Adjustment to Chronic Arthritis of Childhood: The Roles of Illness-Related Stress and Attitude Toward Illness

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Objective To examine the relationship of psychosocial stress and attitude toward illness to psychological adjustment among youth with chronic arthritis.

Methods Seventy-five youths with chronic arthritis aged 8–18 years were administered a semi-structured interview assessing illness-related and nonillness-related stressors in important life domains. Children also completed measures of attitude toward illness, depressive symptoms, and anxiety. Parents completed a measure of child psychosocial adjustment.

Results Higher levels of illness-related and nonillness-related stress were associated with higher levels of anxiety and depressive symptoms and parent-reported adjustment problems, while a more positive attitude toward illness was associated with lower levels of anxiety and depressive symptoms. Attitude toward illness moderated the relationship between stress and depressive symptoms.

Conclusions Results suggest the importance of assessing life stress and attitude toward illness among youth with arthritis and developing interventions to help children cope with arthritis-related stressors and promote a more positive attitude toward illness.

Key words chronic arthritis; juvenile rheumatoid arthritis; pediatric chronic illness; psychological adjustment; stress; attitudes toward illness.

Chronic arthritis of childhood is a heterogeneous group of diseases characterized by joint inflammation and stiffness with onset at or before sixteen years of age. Disease types include juvenile rheumatoid arthritis (JRA), spondyloarthropathies (characterized by inflammation of the axial skeleton or entheses, sites where ligaments and tendons attach to bone), and other forms of chronic arthritis, such as psoriatic arthritis (arthritis associated with psoriasis or family history of psoriasis) and arthritis associated with inflammatory bowel disease. The disease course for youth with chronic arthritis is variable, with periodic remissions and exacerbations and no known cure. Youth with arthritis may experience acute and chronic pain, decreased mobility, fatigue, growth retardation, and functional disabilities. Treatment objectives include controlling pain, improving range of motion and muscle strength, and facilitating normal growth and development (Cassidy & Petty, 2001).

Long-term prognosis varies by disease type. For youth with polyarticular JRA (arthritis in five or more joints) and systemic JRA (arthritis associated with fever and involvement of other body systems), symptoms may be persistent and associated with moderate to severe disability. For children with pauciarticular JRA (arthritis in four or fewer joints), there is less risk for long-term joint damage, although youth with pauciarticular JRA are at increased risk for vision problems caused by inflammatory eye disease. The prognosis for children with spondyloarthropathy is variable. Many children with psoriatic arthritis progress from a pauciarticular to polyarticular course, while outcome of gastrointestinal disease is the most important determinant of prognosis in the case of...
problems may not be as simple as focusing on those with the disease parameters, functional impairment, and psychological stress. Protective factors proposed to influence the risk–adjustment relationship include intrapersonal factors, social–ecological factors, and stress-processing factors (Wallander & Varni, 1992).

Disease characteristics (e.g., severity, functional status, and pain) have not demonstrated a consistent relationship with psychological adjustment among youth with arthritis (Frank et al., 1998; Harris, Newcomb, & Gewanter, 1991; Timko, Stovel, Moos, & Miller, 1992), indicating that identifying youth at greatest risk for problems may not be as simple as focusing on those with the most severe disease. Rather, it may be more meaningful to examine the ways in which aspects of the illness experience impact important life domains.

Children with chronic illness not only face many of the same psychosocial stressors as do their peers, but also confront illness-specific challenges, as well as the impact of the illness on functioning in important life domains (Wallander & Varni, 1992). Several studies have found a direct relationship between stress (negative life events, daily hassles, and interpersonal stressors) and adjustment problems (depressed mood and behavior problems) among youth with arthritis (Timko, Stovel, Baumgartner, & Moos, 1995; Vandvik & Eckblad, 1991; von Weiss et al., 2002). However, the measures used in these studies were not designed to assess stressors specific to the lives of children with arthritis. Attention to arthritis-related stress may be critical in understanding the illness–adjustment relationship and designing effective interventions.

Even children facing similar illness-related stressors, however, may display differences in psychological adjustment based on stress-processing factors such as attitude toward illness, or how they interpret the impact of arthritis on their life. For example, children who view their illness negatively (e.g., believe the illness makes them different from others or keeps them from achieving goals) may be more likely to withdraw or feel badly about themselves (Austin & Huberty, 1993; Ennett et al., 1991). Children who adopt a more positive perspective, on the other hand (e.g., focus on positive aspects of the illness experience, emphasize what they can do rather than what they cannot do), may display more resilience (Austin & Huberty, 1993; Patterson & McCubbin, 1983). Negative attitude toward illness has been associated with internalizing and externalizing problems among youth with asthma and epilepsy (Austin & Huberty, 1993; Heimlich, Westbrook, Austin, Cramer, & Devinsky, 2000). Similarly, in a chronic arthritis population (Ennett et al., 1991), higher ratings of the extent to which children felt arthritis had a negative day-to-day impact and made them feel different from peers were associated with lower perceived social acceptance.

