The Influence of Parental Distress on Child Depressive Symptoms in Juvenile Rheumatic Diseases: The Modulating Effect of Illness Intrusiveness

Janelle L. Wagner,1 MS, John M. Chaney,1 PhD, Kevin A. Hommel,1 PhD, Melanie C. Page,1 PhD, Larry L. Mullins,1 PhD, Molly M. White,1 MS, and James N. Jarvis,2 MD
1Oklahoma State University and 2University of Oklahoma Health Sciences Center

Objective To examine the role of children’s illness-related cognitive appraisals in the parent-child adjustment relationship in a sample of children and adolescents with juvenile rheumatic disease (JRD). Specifically, we tested the moderating effect of children’s perceived illness-induced barriers (i.e., illness intrusiveness) in the parent distress–child depressive symptom relationship.

Methods Participants were 45 children and adolescents (ages 9–17) diagnosed with JRD. Children completed measures of depressive symptoms (Children’s Depression Inventory), functional disability (Juvenile Arthritis and Functional Assessment Report), and illness intrusiveness (Illness Intrusiveness Scale–adapted for children); parents completed a brief measure of global distress (Brief Symptom Inventory). The pediatric rheumatologist provided functional disability ratings following a routine physical exam.

Results Both increased parental distress and child illness intrusiveness were associated with greater child depressive symptoms. Direct effects were qualified by a significant Parent Distress × Illness Intrusiveness interaction. The influence of general parental distress on child depressive symptoms was enhanced under conditions of increased child-reported illness intrusiveness.

Conclusions Results support transactional conceptualizations of child adjustment to chronic illness. Findings also emphasize the need to examine the interaction of parent and child variables, particularly cognitive appraisals, in child adjustment. Results and treatment implications for children with JRD are discussed in terms of reinforcement theories of depression.

Key words juvenile rheumatic disease; illness intrusiveness; transactional stress and coping.

The juvenile rheumatic diseases (JRDs) represent a heterogeneous group of autoimmune chronic disorders, including juvenile rheumatoid arthritis (JRA), systemic lupus erythematosus (SLE), juvenile ankylosing spondylitis (JAS), and juvenile dermatomyositis (JDMA). More specifically, JRA is characterized by synovitis, or inflammation of the synovial joint membrane, and SLE is manifested by systemic inflammation, blood vessel abnormalities, and immune complex disposition. In JAS, peripheral arthritis is common, with the initial effects occurring in the spine and then most commonly in the hips. Finally, JDMA is a disease of the connective tissues characterized by vasculitis of the skin, muscle, and gastrointestinal tract. Children with JDMA often present with muscle weakness and tenderness as well as arthritis (Cassidy & Petty, 2001).

Indeed, JRDs are characterized by similar symptoms, which often interfere with differential diagnosis (Vandvik & Hoyeraal, 1993). In fact, hallmark features of JRDs include persistent inflammation of joints, restricted functional ability, and pain, and the debilitating course of the disease is most often intermittent and chronic in nature. JRA is the most common JRD and affects approximately between 16 and 150 children per 100,000 in the United States, making it one of the most prevalent chronic childhood illnesses (Cassidy & Petty, 2001).

Given the episodic nature of JRD and the restrictions
Further, previous studies have shown similar patterns of psychosocial adjustment between JRD and thus collapsed samples across disease subtypes (e.g., JRA, JAS; for a review see Vandvik & Hoyeraal, 1993). Research, however, has demonstrated that disease features (i.e., pain, disability, and severity) alone provide only a limited explanation for depression in children with chronic diseases (see Wallander & Varni, 1998, for a review).

