.

Timko, C., Stovel, K.W., Baumgartner, M., & Moos, R.H. (1995). Acute and chronic stressors, social resources, and functioning among adolescents with juvenile rheumatic disease. *Journal of Research on Adolescence, 5*(3), 361-385.

Timko, C., Stovel, K.W., Moos, R.H., & Miller, J.J. (1992a). A longitudinal study of risk and resistance factors among children with juvenile rheumatic disease. *Journal of Clinical Child Psychology, 21*(2), 132-142.

Timko, C., Stovel., K.W., Moos, R.H., & Miller, J.J. (1992b). Adaptation to juvenile rheumatic disease: A controlled evaluation of functional disability with a one-year follow-up. *Health Psychology, 11*(1), 67-76.

Vandvik, I.H., (1990). Mental health and psychosocial functioning in children with recent onset of rheumatic disease. *Journal of Child Psychology and Psychiatry 31*(6), 961-971.

Varni, J.W., Wilcox, K.T., Hanson, V. & Brik, R. (1988). Chronic musculoskeletal pain and functional status in juvenile rheumatoid arthritis: An empirical model. *Pain, 32*(1), 1-7.

von Hecker, U. & Sedek, G. (1999). Uncontrollability, depression, and the construction of mental models. *Journal of Personality and Social Psychology, 77*(4), 833-850.

von Weiss, R.T., Rapoff, M.A., Varni, J.W., Lindsley, C.B., Olson, N.Y., Madson, K.L, et al. (2002). Daily hassles and social support as predictors of adjustment in children with pediatric rheumatic disease. *Journal of Pediatric Psychology, 27*(2), 155-165.

Wagner, J.L., Chaney, J.M., Hommel, K.A., Page, M.C., Mullins, L.L, White, M.M., et al., (2003). The influence of parental distress on child depressive symptoms in juvenile rheumatic diseases: The moderating effect of illness intrusiveness. *Journal of Pediatric Psychology, 28*(7), 453-462.

White, M.M. (2002). *Transactional patterns of parent and child adjustment in juvenile rheumatic diseases: The role of illness uncertainty*. Unpublished master's thesis, Oklahoma State University, Stillwater.

Wichstrom, L. (1999). The emergence of gender differences in depressed mood during adolescence: The role of intensified gender socialization. *Developmental Psychology, 35,* 232-245.

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition.* Stanford, CA: Stanford University Press.

Wolpe, J. (1995). Reciprocal inhibition: Major agent of behavior change. In W. O'Donohue & L. Krasner (Eds.), *Theories of behavior therapy* (pp. 23-57). Washington, DC: American Psychological Association.

APPENDIXES

APPENDIX A

TABLES

Table 1

Descriptive Statistics for Demographic, Psychosocial, and Disease-Related Variables

Variable	M	SD	Range
Age	13.62	2.92	9 - 17
Disease Years	2.65	3.32	.04 – 15.73
Functional Disability	1.48	.61	1 – 3
Parental Distress (BSI)	.58	.58	0 – 3.13
Illness Uncertainty (CUIS)	67.02	18.50	32 – 107
Internal Negative Attributions (CASQ)	.94	1.04	0 – 4
Stable Negative Attributions (CASQ)	.80	.90	0 – 4
Global Negative Attributions (CASQ)	.74	.85	0 – 4
Depression (CDI)	8.74	8.67	0 – 44

Note. BSI = Brief Symptom Inventory; CUIS = Children's Uncertainty in Illness Scale; CASQ = Children's Attributional Style Questionnaire-Revised; CDI = Child Depression Inventory.

Table 2

Zero-order Correlations for Study Variables

	1	2	3	4	5	6	7	8
1. Age								
2. Functional Class	-.26							
3. Disease Subtype	.24	-.07						
4. BSI	.27	-.10	.23					
5. CUIS	-.06	-.08	.13	-.09				
6. INTNEG	.14	.08	.05	.13	-.02			
7. STBNEG	.09	-.007	.15	.11	.15	.21		
8. GLONEG	.40**	-.15	.07	.44**	-.25	.42**	.41**	
9. CDI	.31*	-.21	.37**	.41**	.03	.39**	.51**	.69**

Note. BSI = Brief Symptom Inventory; CUIS = Children's Uncertainty in Illness Scale; INTNEG = Internal attributions for negative events on the CASQ; STBNEG = Stable attributions for negative events; GLONEG = Global attributions for negative events; CDI = Child Depression Inventory.