Although such studies support a relationship between attitude toward illness and child adjustment, they do not address the question of whether attitude toward illness plays a role in moderating the impact of illness-related stress on adjustment. For example, a negative attitude toward illness may strengthen the relationship between stress and adjustment problems, where as a more positive attitude may serve a protective role, buffering the impact of arthritis-related stress. Understanding the relationship between stress, adjustment, and attitude toward illness may suggest directions for interventions aimed at coping with arthritis-related stress.

The primary goal of this study was to identify factors associated with resilience or poor adjustment to chronic arthritis of childhood, with a specific focus on the roles of children’s experience of arthritis-related stress and their attitudes toward arthritis. The following hypotheses were tested: (1) higher levels of both arthritis-related stress and overall psychosocial stress will be related to higher levels of adjustment problems; (2) a more positive attitude toward arthritis will be related to lower levels of adjustment problems; and (3) the relationship between stress and adjustment will be moderated by attitude toward illness.

Method
Participants

Participants included youth with childhood arthritis (as defined by the International League Against Rheumatism; Petty et al., 1998) and their parents who were followed at Children’s Memorial Hospital, Chicago, Illinois. Of 89
families approached, 78 (87.6%) agreed to participate. Two children were subsequently excluded due to Peabody Picture Vocabulary Test, Third edition (PPVT-III) scores below the 7-year level, and one child dropped out due to scheduling constraints. The final sample consisted of 75 youths, ranging in age from 8 to 18 years ($M = 14.0$, $SD = 2.65$). The majority (72%) of participants were female, consistent with the higher observed prevalence of arthritis among females (Cassidy & Petty, 2001). By parent report, the majority of youth were white (86.7%), 8.0% African-American, 2.7% Hispanic, 1.3% Asian, and 1.3% other. The majority of participants (70.6%) fell in the Hollingshead (1975) family socioeconomic status (SES) groups of major business owners or professionals and medium business owners or minor professionals. Of participating parents, 84% were mothers and 16% fathers.

Participant diagnoses included pauciarticular JRA (arthritis in ≤ 4 joints, 42.7%), polyarticular JRA (arthritis in ≥ 5 joints, 28.0%), systemic JRA (arthritis associated at onset with a daily fever for two weeks, 5.3%), spondylarthritis (18.7%), psoriatic arthritis (4.0%), and arthritis associated with inflammatory bowel disease (1.3%). Disease duration ranged from 3 months to 15.92 years, with a median duration of 2.91 years. Half of the sample (54.7%) displayed acute disease (swelling) on physical examination, 34.7% demonstrated loss of motion in affected joints, and 62.7% reported joint pain. The number of joints affected by arthritis ranged from zero to eight, with a mean joint count of 1.13 ($SD = 1.68$). Twenty-eight percent of the sample had a diagnosis of an additional chronic illness, with examples including asthma, diabetes, and hearing impairment. Eighty percent of participants were taking some medication for their arthritis, with the most common medications being nonsteroidal anti-inflammatory drugs (taken by 74.7% of participants), methotrexate (used by 20.0% of participants), and sulfasalazine (taken by 9.3% of participants).

**Measures**

**Medical Characteristics**

Disease characteristics were obtained by retrospective chart review by one of the authors, M.L.M., a pediatric rheumatologist. The following medical variables were used in analyses: presence of acute disease (dichotomous variable of no joints affected by arthritis vs. any joint affected, as indicated by physician ratings of any synovitis or enthesitis on physical examination), joint count (number of joints affected by arthritis, as an index of disease severity), disease duration, and diagnosis of another chronic illness in addition to chronic arthritis.

**Psychosocial Stress**

Children and adolescents were administered an adapted version of the UCLA Life Stress Interview for Children: Chronic Stress and Episodic Life Events (Hammen & Rudolph, 1999), a semi-structured interview that assesses chronic stress (ongoing stressful conditions with a duration of one month or longer) and episodic stress (stressors with an acute onset and offset). Interviews were conducted by the first author, an advanced graduate student in clinical psychology with significant experience in the administration of semi-structured interviews. Stressors were assessed in domains relevant to the lives of youth, including school stressors, peer relationships, and family relationships. The time period covered included the previous year and present conditions.