It is widely accepted that child adjustment to pediatric chronic illness involves multiple influences (see Brown, 2002; Thompson & Gustafson, 1996, for a review), and contemporary conceptualizations of adjustment to chronic illness are characterized by multivariate models (i.e., Thompson et al., 1993a, 1993b; Wallander & Varni, 1992). These multivariate models take into account a host of variables, including disease status, parent and family adjustment, and individual cognitive appraisal. Numerous studies, including those examining children with JRD, have demonstrated the importance of the parent-child adjustment relationship in the context of chronic illness. These studies consistently show that both parents' adjustment and their coping behavior (e.g., anxiety, depression, overall distress, support of the child, palliative coping mechanisms) affect their children's adjustment to disease (e.g., depression, internalizing and externalizing behaviors), beyond the influence of demographic and disease variables (Chaney et al., 1997; Gil, Williams, Thompson, & Kinney, 1991; Thompson, Gustafson, Hamlett, & Spock, 1992; Thompson, Zeman, Fanurik, & Sirotkin-Roses, 1992; Timko, Baumgartner, Moos, & Miller, 1993; von Weiss et al., 2002). Without doubt, multivariate models have received substantial empirical support and have advanced our understanding of adjustment to pediatric chronic illness. Thompson and Gustafson (1996) point out, however, that because these models are comprehensive and sophisticated, they are difficult to test in a single study and require refinement through ongoing investigations that incorporate additional variables hypothesized to contribute to child adjustment.

It is evident from the extant literature that parental adjustment, including global distress, plays a pivotal role in child adjustment to chronic illness. However, less is known about the potential role of child cognitive processes in the parent-child adjustment relationship, despite the hypothesized contribution of child appraisals to adjustment in multivariate conceptual models (e.g., Thompson et al., 1993a; Wallander & Varni, 1992). Although research has demonstrated the significance of children's appraisals to adjustment across a number of pediatric chronic illness populations (Frank, Blount, & Brown, 1997; Mullins, Chaney, Pace, & Hartman, 1997; Schoenherr, Brown, Baldwin, & Kaslow, 1992), we do not know the extent to which specific child cognitive appraisal variables influence the relationship between global parent distress and child adjustment. Indeed, it may be the case that certain types of child cognitive appraisals create an emotional vulnerability whereby children are more susceptible to the influence of parent variables. A better understanding of the role of children's cognitive appraisals within the larger context of multivariate conceptualizations of adaptation to pediatric chronic illness could inform a more comprehensive picture of the complex child adjustment process.

One potential cognitive appraisal mechanism that has demonstrated relevance in adult rheumatoid arthritis (RA), and appears salient to adjustment in JRD, is the concept of illness intrusiveness. Although illness intrusiveness is closely related to perceived disability, Devins and colleagues (Devins et al., 1983–84; Devins & Shnek, 2000) suggest that it is conceptually distinct. To illustrate, whereas perceived disability represents the extent to which an individual appraises restrictions in activities of daily living, illness intrusiveness constitutes a more pervasive cognitive schema characterized by perceived “illness-induced barriers” across a variety of life domains (Devins et al., 1983–84, p. 329). Such perceived barriers purportedly lead individuals to restrict involvement in a host of disease-unrelated activities and interests deemed as valuable (e.g., family and friend relationships).

Illness intrusiveness is thought to affect adjustment, particularly depression, through two separate mechanisms: a) a reduction in the availability of positive and rewarding experiences, and b) compromised personal control over important outcomes (Devins, Edworthy, Guthrie, & Martin, 1992). Indeed, it is the awareness of disease interference with positive experiences that constitutes the subjective perception of illness intrusiveness (Devins, Seland, Klein, Edworthy, & Saary, 1993). Not surprisingly, illness intrusiveness has been shown to be significantly associated with depression in adults with RA, even when perceptions of disability are taken into account (Devins et al., 1992). Because the hallmark features of JRD and RA are highly similar (e.g., episodic, chronic, debilitating), it is likely that children's perceptions of illness intrusiveness constitute an important cognitive appraisal mechanism that has yet to be examined in adjustment to childhood rheumatic disease.

Utilizing a multivariate transactional stress and coping approach (e.g., Thompson et al., 1993b), the goals of
the present study were twofold: (a) to investigate parent-child transactional patterns of adjustment in a sample of children and adolescents with JRD, and (b) to explore the role of children's perceived illness intrusiveness in the parent-child adjustment process. Specifically, through multiple regression and post hoc analyses (see Holmbeck, 2002; Peyrot, 1996), we examined the direct relationship between global parent distress and child depressive symptomatology (e.g., Mullins et al., 1995, 1991), as well as the potential role of child-perceived illness intrusiveness as a moderator in the parent-child adjustment relationship. In other words, we hypothesized that when children perceive their illness as creating barriers across a number of domains, including relationships with parents, they are more susceptible (experience-increased depressive symptoms) to the influence of global parent distress.