* $p < .05$

** $p < .01$

Table 3

Hierarchical Multiple Regression Analyses: Children (Age 9-17)

Step	Variables	*t* for within step predictors	R^2 Change for Step	F Change
	EQUATION 1			
1	Age	1.02	.29	4.50**
	Functional Class	-.97		
	Disease Subtype	1.95		
	BSI	2.25*		
2	CUIS	-.26	.001	.07
	EQUATION 2			
2	INTNEG	2.83**	.11	8.03**
	EQUATION 3			
2	STBNEG	3.95**	.19	15.63**
	EQUATION 4			
2	GLONEG	5.72**	.31	33.20**
	EQUATION 5			
2	CUIS	-.30	.11	3.98*
	INTNEG	2.81**		
3	CUISXINTNEG	-.25	.001	.06
	EQUATION 6			
2	CUIS	-.89	.20	8.17**
	STBNEG	4.03**		
3	CUISXSTBNEG	-.13	.00	.02
	EQUATION 7			
2	CUIS	1.02	.32	17.14**
	GLONEG	5.85**		
3	CUISXGLONEG	3.09**	.07	9.52**

Note. BSI = Brief Symptom Inventory; CUIS = Children's Uncertainty in Illness Scale. INTNEG = Internal attributions for negative events on the CASQ; STBNEG = Stable attributions for negative events; GLONEG = Global attributions for negative events.
* $p < .05$
** $p < .01$

Table 4

Post-hoc Hierarchical Multiple Regression Analyses: Children (Age 9-17)

Step	Variables	*t* for within step predictors	R^2 Change for Step	F Change
	EQUATION 1			
1	Age	1.02	.29	4.49**
	Functional Class	-.97		
	Disease Subtype	1.95		
	BSI	2.25*	.39	16.87**
2	$GLONEG_{Centered}$	6.41**		
	HICUIS	1.48		
	HICUIS X GLONEG	3.09**		
	EQUATION 2			
2	$GLONEG_{Centered}$	5.14**	.39	16.87**
	LOCUIS	1.48		
	LOCUIS X GLONEG	3.09**		

Note. BSI = Brief Symptom Inventory; GLONEG = Global Attributions for Negative Events; CUIS = Children's Uncertainty in Illness Scale.

* $p < .05$

** $p < .01$

Table 5

Mean Differences for Demographic, Psychosocial, and Disease-Related Variables

Age Group	(9-12)	(13-17)
Variable	M(SD)	M(SD)
Age	10.89(1.08)**	15.16(1.35)**
Disease Years	2.79(2.50)	2.57(3.73)
Functional Disability	1.61(.78)	1.41(.50)
BSI	.42(.36)	.67(.67)
CUIS	67.11(18.18)	66.97(18.97)
Internal Negative	.72(.83)	1.06(1.13)
Stable Negative	.72(.75)	.84(.98)
Global Negative	.44(.62)*	.91(.93)*
Depression (CDI)	6.00(4.85)*	10.28(9.96)*

Note. BSI = Brief Symptom Inventory; CUIS = Children's Uncertainty in Illness Scale; CDI = Child Depression Inventory.

* $p < .05$

** $p < .01$

Table 6

Hierarchical Multiple Regression Analyses: Children (Age 13-17)

Step	Variables	*t* for within step predictors	R^2 Change for Step	F Change
	EQUATION 1			
1	Age	.15	.26	2.40
	Functional Class	-.90		
	Disease Subtype	1.68		
	BSI	1.71		
2	CUIS	.23	.05	.002
	EQUATION 2			
2	INTNEG	2.25*	.12	5.06*
	EQUATION 3			
2	STBNEG	3.55 **	.24	12.57**
	EQUATION 4			
2	GLONEG	5.07**	.37	27.74**
	EQUATION 5			
2	CUIS	-.04	.12	2.43
	INTNEG	2.19*		
3	CUISXINTNEG	-.63	.01	.39
	EQUATION 6			
3	CUIS	-.27	.24	6.10**
	STBNEG	3.48**		
3	CUISXSTBNEG	-.23	.001	.05
	EQUATION 7			
2	CUIS	1.72	.41	15.30**
	GLONEG	5.52**		
3	CUISXGLONEG	3.12**	.10	9.74**

Note. BSI = Brief Symptom Inventory; CUIS = Children's Uncertainty in Illness Scale. INTNEG = Internal attributions for negative events on the CASQ; STBNEG = Stable attributions for negative events; GLONEG = Global attributions for negative events.
* $p < .05$
** $p < .01$

Table 7

Hierarchical Multiple Regression Analyses: Children (Age 9-12)