**Chronic Stress** Multiple probes on the Life Stress Interview assess chronic stress in each life domain (e.g., school stressors, peer relationships, and family relationships). For example, in the peer relationships domain, questions assess aspects of friendships and peer relationships such as number of close friends, trouble-making friends, being the victim of teasing, being excluded from activities at school, presence of friends who can be trusted with secrets or who can help out with problems, arguments or physical fights with friends and peers, and time spent with friends outside of school. On the basis of participants’ responses to questions within each domain, the interviewer makes an overall rating for each domain for the degree of stress experienced in the past year. Ratings are made on a 5-point scale and anchored by specific examples of stressful conditions. Higher ratings reflect higher levels of stressful conditions and lower levels of positive conditions. High reliability (intra-class correlation coefficients of .86 to .94) has been demonstrated for ratings of chronic stress (Hammen, Rudolph, Weisz, Rao, & Burge, 1999; Rudolph et al., 2000). For the present study, a total chronic stress score was created by summing the stress ratings for each of the three domains (school stressors, peer relationships, and family relationships), yielding a possible range of scores of three to fifteen. Internal consistency reliability was adequate ($\alpha = .65$).

**Episodic Stress** At the beginning of the interview, a general inquiry is made asking children to freely recall stressful events in the past year (i.e., ‘has anything happened that has upset you or caused you trouble, or have there been any big changes in your family or in your life?’). Specific inquiries are also made about particular life events within each domain. For example, within the family relationships domain, youth are asked about events such as family illnesses or deaths, parental fighting,
separation, or divorce, changes in the family living situation, specific conflicts with a family member, and changes in the family financial situation. Follow-up probes elicit details about the context of stressful events (timing and duration, availability of coping resources, and unexpectedness of the event). Event impact ratings for each life event are made by the interviewer on a 5-point scale (1–5, from no or minimal impact to severe impact with many consequences), based on the coping demands imposed by the stressor and guided by anchoring lists with examples of specific events within each rating category. High reliability has been achieved for event impact rating (intraclass correlation coefficients of .85; Hammen et al., 1999; Rudolph et al., 2000). For the present study, a total episodic stress score was created by summing all of the event impact ratings for each participant.

### Arthritis-Related Stress

For the purposes of this study, the interview was adapted to assess arthritis-related stress. Following existing probes for each life domain (school stressors, peer relationships, and family relationships), children were asked about ways that having arthritis may have made things more difficult for them or contributed to stressors already identified. In addition, specific probes were added based on the literature on illness-related concerns of youths with arthritis (Degotardi, Revenson, & Ilowite, 1999; Konkol et al., 1989; Taylor, Passo, & Champion, 1987). For example, in the academic stress domain, children were asked about issues such as difficulty in completing assignments and missing school because of arthritis, while in the peer domain they were asked about issues such as teasing related to arthritis and spending less time with friends due to arthritis. Because arthritis symptoms often interfere with participation in sports and other extracurricular activities, an additional life domain, extracurricular activities, was added to assess arthritis-related stress.

Because the arthritis-related stress measure was created for this study, rating guidelines for arthritis-related stress were developed for each domain based on examination of reported arthritis-related stressors in a subset (n = 20) of the interviews, using a similar format as used for rating chronic stress. The ranges of the rating scales developed for each domain were based on the variability of participants’ responses within each domain (5-point scale for school stressors and extracurricular activities, 4-point scale for peer relationships, and 3-point scale for family relationships). Behavioral indicators (i.e., examples of arthritis-related stressors) were also developed to anchor interviewer ratings on these scales. A total arthritis-related stress score was created by summing the stress ratings for each of the four domains (school stressors, peer relationships, family relationships, and extracurriculars), with possible scores ranging from four to seventeen. Internal consistency reliability was moderate (α = .75).

The first author coded all of the interviews. For purposes of reliability, a second rater (a research assistant in psychology trained in interview coding) coded 22 (29.3%) interviews. Intraclass correlation coefficients based on these 22 interviews demonstrated high inter-rater reliability for chronic stress (single measure r = .88), episodic stress (single measure r = .84), and arthritis-related stress (single measure r = .91).

Additionally, a brief set of questions was added to the end of the interview, regarding positive aspects of the arthritis experience. These questions were added to provide a positive conclusion to the interview and generate directions for future research, but responses were not rated. This section of the interview included an open-ended question about whether there have been any positive or good things that have come out of having arthritis, as well as specific questions, including: (1) Are there important things you’ve learned because of having arthritis? (2) Are there ways that having arthritis has helped you develop strengths/positive qualities? and (3) Are there good things that have happened in your relationships with friends or family because of having arthritis?