Method

Participants and Procedure

Participants were 45 children and adolescents (29 girls, 16 boys) between the ages of 9 and 17 (M = 13.6 years, SD = 2.5) who had been diagnosed with JRA (n = 27), lupus (n = 11), JDMA (n = 5), or JAS (n = 2) and their parents. Participants were chosen within this age range to allow for maximum recruitment while attending to valid use of the self-report instruments (e.g., the Children's Depression Inventory [CDI]) and homogeneity of the sample. The majority of child participants were white (n = 21), followed by Native American (n = 12), African American (n = 3) and biracial (n = 4), Hispanic (n = 4), and Asian (n = 1).

Participants were recruited from a pediatric rheumatology clinic in a large children's teaching hospital. Institutional review board approval was obtained, as well as written informed consent or assent from each participant, parent, or legal guardian. Inclusion criteria for participation were diagnosis of one of the above-mentioned illnesses, age between 9 and 17 years, and duration of JRD symptoms of at least one year. Illness duration was calculated by subtracting the date of diagnosis from the date of participation and ranged from 0.04 years to 15.73 years (M = 2.80, SD = 3.42). Therefore, some participants in the sample had been diagnosed for less than one year but all had active symptoms for more than a year, and thus still qualified for the study. Children were excluded if there was demonstrated evidence of comorbid cognitive deficits (e.g., mental retardation) or comorbid chronic illness. The primary rheumatologist verified inclusion criteria before eligible participants were contacted, and participants were compensated monetarily with $10 per family.

Eligible participants were recruited in one of two ways. Participants not scheduled for upcoming appointments in the rheumatology clinic were recruited by telephone, and correspondence occurred via mail (n = 16). Other children and their parents were recruited in the clinic and completed study packets either in the clinic or at home and returned them via postage-paid mail (n = 29). Participation rates for those recruited in the clinic and by phone were 74% and 97%, respectively.

Measures

Physician-Report Measures. A provider questionnaire was developed to obtain information from the pediatric rheumatologist regarding patient diagnosis, date of diagnosis, and functional disability. Given the poor reliability of biological indices in explaining clinical presentation and disease outcome (i.e., Giannini et al., 1997; Graham & Lovell, 1997), physician-rated functional disability (PRFD) was determined through rheumatologist classification of patients into one of four functional classes. These functional classes ranged from class I (limited by no disability in vocational and self-care activities) to class IV (severe disability in these same activities; e.g., Hochberg et al., 1992). This classification system has been widely used and shown to be a valid indicator of functional disability, specifically in JRD (Hochberg et al., 1992; Baildam, Holt, Conway, & Morton, 1995). The rheumatologist provided disability classifications following a routine physical examination after study packets were returned. Data indicated a relatively low level of functional disability (M = 1.47, SD = .63, range = 1–3).

Parent-Report Measures. The Brief Symptom Inventory (BSI; Derogatis, 1993) is a 53-item questionnaire that assesses adult global psychological adjustment. Respondents rate the degree to which they are distressed by each of 53 psychological symptoms in the past week, ranging from 1 (not a lot) to 4 (extremely). The global severity index (GSI) is the average distress score and was utilized in the present study to represent global parental distress. The mean score for the GSI was .59 (SD = .60, range = 0–3.13), and approximately 32% of the sample obtained clinically elevated GSI scores (T scores ≥ 63). The BSI has demonstrated acceptable internal consistency (alpha coefficients range from .71 to .85; Derogatis, 1993), and Cronbach's alpha for this sample was .97 (Cronbach, 1951). More specifically, the BSI has been shown to be a reliable (Mullins et al., 1991, 1995) and valid (Derogatis, 1993, review) measure of adaptation in families of individuals with a chronic illness.

Child-Report Measures. The CDI (Kovacs, 1992) is a 27-item scale that measures depressive symptoms over the previous 2 weeks. Each of the items on the CDI is a
group of three statements that assesses the severity of a depressive symptom on a 0 to 2 scale. Total scores are used as the index of depression and are derived by summing the 27 items, with higher scores indicating more severe depression. The average CDI score for the present sample (M = 8.82, SD = 8.68, range = 0–47) was equivalent to a T score of 50, indicating that the present sample was fairly well adjusted with respect to depression. The CDI has been shown to be a reliable scale (internal consistencies range from .71 to .89) and a valid measure of depressive symptomatology in children ages 7 to 17 years (Kovacs, 1992). Internal reliability for the present sample was estimated at .91.