Step	Variables	*t* for within step predictors	R^2 Change for Step	F Change
	EQUATION 1			
1	Age	1.65	.30	1.38
	Functional Class	-.87		
	Disease Subtype	.49		
	BSI	.91		
2	CUIS	-1.09	.06	1.19
	EQUATION 2			
2	INTNEG	1.51	.11	2.29
	EQUATION 3			
2	STBNEG	1.13	.07	1.28
	EQUATION 4			
2	GLONEG	2.51*	.24	6.29*
	EQUATION 5			
2	CUIS	-.64	.13	1.29
	INTNEG	1.16		
3	CUISXINTNEG	.05	.00	.003
	EQUATION 6			
4	CUIS	-1.30	.15	1.51
	STBNEG	1.33		
3	CUISXSTBNEG	-1.14	.06	1.29
	EQUATION 7			
2	CUIS	-.73	.30	3.29
	GLONEG	2.23*		
3	CUISXGLONEG	1.60	.09	2.58

Note. BSI = Brief Symptom Inventory; CUIS = Children's Uncertainty in Illness Scale. INTNEG = Internal attributions for negative events on the CASQ; STBNEG = Stable attributions for negative events; GLONEG = Global attributions for negative events.
* $p < .05$
** $p < .01$

Table 8

Post-hoc Hierarchical Multiple Regression Analyses: Children (Age 13-17)

Step	Variables	*t* for within step predictors	R^2 Change for Step	F Change
	EQUATION 1			
1	Age	.15	.26	2.40
	Functional Class	-.90		
	Disease Subtype	1.68		
	BSI	1.71	.50	17.01**
2	$GLONEG_{Centered}$	6.34**		
	HICUIS	2.32*		
	HICUIS X GLONEG	3.12**		
	EQUATION 2			
2	$GLONEG_{Centered}$	5.51**	.50	17.01**
	LOCUIS	2.32*		
	LOCUIS X GLONEG	3.12**		

Note. BSI = Brief Symptom Inventory; GLONEG = Global Attributions for Negative Events; CUIS = Children's Uncertainty in Illness Scale.