### Attitude Toward Illness

Children and adolescents completed the Child Attitude Toward Illness Scale (CATIS), a 13-item self-report measure designed to assess how favorably or unfavorably children feel about having a chronic illness (Austin & Huberty, 1993). Higher scores reflect more positive attitudes and lower scores more negative attitudes. The CATIS has been found to have good internal consistency (r = .77 to .89) and test-retest reliability (r = .77 to .80) in children and adolescents aged 8–17 years with epilepsy and asthma (Austin & Huberty, 1993; Heimlich et al., 2000). Child negative attitude toward illness has been positively associated with depression and behavior problems and negatively associated with self-esteem (Austin & Huberty, 1993; Heimlich et al., 2000).

### Depressive Symptoms

Children and adolescents completed the Beck Depression Inventory for Youth (BDI-Y), a 20-item self-report scale designed to identify symptoms of depression in youth, including negative thoughts, feelings of sadness, and physiological indications of depression (Beck, Beck, & Jolly, 2001). Children rate symptom frequency on a 0–3
scale (never, sometimes, often, or always). The total raw score (summation of scores for each item) can be transformed into a T score, based on child gender and age. The BDI-Y displays good internal consistency reliability (alpha coefficients from .87 to .92). It correlates highly with another widely used child self-report measure of depressive symptoms (Children's Depression Inventory, Kovacs, 1992) and demonstrates good test-criterion validity, with higher levels of distress found in special education and clinical samples than in control samples (Beck et al., 2001).

**Anxiety**

Children and adolescents completed the Revised Children's Manifest Anxiety Scale (RCMAS), a 37-item self-report measure designed to assess trait anxiety in youth (Reynolds & Richmond, 1985). Domains include physiological anxiety, worry/oversensitivity, social anxiety/concentration difficulties. The total anxiety score (a count of yes or true responses) can be transformed into a T score, based on child gender and age. Good internal consistency (r = .83 to .85) and test-retest reliability (r = .68) have been demonstrated for total anxiety scores, as well as good convergent and divergent validity (Reynolds & Richmond, 1985).

**Parent-Reported Psychosocial Adjustment**

Parents completed the Personal Adjustment and Roles Skills Scale (PARS III), a 28-item measure of the psychological adjustment of children and adolescents with chronic illness, which excludes potentially biasing items about physical symptoms (Stein & Jessop, 1990; Walker, Stein, Perrin, & Jessop, 1990). Domains include dependency, peer relations, anxiety, depression, productivity, withdrawal, and hostility. Symptoms are rated on a 4-point scale (never or rarely, sometimes, often, and always). The total score is a sum of item scores, with higher scores indicating better functioning. The PARS III shows good internal consistency reliability (r = .88) and convergent validity (correlations of .79 to .80 with other parent-report measures of child psychological adjustment) when used with children and adolescents aged 5–18 years with chronic illnesses (Walker et al., 1990).

**Procedure**

The research protocol was approved by the hospital Institutional Review Board. Eligible children and their parents were sent a letter introducing the study two weeks prior to the child's next scheduled clinic visit. During clinic visits, potential participants were approached by one of the investigators and informed of the purpose of and procedure for the study. Child-parent pairs who agreed to participate signed parental consent and child assent forms. Study assessments were conducted before or after the child’s clinic visit. For younger children (aged 8–10 years), self-report measures were administered by the interviewer, while older children (aged 11–18 years) completed measures independently with the interviewer present to answer questions. In the case of children who endorsed anxiety or depressive symptoms in the significantly elevated range on the BDI-Y and/or RCMAS (T score ≥ 70) or who endorsed suicidal ideation on the BDI-Y, parents were informed and referrals for mental health services were provided.

The Life Stress Interview was conducted with all youth. Thirty-eight (50.67%) participants who were unable to complete the full interview during their clinic visits completed some or all of the interview over the telephone.

**Results**

**Descriptive Analyses**

Table I provides a summary of participants’ responses to the Life Stress Interview, including the most commonly reported arthritis-related stressors in the domains of school stressors, peer relationships, family relationships, and extracurricular activities, as well as positive aspects of the illness experience.

The study self-report measures demonstrated good internal consistency reliability (CATIS, $\alpha = .87$; BDI-Y, $\alpha = .93$; RCMAS, $\alpha = .89$; PARS III, $\alpha = .91$). Internal consistency reliability for arthritis-related stress was moderate ($\alpha = .75$); however, internal consistency for chronic stress was weaker ($\alpha = .65$), falling below the acceptable level of $\alpha = .70$.