The Illness Intrusiveness Scale–Child (IIS-C) is a 12-item measure that assesses the degree to which children perceive their illness as interfering with their ability to engage in activities across a variety of life domains (e.g., school, social, family). The child form of the scale was adapted directly from the original adult IIS (Devins et al., 1983–84). Specifically, the 13 items from the adult version were modified to be more developmentally appropriate. For example, the work domain question on the original IIS was adapted to include both work and school on the child form; the domain of relationship with spouse/lover was changed to assess relationships with boyfriend/girlfriend on the child form. The sex-life domain was eliminated from the child form, yielding a total of 12 items. Children were asked to respond on a scale from 0 (does not apply to me) to 7 (a lot). Items include: “How much does your illness or its treatment interfere with relationships within your family?” “How much does your illness or its treatment interfere with school or work? How much does your illness or its treatment interfere with relationships with your friends?” Items were summed to yield the index of total intrusiveness; higher scores indicated greater intrusiveness (M = 21.16, SD = 13.3, range = 0–47 for the present sample).

Because the IIS-C was adapted from the original IIS specifically for this study, no previous psychometric data are available on the child version of the scale. However, data from adult RA and lupus samples indicate that internal consistency estimates for the original IIS range from .87 to .94, test-retest reliability indexes range from .79 to .85 over a 6-week period, and support has been provided for its construct validity (Devins et al., 2001; Devins & Edworthy, 2000; Edworthy, Domazet, Talavera, & Devins, 1998). Internal consistency on the IIS-C in the present sample was also high (α = .84). Additionally, the IIS-C did not correlate significantly with children’s self-reported functional disability (r = .23), providing some support for the independent nature of perceived disability and illness intrusiveness.

The Juvenile Arthritis Functional Assessment Report–Child (JAFAR-C; Howe et al., 1991) is a 23-item measure completed by children to provide subjective estimates of their functional ability. Respondents rate how often they are able to perform 23 daily tasks (e.g., buttoning a shirt, getting into bed) on a 3-point Likert scale, ranging from 0 (all the time) to 2 (almost never). Higher sum scores on the JAFAR-C indicate greater disability (M = 4.94, SD = 6.46, range = 0–27 for the present sample). The JAFAR has demonstrated good construct validity and acceptable internal consistency for both the child-report (.85) and the parent-report (.93) version of the scale (Howe et al., 1991). Cronbach’s alpha in the present study was .92.

**Results**

**Preliminary Analyses**

Preliminary analyses were conducted to test for potential effects of ethnicity, disease subtype, and recruitment method on disease (PRFD, JAFAR-C, and illness duration) and psychosocial variables (IIS-C, CDI, BSI). Separate one-way multivariate analyses of variance revealed no significant effects for ethnicity (white vs. nonwhite), disease subtype, or recruitment method on disease or psychosocial variables (p > .05 for all). Subsequent analyses were performed collapsing across ethnicity, disease subtype, and recruitment method.

Although only child’s age was significantly associated with the PRFD (see Table 1), other demographic and disease variables were utilized as covariates in the present study based on theoretical rationale and on findings in the extant literature. Specifically, because of the unequal distribution in gender and the wide range in disease duration, these variables were also covaried to provide for a more conservative test of anticipated relationships and to control for potential shared variance among variables. Also, physician-rated disability was included to control for the influence of objective disease status. Previous studies have demonstrated significant age and gender effects on both illness intrusiveness and depression in persons with RA (Devins et al., 1992; Hommel, Wagner, Chaney, & Mullins, 1998).