* $p < .05$

** $p < .01$

APPENDIX B

FIGURES

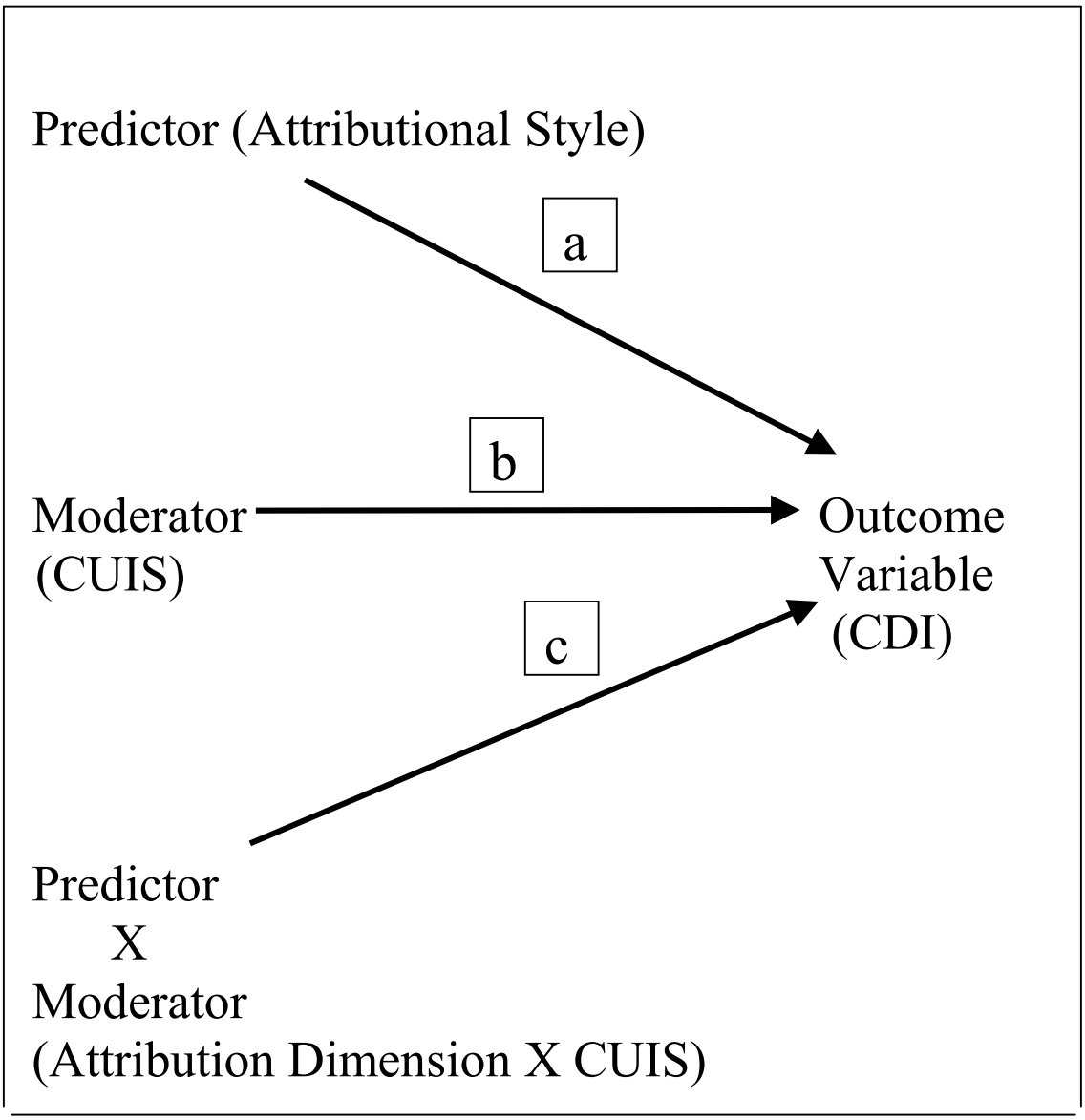

Figure 1. Moderator Model

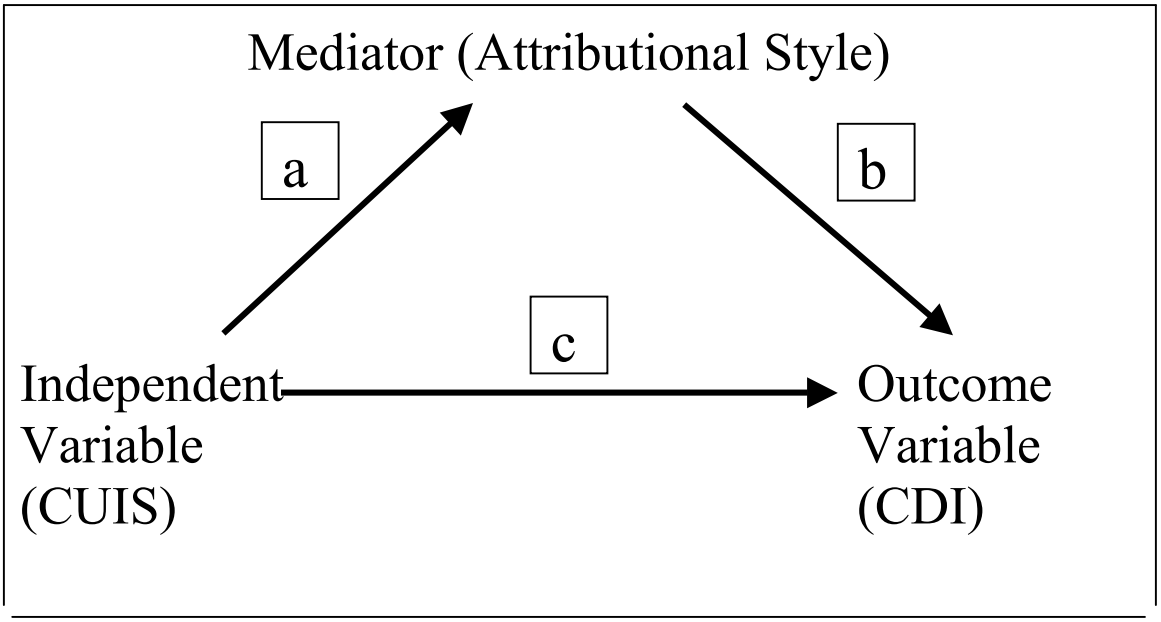