Mean T scores for youth with arthritis in this sample fell below the clinical range on the BDI-Y ($M = 45.99$, $SD = 10.23$) and the RCMAS ($M = 45.93$, $SD = 12.02$). On the BDI-Y, the majority (80%) of youth achieved scores in the average range ($T < 55$), 8.0% in the mildly elevated range ($T = 55–59$), 8.0% in the moderately elevated range ($T = 60–69$), and 4.0% in the severely elevated range ($T = 70+$; Beck et al., 2001). On the RCMAS, 86.7% of youths achieved scores in the average range ($T < 60$), 9.3% in the mildly elevated range ($T = 60–69$), and 4.0% in the significantly elevated range ($T = 70+$; Reynolds & Richmond, 1985). There were no significant associations between scores above the average range on the BDI-Y or RCMAS and use of arthritis medications with reported possible side effects of depressive or anxiety symptoms.
Descriptive statistics were calculated to screen variables for normality and assess for problems with multicollinearity. Because small numbers of children fell into each of the racial or ethnic groups other than white, this variable was dichotomized into white \((n = 65)\) versus minority \((n = 10)\). The distribution of the joint count variable was positively skewed, with 54.7% of participants reporting no joints currently affected, 10.7% one joint affected, 20.0% two joints affected, and 14.7% three to eight joints affected. Joint count was strongly correlated with the dichotomous acute disease variable (no joints affected by arthritis vs. any joint affected by arthritis, \(r = .62\)). Due to the restricted range of the joint count variable and high correlation with acute disease, joint count was not included in regression analyses.

Transformations were required to reduce negative skewness for PARS III scores [constant created to convert from negative to positive skewness (see Tabachnick & Fidell, 1996, pp. 82–84), followed by a square root transformation]. Transformations were also used to reduce positive skewness for BDI-Y scores (inverse), chronic stress scores (logarithm), episodic stress scores (square root), and arthritis-related stress scores (logarithm). None of the correlations among predictor variables approached or surpassed the level suggestive of statistical problems with multicollinearity (see Table II; Tabachnick & Fidell, 1996).

To assess for potential method variance, \(t\)-tests and chi-square tests were conducted on all study variables to examine potential differences based on method of interview administration (in-person vs. phone). Participants who conducted the Life Stress Interview over the telephone achieved higher chronic stress scores than participants who completed the interview in-person, \(t(73) = 2.34, P < .05\). There were no other significant differences on any study variables based on method of interview administration.

### Differences Between Disease Subtypes on Predictor and Criterion Variables

Given variability in disease course among subtypes of chronic arthritis, ANOVAs were conducted to assess for differences by diagnostic group (pauciarticular JRA,
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polyarticular JRA, systemic JRA, spondyloarthropathy, and other chronic arthritis) on predictor and criterion variables. No significant differences were found; therefore, all analyses were conducted on the full sample. However, the numbers of subjects in several of the disease groups were likely too low to allow for detection of differences on study variables (systemic JRA, n = 4; spondyloarthropathy, n = 14; other chronic arthritis, n = 4).

**Regression Analyses Predicting Child Adjustment**

Using the procedures described by Holmbeck (1997), hierarchical multiple regression analyses were performed to test the hypothesis that attitude toward illness would moderate the relationship between stress and child psychosocial adjustment. For each regression analysis, one of the child adjustment measures (depressive symptoms, anxiety symptoms, and parent-reported adjustment) was treated as a dependent variable. Demographic variables (age and family SES) were entered simultaneously in the first step of the regression analyses. Gender and child race were not entered, because there were not significant bivariate correlations between gender or race and any of the criterion variables, nor any specific hypotheses about the impact of these variables on child adjustment. Disease variables (diagnosis of another chronic illness and presence of acute disease) were entered in the second step. Disease duration was excluded from regression analyses, due to a lack of significant bivariate correlations with criterion variables, or specific hypotheses about this variable. One of the stress variables (chronic stress, episodic stress, and arthritis-related stress) and attitude toward illness were entered in the third step, with each stress variable tested in a separate analysis. On the fourth step, the stress × attitude interaction was entered to test for the presence of a moderator effect. To correct for problems of multicollinearity between main effects and interaction terms, stress and attitude toward illness variables were centered prior to entry into regression equations (Aiken & West, 1991).