**Primary Analyses**

To test for the potential moderator effect of illness intrusiveness in the parent distress–child depressive symptomatology relationship, a regression equation was constructed in which demographic and disease variables were entered on steps 1 and 2. On step 3, parent distress (BSI) and child illness intrusiveness (IIS-C) variables and a Parental Distress × Child Illness Intrusiveness interaction
term (BSI × IIS-C) were entered (see Table II). The BSI and IIS-C variables were centered to reduce multi-collinearity with the interaction term (see Aiken & West, 1991). The interaction of parent distress and child illness intrusiveness was significant, contributing an additional 5.3% of the variance to child depressive symptoms beyond the influence of demographic variables, disease parameters, and the main effects of parent distress and child illness intrusiveness.1

Consistent with Holmbeck (2002; see also Aiken & West, 1991), post hoc probes were conducted to further examine the significant moderator effect of illness intrusiveness on the parent-child adjustment relationship. First, conditional moderator variables were computed for high (Hi-IIS) and low (Lo-IIS) illness intrusiveness, and using these conditional variables, two new interaction terms were computed. Two separate regression analyses were run, with the same entry of demographic and disease covariates on steps 1 and 2 as previously described (see Table II). In step 3 of the first equation, Hi-IIS, BSI, and the Hi-IIS × BSI interaction terms were simultaneously entered. In step 3 of the second equation, Lo-IIS, BSI, and the Lo-IIS × BSI interaction terms were simultaneously entered. Significance tests indicated that the simple slope for the BSI regression line under Hi-IIS conditions was significant, t(1) = 2.45, p = .02; the simple slope for the BSI regression line under Lo-IIS conditions was nonsignificant, t(1) = –1.38, p = .18. Specifically, the influence of parent distress on child depressive symptoms was enhanced under conditions of high perceived child-reported depression.

### Table I. Zero-order and Partial Correlations and Means for Study Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Child's age</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Child's gender</td>
<td>–.16</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. JAFAR-C</td>
<td>–.10</td>
<td>–.25</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. PRFD</td>
<td>–.31*</td>
<td>.11</td>
<td>.27</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Illness durationa</td>
<td>.13</td>
<td>.06</td>
<td>–.18</td>
<td>–.03</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. IIS-C</td>
<td>.19</td>
<td>.12</td>
<td>.23</td>
<td>–.05</td>
<td>–.12</td>
<td>(.61**)b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. BSI</td>
<td>.28</td>
<td>.03</td>
<td>.18</td>
<td>–.04</td>
<td>.05</td>
<td>.37*</td>
<td>–</td>
<td>(.31*)</td>
</tr>
<tr>
<td>8. CDI</td>
<td>.15</td>
<td>.28</td>
<td>.15</td>
<td>.17</td>
<td>.21</td>
<td>.71**</td>
<td>.28</td>
<td>–</td>
</tr>
</tbody>
</table>

JAFAR-C = Juvenile Arthritis Functional Assessment Report–Child form; PRFD = physician-rated functional disability; IIS-C = Illness Intrusiveness Scale–Child form; BSI = Brief Symptom Inventory; CDI = Children’s Depression Inventory.

*aIllness duration (in years).

*bSemipartial correlations, controlling for recruitment, age, gender, JAFAR-C, PRFD, illness duration, appear above the diagonal (in parentheses).

**p < .01.

Table II. Hierarchical Regression Analyses of Children’s Depression Inventory, Conditional Moderators

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable</th>
<th>β</th>
<th>t for Within-Step Predictors</th>
<th>R² Change for Step</th>
<th>Cumulative R²</th>
<th>F Change for Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Child’s gender</td>
<td>.68</td>
<td>.25</td>
<td>.08</td>
<td>.08</td>
<td>1.86</td>
</tr>
<tr>
<td></td>
<td>Child’s age</td>
<td>1.00</td>
<td>1.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>JAFAR-C</td>
<td>.29</td>
<td>1.36</td>
<td>.11</td>
<td>.19</td>
<td>1.75</td>
</tr>
<tr>
<td></td>
<td>PRFD</td>
<td>–.17</td>
<td>–.99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration</td>
<td>–.56</td>
<td>–.48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BSI</td>
<td>.24</td>
<td>.13</td>
<td>.44</td>
<td>.63</td>
<td>14.13**</td>
</tr>
<tr>
<td></td>
<td>IIS-C</td>
<td>.38</td>
<td>5.20**</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>BSI × IIS-C</td>
<td>.37</td>
<td>2.29*</td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>BSI</td>
<td>5.22</td>
<td>2.45*</td>
<td>.44</td>
<td>.63</td>
<td>4.44*</td>
</tr>
<tr>
<td></td>
<td>Hi-IIS</td>
<td>.37</td>
<td>5.20**</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>BSI × Hi-IIS</td>
<td>.35</td>
<td>2.29*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BSI</td>
<td>4.73</td>
<td>–1.38</td>
<td>.44</td>
<td>.63</td>
<td>4.44*</td>
</tr>
<tr>
<td></td>
<td>Lo-IIS</td>
<td>3.8</td>
<td>5.20**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BSI × Lo-IIS</td>
<td>.37</td>
<td>2.29*</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Steps 1 and 2 were the same in all three equations and are shown only once. JAFAR-C = Juvenile Arthritis Functional Assessment Report–Child; PRFD = physician-rated functional disability; Duration = illness duration (in years); BSI = Brief Symptom Inventory; Hi-IIS = high illness intrusiveness; Lo-IIS = low illness intrusiveness.