Figure 2. Mediational Model

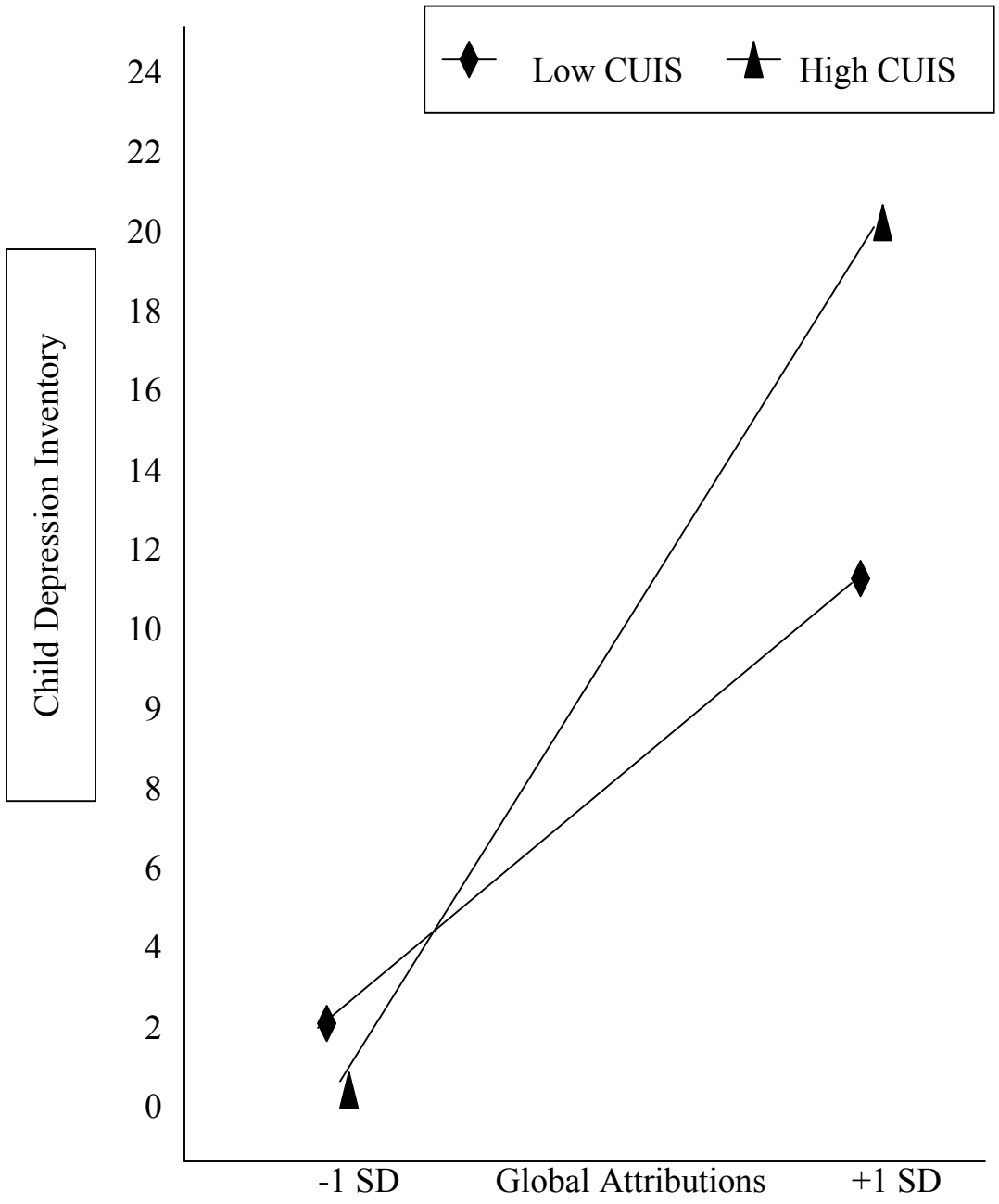

Figure 3. GLONEGXCUIS Interaction (Full Sample, Age 9-17)