As shown in Table III, each regression analysis was significant. Models with all predictors entered explained 58–60% of the variance in depressive symptoms, 45–52% of the variance in anxiety symptoms, and 28–36% of the variance in parent-reported adjustment. At each step in the regression equations, the increment in variance accounted for by the set of predictors added ($R^2$ change)
was tested (see Table III). In addition, the unique variance accounted for by each variable at the step it entered into each regression equation was also tested for significance.

### Depressive Symptoms

At step 1 of the regression analyses, child age was a significant predictor of depressive symptoms, with older children showing more depressive symptoms. At step 2, disease variables were not significant predictors of depressive symptoms. At step 3, negative attitude toward illness and higher levels of episodic and arthritis-related stress each accounted for significant unique proportions of the variance in depressive symptoms. At step 4 of the regression analyses, small, but significant, stress × attitude toward illness interactions were found for each of the three stress variables in the prediction of depressive symptoms.

To interpret the direction of significant interactions, simple regression lines were plotted for high (one standard deviation above the mean) and low (one standard deviation below the mean) values of stress and attitude toward illness variables, using procedures described by Aiken and West (1991). As seen in Figure 1, under the condition of a negative attitude toward illness, higher levels of chronic stress were associated with higher levels of depressive symptoms. Under the condition of a positive attitude, however, there was no significant association between chronic stress and depressive symptoms. Similarly, under the condition of a negative attitude toward illness, higher levels of episodic and arthritis-related stress were associated with higher levels of depressive symptoms.

#### Table III. Hierarchical Multiple Regression Analyses Predicting Child Adjustment

<table>
<thead>
<tr>
<th>Variables/step</th>
<th>Depressive symptoms</th>
<th>Anxiety symptoms</th>
<th>Parent-reported adjustment</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>β</td>
<td>β</td>
</tr>
<tr>
<td>Chronic stress</td>
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<td></td>
<td></td>
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<tr>
<td>Age</td>
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<td>.36**</td>
<td>-.13</td>
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<tr>
<td>SES</td>
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<td>-.17</td>
<td>-.34**</td>
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<td>.17**</td>
<td>.13**</td>
</tr>
<tr>
<td>Other chronic illness</td>
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<td>.03</td>
<td>.23*</td>
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<tr>
<td>Acute disease</td>
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<tr>
<td>$R^2$ Change</td>
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<td>.11**</td>
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<tr>
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<td>.37**</td>
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<tr>
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<td>$R^2$ Change</td>
<td>.28***</td>
<td>.34***</td>
<td>.11**</td>
</tr>
<tr>
<td>Stress × attitude</td>
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<td>.02</td>
<td>.10</td>
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<tr>
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<td>.00</td>
<td>.01</td>
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<tr>
<td>Cumulative $R^2$</td>
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<td>.36***</td>
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<tr>
<td>Episodic Stress</td>
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<td></td>
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<tr>
<td>Stress</td>
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<td>.23*</td>
<td>.08</td>
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<td>Attitude toward illness</td>
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<td>-.50***</td>
<td>-.22</td>
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<td>$R^2$ Change</td>
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<td>.27**</td>
<td>.05</td>
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<tr>
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<td>-.08</td>
<td>-.03</td>
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<tr>
<td>$R^2$ Change</td>
<td>.04*</td>
<td>.01</td>
<td>.00</td>
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<td>Cumulative $R^2$</td>
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<td>.45***</td>
<td>.29**</td>
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<tr>
<td>Arthritis–related stress</td>
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<td>Steps 1–2 are the same as above</td>
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<tr>
<td>$R^2$ Change</td>
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<td>Cumulative $R^2$</td>
<td>.60***</td>
<td>.45***</td>
<td>.28**</td>
</tr>
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</table>

**Note:** Higher depression scores indicate fewer depressive symptoms (as a result of the transformation of BDI-Y scores). Higher parent-reported adjustment scores indicate higher levels of adjustment problems (as a result of the transformation of PARS III scores).

*P < .05

**P < .01

***P < .001.
Illness-Related Stress and Attitudes

Attitude toward illness, higher levels of episodic stress were associated with higher levels of depressive symptoms, while there was no such relationship under the condition of a positive attitude. Higher levels of arthritis-related stress were associated with higher levels of depressive symptoms under the conditions of both positive and negative attitudes toward illness. However, arthritis-related stress demonstrated a slightly weaker relationship with depressive symptoms under the condition of a more positive attitude toward illness.
Anxiety Symptoms
At step 1 of the regression analyses, older child age accounted for a significant unique proportion of the variance in anxiety symptoms. At step 2, disease variables were not significant predictors of anxiety symptoms. At step 3, negative attitude toward illness and higher levels of chronic, episodic, and arthritis-related stress each accounted for significant unique portions of the variance in anxiety symptoms. At step 4, stress × attitude toward illness interactions were not significant.