*p < .05.

**p < .001.
illness intrusiveness. Under conditions of low perceived illness intrusiveness, parent distress was unrelated to child depressive symptomatology. To graph the results, regression lines were derived and plotted by substituting high (one SD above the mean) and low (one SD below the mean) values of BSI (see Figure 1) into the following formulas:

For high IIS (one SD above the mean): \( \text{CDI} = 5.22 \times \text{BSI} + 7.92 \)

For low IIS (one SD below the mean): \( \text{CDI} = -4.73 \times \text{BSI} - 2.4 \)

**Discussion**

The present study examined transactional patterns of parent-child adjustment in a sample of children with JRD, as well as the potential intervening role of children's perceived illness intrusiveness in the parent distress—child depressive symptoms relationship. Consistent with previous studies (Chaney et al., 1997; Mullins et al., 1995; Thompson et al., 1993b), increased parent distress was significantly associated with greater child depressive symptomatology, again demonstrating the transactional nature of child adjustment in pediatric chronic illness. In addition, children's perceptions of illness intrusiveness were shown to play a significant role in child depressive symptoms, beyond the influence of parent distress. Although both parent distress and illness intrusiveness made independent contributions to child depression, these direct effects were qualified by a significant Parent Distress × Illness Intrusiveness interaction. Post hoc analyses indicated that parent distress had a significant impact on child depressive symptoms when children reported their illness as interfering with their lives across a variety of domains (i.e., high intrusiveness). Parent distress was unrelated to child depressive symptomatology when children reported low perceived illness intrusiveness.

In general, the present results emphasize the importance of examining children's cognitive appraisals in adjustment to pediatric chronic illness, particularly within a parent-child transactional context, and provide evidence for one potential route by which parent and child variables combine to influence child emotional adjustment. More specifically, our results suggest that children's perceptions of illness intrusiveness may serve to create an emotional vulnerability to the effects of parent distress. To illustrate, because rheumatic diseases place physical limitations on children's behavior and frequently lead to restrictions in a variety of activities, there is the potential for these perceived illness-induced limitations to generalize to disease-unrelated events (Adams, Streisand, Zawacki, & Joseph, 2002; Pimm & Weinman, 1998) and result in a concomitant decrease in activities across a wide range of life domains. Consequently, enjoyable activities and relationships (e.g., leisure, peer, family) may also get elimi-
nated inadvertently as a by-product of limitations imposed by the disease. The net effect for children may be an extremely narrow range of available rewarding activities, which decreases their opportunities for reinforcement from the environment, resulting in an emotionally vulnerable circumstance for children (see Lewinsohn 1974a, 1974b). Our data would suggest that this hypothesized vulnerability provides the requisite condition for parent distress to significantly impact depressive symptoms in children with JRD.