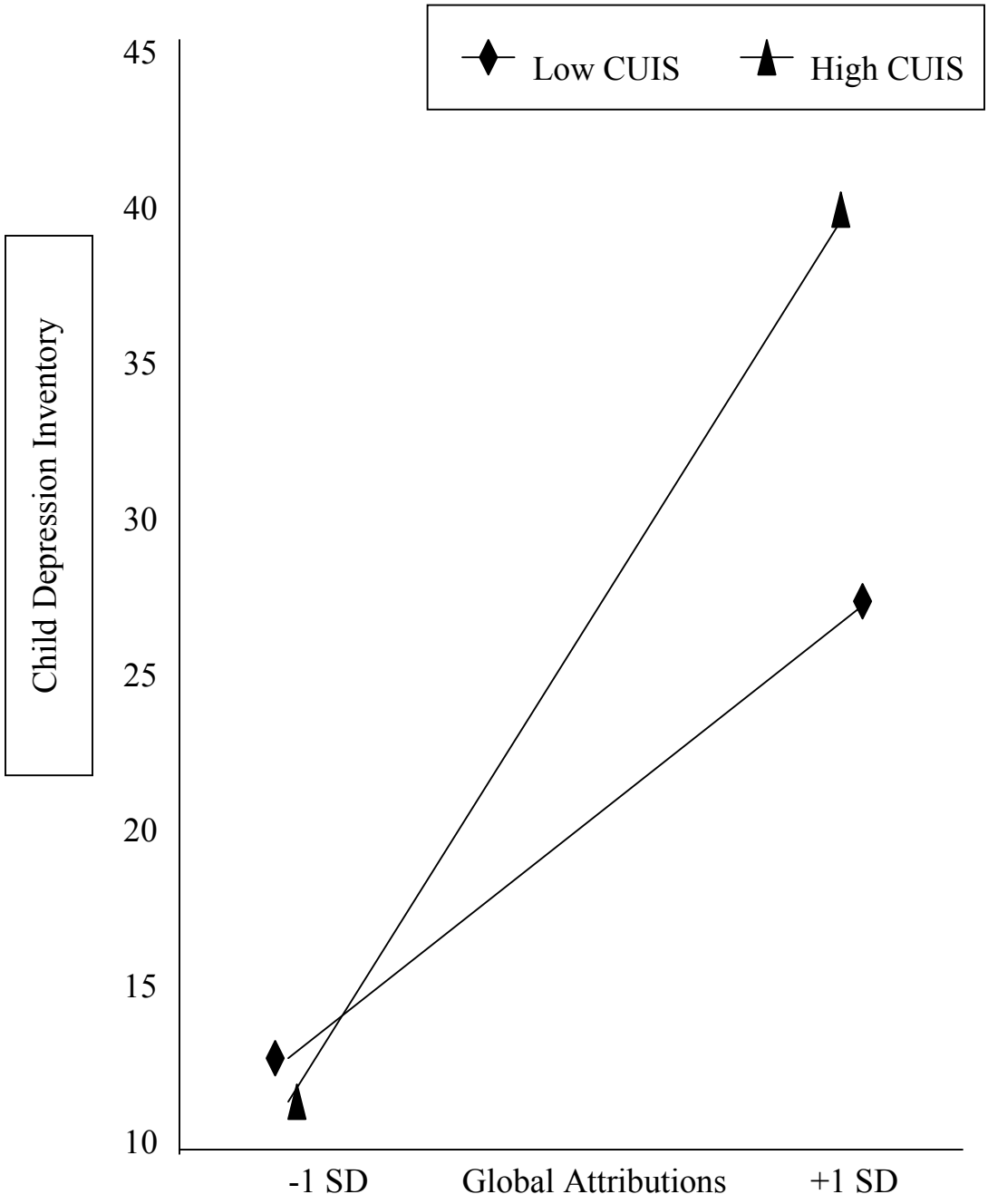

Figure 4. GLONEGXCUIS Interaction (Adolescent Sample, Age 13-17)

APPENDIX C

INSTITUTIONAL REVIEW BOARD FORM

Oklahoma State University
Institutional Review Board

Protocol Expires: 1/21/03

Date: Tuesday, January 22, 2002 IRB Application No AS00104

Proposal Title: PSYCHOLOGICAL COMORBIDITY IN JUVENILE RHEUMATOID ARTHRITIS: A COMPARISON OF AMERICAN INDIANS AND CAUCASIANS

Principal Investigator(s):

Janelle Wagner
407 N. Murray
Stillwater, OK 74078

James Jarvis
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Molly White
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Stillwater, OK 74078

John Chaney
407 N Murray
Stillwater, OK 74078

Reviewed and Expedited (Spec Pop) **Continuation**

Approval Status Recommended by Reviewer(s): Approved

Signature: Carol Olson

Carol Olson, Director of University Research Complian

Tuesday, January 22, 2002
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modifications to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

APPENDIX D

CONSENT FORM

I, _____ (name of participant's parent/legal guardian), voluntarily consent to allow my child to participate in the investigation of psychological factors and juvenile rheumatic diseases (JRD).

PURPOSE OF STUDY: The purpose of the study is to examine psychological factors associated with JRD disease processes.

DESCRIPTION OF RESEARCH PROCEDURES: The research requires the completion of several paper-and-pencil measures in the Pediatric Rheumatology Clinic at the Children's Hospital of Oklahoma that address psychological factors and perceptions of life events, both in general and with respect to JRA. Some items on the questionnaires contain sensitive issues (e.g., depression, relationships, etc.).

COST: There are no costs to your child for participating in this study.

POSSIBLE RISKS: There is virtually no risk associated with completing questionnaires. It is possible that your child may experience some negative emotions during the completion of the questionnaires, but these will be short-lived and have no long-term effects.

RIGHT TO REFUSE OR WITHDRAWAL: My child's participation is voluntary; there is no penalty for refusal to participate, and my child is free to withdraw his/her consent and participation in this project at any time without penalty, after notifying the project director.

BENEFITS: Although my child's participation may not necessarily be personally beneficial to my child, the information derived from this project may have important implications for others who have JRD. The information gained may contribute to a better understanding of the cognitive/emotional functioning and overall treatment of individuals with JRD.

COMPENSATION AND INJURY: I understand that my child and I will receive $10.00 compensation in the form of gift certificates for approximately one hour of participation, and there is no risk of injury as a result of this study.

SUBJECT ASSURANCES: Any data collected as part of my child's participation in this experiment will be treated as confidential and will received a code number so that they will remain confidential. In no case will any use be made of these data other than as research results. If data from my child's participation is ever displayed, my child's identity will remain confidential.