Parent-Reported Adjustment
At step 1 of the regression analyses, lower SES accounted for a significant unique proportion of the variance in parent-reported adjustment problems. At step 2, both the diagnosis of another chronic illness and the presence of acute disease were significant predictors of parent-reported adjustment. At step 3, a higher level of chronic stress accounted for a significant unique portion of the variance. At step 4, stress × attitude toward illness interactions were not significant.

Discussion
Study results confirm the predicted associations between psychosocial stress and attitude toward illness and psychological adjustment among children and adolescents with chronic arthritis. Of note, 80–85% of youth in this study reported levels of depressive and anxiety symptoms that fell in the average range, suggesting that variations in illness-related stress and attitude toward illness among youth with arthritis may be associated with subtle variations in adjustment within the normal range as well as with clinically significant internalizing problems.

After controlling for demographic and medical factors, higher levels of both illness-related and nonillness-related child stress were associated with higher levels of depressive and anxiety symptoms and parent-reported adjustment problems. Attitude toward illness was also a significant predictor of child adjustment, with a more positive attitude associated with lower levels of depressive and anxiety symptoms. Moreover, attitude toward illness served as a moderator of the relationship between stress and adjustment in the case of depressive symptoms, with positive attitude demonstrating a protective role against the impact of psychosocial stress.

The stress-moderating effect of attitude toward illness on depressive symptoms occurred not only for arthritis-related stress but for chronic and episodic stress as well. It may be the case that responses to the CATIS, the measure used to assess attitudes toward illness, reflect personality characteristics or cognitive styles that are not specific to feelings about illness. For example, youth who respond that they feel just as good as their peers even though they have arthritis or do not feel that arthritis keeps them from doing things they like may be individuals who have a high sense of self-esteem or self-efficacy. It is also possible that a positive attitude toward illness may reflect a generally optimistic attributional style (i.e., viewing causes of negative events as external, specific, and unstable), while a negative attitude toward illness may reflect a pessimistic attributional style (viewing causes of negative events as internal, global, and stable; Abramson, Seligman, & Teasdale, 1978). Indeed, pessimistic attributional style has been found to interact with negative events to predict increases in depressive symptoms among youth (Abela, 2001). Stress moderating effects seen in this study could be attributed to such characteristics and cognitive styles.

Study results suggest several directions for clinical intervention. First, it is important for clinicians to talk with children and adolescents about the ways in which arthritis impacts their daily lives, as well as to assess overall functioning in important life domains to identify areas of risk for the development of illness-related adjustment problems. For example, a child with pre-existing academic difficulties may have particular difficulty coping with arthritis-related school absences or pain in the classroom. Moreover, the finding that older child age was associated with higher levels of depressive and anxiety symptoms supports the need for earlier, prospective intervention with these youth. The lack of differences on study variables as a function of arthritis disease types also suggests the importance of assessing all youth with chronic arthritis, rather than neglecting children with milder disease. More definitive conclusions regarding differences in stress levels and adjustment difficulties based on disease type, however, will require examination of such differences in larger samples.

Additionally, arthritis-related stressors reported during the Life Stress Interview suggest specific targets for intervention. Within the school domain, youth may benefit from education of school personnel about the illness, treatment, and associated psychosocial issue (Katz, Rubinstein, Hubert, & Blew, 1989). Children may benefit from social skills and problem-solving training to handle illness-related teasing and questions (e.g., using strategies such as ignoring, giving age-appropriate explanations of medical issues, seeking adult support) and to facilitate positive interactions with peers (e.g., generating possible solutions to situations in which arthritis
impacts group activities; Varni, Katz, Colegrove, & Dolgin, 1993). Children and parents may also benefit from interventions to increase adherence to treatment regimens. In previous research with youth with JRA, behavioral strategies such as medication and exercise monitoring, parental support and positive verbal feedback, and incentives for adherence have demonstrated positive effects on treatment adherence (Lemanek, Kamps, & Chung, 2001). Finally, children who experience arthritis pain that impacts their academic performance, extracurricular participation, or interactions with family and friends may benefit from cognitive-behavioral pain management techniques such as progressive muscle relaxation, meditative breathing exercises, and guided imagery (Walco, Varni, & Ilowite, 1992).