The transactional nature of adjustment in pediatric chronic illness observed in this and previous studies (e.g., Timko Stovel, Moos, & Miller, 1992; Timko et al., 1993) highlights the need for clinical interventions to take into account the complex interplay of parent and child variables to adequately address child adjustment difficulties. Specifically, our findings point to the potential efficacy of cognitive-behavioral treatments that simultaneously assist children to more accurately gauge the impact of their JRD symptoms and encourage reasonable participation in their usual activities as well as valued activities, particularly social and family relationships, despite physical limitations of the illness. Indeed, several studies have demonstrated the efficacy of cognitive-behavioral treatments employing cognitive restructuring and pleasant-events scheduling in populations with RA (e.g., Bradley & Alberts, 1999; Leibing, Pfingsten, Bartmann, Rueger, & Schuessler, 1999); however, the use of these treatments is limited in JRD (Walco, Varni, & Ilowite, 1992). Our results further suggest that interventions should promote the alleviation of parent distress, particularly in light of evidence indicating that decreased parenting stress is associated with more optimal parent-child interactions (Crnic & Greenberg, 1990) and that a supportive parenting relationship is one of the best predictors of child adjustment in JRD (von Weiss et al., 2002). Parental social support has been shown to positively impact parent distress (Timko et al., 1992) and may be a cost-effective strategy to implement in this population. Indeed, social support programs have been shown to significantly reduce the appearance of mental health symptoms in mothers of children recently diagnosed with JRA (e.g., Ireys, Sills, Kolodner, & Walsh, 1996).

The findings of this study are qualified by several limitations, including the use of self-report inventories, which may have resulted in shared method variance and spurious correlations among variables. This concern is attenuated somewhat by the utilization of both child and parent self-report measures. In addition, the cross-sectional nature of this study precludes the determination of causal relationships among variables. Although children's illness intrusiveness was conceptualized as a predictor of depressive symptoms in the regression analyses, we assessed children at various points during the course of their illness. It is possible that depressive symptoms were actually antecedent in the process and resulted in both increased negative cognitive appraisals (i.e., illness intrusiveness) and greater parent distress. In addition, there are several limitations with regard to the measures utilized. First, although a number of studies have examined the properties of the IIS in adult populations, only limited psychometric data exist on the child version of the scale developed for the present study, which served as the moderator variable in our primary analysis. It should also be noted that a measure of child depressive symptoms (i.e., CDI), and not a diagnostic measure of depression, was utilized. In addition, we included a brief instrument to determine levels of parent adjustment (i.e., BSI). Although this measure demonstrated good reliability and allows for ease of administration in a medical setting, it does not provide detailed information regarding specific diagnostic categories (e.g., anxiety, depression). Thus, caution should be given to interpretation of the results.

Further, generalization of these results should be done cautiously because of the inclusion of a relatively modest, self-selected sample. Although 91% of patients agreed to participate in the study, data collection procedures precluded examination of potential differences between participants and nonparticipants. This self-selection bias may have resulted in a sample that was more homogeneous across disease and/or psychological variables than would normally be seen in the larger JRD population. Even though we were unable to make these comparisons, our sample did approximate the 2:1 female: male ratio of the larger JRD population and represented a greater range in ethnic diversity than is typically seen in JRD studies (e.g., Timko et al., 1992). Finally, although power (.99 for the set of main effects and interaction and .64 for the interaction only) does not affect the significant findings in the present study, larger sample sizes should be used in future research so that greater power to detect a significant interaction may be achieved.

Despite these limitations, the present study provides support for transactional conceptualizations of children's psychological adjustment to chronic illness and offers insights into the potential role of child cognitive appraisals in parent-child adjustment relationships. Further, the utilization of a strong conceptual model (Thompson et al., 1993a, 1993b) and contemporary statistical approaches (Holmbeck, 1997, 2002; Peyrot, 1996) provided for more precise information regarding the complex nature of these
relationships in a relatively understudied population. Although our data suggest that children's perceptions of illness-induced barriers (i.e., illness intrusiveness) play a pivotal role in the parent-child adjustment relationship in JRD, future investigations need to examine the role of other child cognitive appraisals (e.g., causal attributions, perceived control) in the adjustment process across a variety of pediatric chronic illnesses. Studies of this nature would yield information that allows for the potential identification of common cognitive appraisal mechanisms across illness groups and/or disease-specific cognitive appraisals that operate differentially in parent-child adjustment relationships. Data emanating from these investigations will undoubtedly prove valuable to the development of treatment strategies designed to promote children's adjustment to chronic illness.

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Note
1 Despite the hypothesized role of illness intrusive-
ness as a moderator in the parent distress–child depres-
sive symptom relationship, mediation was also tested to ex-
amine more precisely the nature of the predictor variables
(i.e., Holmbeck, 2002). Sobel’s (1982) test for partial medi-
ation revealed a nonsignificant effect ($z = 1.77, p = .08$).