I may contact Dr. John M. Chaney, Oklahoma State University, Psychology Department, 215 North Murray Hall, Stillwater, Oklahoma 74078, at (405) 744-5703 should I wish further information about the research. I may also contact the Institutional Review Board (IRB) executive assistant, Sharon Bacher, Oklahoma State University, 203 Whitehurst, Stillwater, Oklahoma 74078, (405) 744-5700. Should any problems arise during the course of the study I may take them to Dr. Maureen Sullivan, Psychological Department Head, Oklahoma State University, Department of Psychology, 215 North Murray Hall, Stillwater, Oklahoma, 74078, at (405) 744-6027.

I have read and fully understand the consent form, and the option to receive a copy of this consent form has been give to me. I sign it freely and voluntarily.

Date: _____ Time: _____ (A.M./P.M.)

Signed:_____
(Signature of participant's parent/legal guardian)

Witness(es) if required: _____

I certify that I have personally explained all elements of this form to the subject before requesting the subject to sign it.

Signed_____
(Project director or his/her authorized representative)

APPENDIX E

ASSENT FORM

Assent Form

By signing this form, you are saying that you volunteer to participate in the following study on feelings and juvenile rheumatoid disease (JRD). For this study you will complete several questionnaires. No harm will come to you as a result of participating in this study, however, you are free to stop at any time during your participation in the study. Although the information that you provide will not benefit you directly, other individuals with JRD and related medical conditions will likely benefit through better overall treatment of their disease. Your name will not be used after you complete these questionnaires. This means that the information you provide will not be made public in any way, and only you and the experimenter will know what answers you provide on the questionnaire.

Signed: _____
(Signature of participant)

Date: _____ Time: _____ (A.M./P.M.)

Witness(es) if required: _____

I certify that I have explained all elements of this form to the participant before requesting them to sign it.

Signed: _____

APPENDIX F

PROVIDER QUESTIONNAIRE

Provider Questionnaire

1. Patient's Name_____

2. Patient's Diagnosis (if multiple diagnoses, please list rheumatic illness first; please indicate if patient is seropositive or ANA-positive):

   _____

   _____

   _____

3. When was the patient diagnosed with the above rheumatic illness?

   Date of diagnosis: _____

4. What is the patient's current medication regimen?

   _____ _____
   _____ _____
   _____ _____
   _____ _____

5. Currently, how active is the patient's illness?

1	2	3	4	5	6	7
Not Active or In Remission		Mild		Moderate		Severe

6. Compared to other patients, how well does this patient ahdear to his/her treatment?

1	2	3	4	5	6	7
Adheres Very Poorly		Worse than Most Patients		Better than Most Patients		Adheres Extremely Well

7. Compared to the other patients, how well does this patient cope with his her illness?

1	2	3	4	5	6	7
Copes Very Poorly		Worse than Most Patients		Better than Most Patients		Copes Extremely Well

Based on the patient's physical exam, please classify him/her into one of the following four classes

Class I	Class II	Class III	Class IV
Completely able to perform usual activities of daily living, (self care, vocational, & avocational)	Able to perform usual self-care and vocational activities, but limited in avocational	Able to perform usual self-care activities, but limited in avocational activities	Limited ability to perform usual self-care, vocational and avocational activities

APPENDIX G

BACKGROUND INFORMATION QUESTIONNAIRE

1. Age: _____

2. Gender: M F
   1 2

3. Ethnicity:
   1 Caucasian
   2 African American
   3 Native American
   4 Hispanic
   5 Asian
   6 Biracial; Specify: _____
   7 Other; Specify: _____

4. Highest level of educational attained:
   1 Elementary School
   2 Middle School
   3 High School
   4 Some College; Specify number of year:_____

5. Marital Status:
   1 Never married
   2 Married
   3 Divorced
   4 Cohabitation (living with partner)
   5 Widowed
   6 Other: _____

6. Parent's Occupation: Father:_____ Mother:_____

7. Parent's Highest level of education:

   Father
   1 Middle School
   2 High School
   3 Some College; Specify number of years: _____
   4 College Degree
   5 Post-Graduate Degree

   Mother
   1 Middle School
   2 High School
   3 Some College; Specify number of years:_____
   4 College Degree
   5 Post-Graduate Degree

8. Living Arrangement:
   1 Live alone
   2 Live with both parents
   3 Live with one parent; Specify with parent: _____
   4 Other; Specify: _____

9. Are you currently taking any psychoactive medication (e.g., antidepressants, anti-anxiety)?
   Yes No
   1 2

10. Have you received any type of psychological counseling/therapy? Yes No
    1 2

11. Have you ever received counseling directly related to your JRD? Yes No
    1 2

12. Please indicate the number of visits to your physician due to your JRD in the past 6 months:
    _____

13. How severe do you think your JRD has been in the past year?

1	2	3	4	5	6	7
Not Active or In Remission		Mild		Moderate		Severe

14. How much control do you think you have over the daily symptoms of your JRD?

1	2	3	4	5	6	7
No Control		A Little Control		A Great Deal Of Control		Complete Control