Study findings also support the importance of promoting a positive attitude toward arthritis as a source of resilience in the face of stress. Assessment of attitudes toward illness could be completed through informal questions about children's feelings about arthritis and its impact on daily functioning and achievement of important goals. Alternatively, a standardized measure of attitude toward illness could be administered in a clinic setting. In the present study, for example, children generally required 5 minutes or less to complete the CATIS.

This study did not examine factors associated with the development and maintenance of positive attitudes toward illness. However, given that 80% of participants reported positive aspects of the arthritis experience, it may be useful to look more carefully at the positive experiences identified by these youth. For example, some participants reported that in coping with arthritis, they had developed greater determination in working toward goals and had learned not to give up in the face of challenges. In work with youth with arthritis, it may be helpful to both acknowledge negative aspects of the illness, as well as guide them in reframing their experience. Efforts in coping with arthritis, for example, can also be seen as signs of strength in handling difficult situations. Indeed, such an intervention strategy may follow a cognitive-behavioral perspective, in which interventions are aimed at helping children develop new ways of interpreting their experiences and conceptualizing problems, as well as building new coping templates (Kendall, 1993).

Additionally, some participants identified positive relationships they would not have made or activities that they would not have participated in were it not for arthritis (e.g., friends from arthritis camp and new activities joined after giving up sports). When arthritis prohibits children from participating in certain activities, it may be important to help them identify and focus on what they can do, rather than what they cannot do, by identifying existing strengths or encouraging participation in new activities that offer opportunities for achievement and mastery. Children may also benefit from group situations (e.g., support groups within clinic populations and arthritis summer camps) to talk with one another about their illness experience and how to handle difficult situations, so that overwhelming situations may be appraised as more manageable. Areas for future research include investigation of potential factors contributing to attitude toward illness (e.g., disease status, personality characteristics, parental attitudes and cultural influences) and interventions aimed at promoting positive attitudes.

Limitations of the study should also be addressed. Internal consistency reliability for the chronic stress measure of the Life Stress Interview was weak, likely reflecting the limited number of items (school stressor rating, peer relationship rating and family relationship rating) contributing to the chronic stress score. The low coefficient alpha may also reflect the fact that a child experiencing stress in one life domain (e.g., school-related stress) would not necessarily be expected to be experiencing high levels of stress in each of the other domains (e.g., peer relationships and family relationships). Although the authors of this study chose to combine stress domains to create an overall chronic stress score, in future studies, it may be more useful to examine the impact of illness-related stress in each life domain separately. Additionally, evidence for the construct validity for the Life Stress Interview is not provided by its authors or specifically assessed in the current study. In the current study, however, relationships with relevant psychosocial variables were in the expected direction (e.g., higher stress associated with higher levels of depressive and anxiety symptoms and higher arthritis-related stress associated with more negative attitude toward illness).

Of note, participants who completed the Life Stress Interview over the telephone achieved higher chronic stress scores than participants who completed the interview in person, suggesting possible method variance. Participants did not differ on any other study variables based on method of interview administration, however. Although this may at first appear to be method variance, it is more likely that families interviewed by telephone were more stressed and less able to make time available at a clinic appointment to complete the study measures. Prior research has shown little difference in mode of response (telephone vs. in-person interviewing) in length.
of interviews and psychometric properties, although there may be differences in the responses obtained, because of non-random assignment to in-person versus telephone interviews (McCormick, Workman-Daniels, Brooks-Gunn, & Peckham, 1993).

Additionally, conclusions about the directionality of effects are limited by the cross-sectional nature of the research. Although results suggest that stress and attitude toward illness influence adjustment, there may also be reciprocal relationships between variables, such that child psychological functioning may influence attitude toward illness and experience of stress as well. Longitudinal research may be useful in teasing out these relationships. Sample characteristics may also limit the generalizability of results, as the majority of participants were Caucasian and from middle to upper-middle class backgrounds, with well-controlled arthritis symptoms. Finally, the measure used to assess arthritis-related stress was designed for this study (based on the existing format of the Life Stress Interview). Although the arthritis-related stress measure demonstrated high inter-rater reliability and moderate internal consistency reliability, further psychometric validation is warranted.

Of note, however, this study's unique effort to assess stressors specific to the lives of children with arthritis is also one of its strengths. During the planning of this study, no existing measures of arthritis-related stress could be identified. The study provides an opportunity to learn from youth about the nature and context of illness-related stress in their lives, as well as the ways in which they have found positive meaning in the arthritis experience. Results provide guidelines for identification of children at increased risk for adjustment problems, as well as for development of interventions to increase resilience in the face of arthritis-related challenges.

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