15. How much control do you think your physician has over the daily symptoms of your JRD?

1	2	3	4	5	6	7
No Control		A Little Control		A Great Deal Of Control		Complete Control

16. How much control do you think you have over the long-term course of your JRD?

1	2	3	4	5	6	7
No Control		A Little Control		A Great Deal Of Control		Complete Control

17. How much control do you think your physician has over the long-term course of your JRD?

1	2	3	4	5	6	7
No Control		A Little Control		A Great Deal Of Control		Complete Control

18. How important to you is the ability to perform, by yourself, activities of daily living such as dressing yourself?

1	2	3	4	5	6	7
Not at all Important		A Little Important		Somewhat Important		Very Important

19. Currently, how active are the symptoms of your JRD?

1	2	3	4	5	6	7
Not Active or In Remission		Mild		Moderate		Severe

20. Please indicate the number of school and/or work days you have missed in the past 6 months:
    _____

VITA

Molly Marie White

Candidate for the Degree of

Doctor of Philosophy

Thesis: ILLNESS UNCERTAINTY AND ATTRIBUTIONAL STYLE IN CHILDREN WITH JUVENILE RHEUMATIC DISEASES: AN EXAMINATION OF A COGNITIVE DIATHESIS-STRESS MODEL

Major Field: Psychology

Biographical:

Education: Graduated from Emporia High School, Emporia, Kansas in May 1996; received Bachelor of Science degree in Psychology from Kansas State University, Manhattan, Kansas in May 2000; received Master of Science degree in Psychology from Oklahoma State University, Stillwater, Oklahoma in August 2002. Completed the requirements for the Doctor of Philosophy degree with a major in Psychology at Oklahoma State University, Stillwater, Oklahoma in December 2005.

Experience: Research assistant, Department of Psychology, Perception Lab, Kansas State University, Manhattan, KS, Supervisor: John Uhlarik, Ph.D.; Research assistant, Department of Psychology, Child Research Lab, Kansas State University, Manhattan, KS, Supervisor: Mark Barnett, Ph.D.; Research Assistant, Department of Psychology, Health Psychology Lab, Oklahoma State University, Stillwater, OK, Supervisor: John M. Chaney, Ph.D.

Professional Memberships: Brain Injury Association of Oklahoma, American Psychological Association (APA), APA Division 54: Society of Pediatric Psychology, APA Division 22: Rehabilitation Psychology, APA Division 38: Health Psychology, American Psychological Association of Graduate Students, Mortar Board National Senior Honor Society, Psi Chi National Honor Society.

Name: Molly Marie White Date of Degree: December, 2005

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: ILLNESS UNCERTAINTY AND ATTRIBUTIONAL STYLE IN CHILDREN WITH JUVENILE RHEUMATIC DISEASES: AN EXAMINATION OF A COGNITIVE DIATHESIS-STRESS MODEL

Pages in Study: 113 Candidate for the Degree of Doctor of Philosophy

Major Field: Psychology

Scope and Method of Study: The present study attempted to examine the influences of children's causal attributions for disease unrelated events on depression under varying levels of perceived illness uncertainty in a sample of children with juvenile rheumatic disease (JRD). Participants were 50 (31 females; 19 males) children and adolescents between the ages of nine and 17 (M = 13.62; SD = 2.42) and their parents. Participants were recruited through the Pediatric Rheumatology Clinic at the Children's Hospital of Oklahoma in Oklahoma City, Oklahoma. The physician completed a Provider Questionnaire, which was designed to obtain patient information regarding diagnoses, date of diagnoses, and current disease activity. Parents completed the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) while either in the clinic or through packets mailed to the participant's home. Children completed a background information questionnaire, the Children's Depression Inventory (CDI; Kovacs, 1983; 1992), the Children Uncertainty in Illness Scale (CUIS; Mullins & Hartman, 1995), and the Children's Attributional Style Questionnaire-Revised (CASQ-R; Kaslow & Nolen-Hoeksema, 1991).

Findings and Conclusions: Results of the present study revealed main effect relationships between the three primary attribution dimensions (global negative, stable negative, and internal negative) and depression. Further, although no main effect of illness uncertainty on CDI depression was observed, results supported illness uncertainty as a moderator in the global negative attribution-depression relationship. These findings suggest the need to focus on examining cognitive variables in the adjustment process. Specifically, interventions should focus on minimizing pervasive negative attributions by increasing positive experiences in disease unrelated areas of their lives. Because illness uncertainty also appears to be a critical factor in determining psychological outcome in children and adolescents with JRD, results suggest that clinical interventions should focus on providing the family with sufficient information about the disease course, which may result in more realistic disease expectations and decreased child depression.

ADVISER'S APPROVAL: John M. Chaney, Ph.D.