Psychological Adjustment of Children and Adolescents With Chronic Arthritis: A Meta-analytic Review

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Objective To review studies of psychological adjustment among children and adolescents with chronic arthritis to determine whether they are at more risk for development of adjustment problems than controls. Methods We used meta-analytic techniques to review 21 studies reporting overall adjustment problems, internalizing symptoms, externalizing symptoms, or self-concept among youths with arthritis. Results Youths with arthritis displayed increased risk for overall adjustment problems and internalizing symptoms, but not for externalizing symptoms or poor self-concept. Risk was greater in studies making comparisons to study controls rather than to norms and in studies including mixed disease samples (arthritis plus other rheumatic diseases) rather than samples of youths with arthritis only. Conclusions Results suggest the importance of assessing for internalizing problems among youths with chronic arthritis. Future research may benefit from inclusion of child self-report of adjustment problems, diagnostic specificity in reporting results, and use of adjustment measures without somatic items.

Key words chronic arthritis; juvenile rheumatoid arthritis; pediatric chronic illness; psychological adjustment; meta-analysis.

Chronic arthritis in childhood is a heterogeneous group of diseases characterized by joint inflammation and stiffness. There are two major classification systems used for the diagnosis and classification of children with chronic arthritis. American College of Rheumatology (ACR; Brewer, 1977) criteria for juvenile rheumatoid arthritis (JRA) define three subtypes of JRA: pauciarticular (arthritis in four or fewer joints), polyarticular (arthritis in five or more joints), and systemic onset (arthritis in one or more joints in association with a daily fever for at least 2 weeks). European League Against Rheumatism (EULAR, 1977) criteria for juvenile chronic arthritis (JCA) include the subtypes of JRA defined by the ACR criteria, as well as several conditions that fall under the category of spondyloarthopathies (arthritic conditions that affect entheses, insertions of tendons and ligaments into bone, including juvenile ankylosing spondylitis, psoriatic arthritis, and arthropathy associated inflammatory bowel disease). The prevalence of chronic arthritis is approximately 95 to 130 per 100,000 children (Oen & Cheang, 1996; Peterson, Mason, Nelson, O’Fallon, & Gabriel, 1996; Towner, Michet, O’Fallon, & Nelson, 1983). Chronic arthritis is two to three times more common in girls than in boys, with a more balanced gender distribution seen when children with spondyloarthopathies are included (Cassidy & Petty, 1995; Kewman, Warschausky, & Engel, 1995).

There is no known cure for chronic arthritis. Treatment is aimed at controlling pain; improving range of motion, muscle strength, and function; and facilitating normal nutrition, growth, and development (Cassidy & Petty, 1995). The approach to disease management is multidisciplinary, incorporating pharmacotherapy, physical and occupational therapy, orthopedic surgery, and psychosocial services (Cassidy & Petty, 1995).
Children with chronic arthritis and their families face many challenges associated with this disease and its treatment. In addition to pain and physical limitations, children may also experience altered body image, anxiety around teasing and social acceptance (Barlow, Harrison, & Shaw, 1998; Konkol et al., 1989; Taylor, Passo, & Champion, 1987), and fears about the course of the disease and their future (Barlow et al., 1998; Degotardi, Revenson, & Ilowite 1999; Konkol et al., 1989). During periods of symptom exacerbation, children may have difficulty performing daily classroom activities (Ansell & Chamberlain, 1998; Lovell et al., 1990; Taylor et al., 1987). Treatment requirements and medical appointments may create financial burdens and place limitations on family activities (Barlow et al., 1998; Degotardi et al., 1999).

In recognition of the stressors and burdens associated with chronic arthritis, a considerable number of studies have been conducted to assess the impact of the illness on children's psychological adjustment. However, a consensus about the psychological impact of arthritis has not been reached. Some authors report higher rates of adjustment problems (e.g., behavioral and emotional problems, low self-esteem) among children with chronic arthritis than among healthy controls or compared to published norms (Billings, Moos, Miller, & Gottlieb, 1987; McNarney, Pless, Satterwhite, & Friedman, 1974; Timko, Stovel, Moos, & Miller, 1992), whereas others report no significant differences (Garstein, Short, Vannatta, & Noll, 1999; Harris, Newcomb, & Gewanter, 1991; Huygen, Kuis, & Sinnema, 2000; Noll et al., 2000; Ungerer, Chaitow, & Champion, 1988).

There have been several helpful reviews of research on the psychological adjustment of children and adolescents with chronic arthritis (Miller, 1993; Quirk & Young, 1990; Varni & Jay, 1984), but conclusions as to whether this population is at increased risk for adjustment problems have been inconsistent. Moreover, prior reviews have not included all relevant published research reports for the time periods covered, and criteria for inclusion in the reviews have not always been presented. Lavigne and Faier-Routman (1992) provide a meta-analytic review of children's adjustment to a wide range of pediatric physical disorders. Results specific to chronic arthritis, however, were based on only two studies, the most recent published in 1988. Given that the most recent review of research on psychological adjustment to chronic arthritis was published in 1993, and several studies have been published since then, our ability to examine the psychological adjustment of children with this disorder is now considerably improved.

The goal of this study is to provide a systematic review of the current empirical body of literature on psychological adjustment in children and adolescents with chronic arthritis to determine whether they are at higher risk for the development of psychological adjustment problems than are healthy control children. The challenge in such a review is to integrate seemingly disparate research findings meaningfully without introducing subjective bias in the interpretation of results. Meta-analysis provides one means of accomplishing this task. Meta-analytic techniques allow for statistical analysis of results obtained from multiple studies, such that results from individual studies, rather than from individual subjects, serve as data points for analysis (Glass, McGaw, & Smith, 1981; Wolf, 1986). Findings across studies can then be quantitatively integrated without subjective bias in interpreting results, and statistical tests can be used to determine whether differences in methodological or sample characteristics influence findings. Therefore, we used meta-analytic techniques to provide a quantitative review of studies that have assessed whether children and adolescents with chronic arthritis differ from controls on specified measures of psychological adjustment.

**Methods**

**Identification of Studies**

Potential studies for this meta-analytic review of adjustment to chronic arthritis were obtained via literature searches of the topics of JRA, JCA, juvenile rheumatic disease, and juvenile arthritis in PsychInfo and Medline from the earliest years available in these databases (1887 and 1966, respectively) through July 2001. Studies were also obtained from review articles and chapters on adjustment to chronic arthritis, as well as from references contained within individual articles. Dissertation Abstracts International was not searched, and studies presented at a conference or meeting but not published in a journal or a text were excluded.

Criteria for inclusion in the meta-analysis were as follows: (a) studies were original, published research reported in English; (b) participants were children or adolescents (age 20 and under) diagnosed with chronic arthritis; (c) studies included a broad-band questionnaire yielding an estimate of overall psychological adjustment problems, a questionnaire describing internalizing or externalizing symptom frequency, or a child-rated measure of self-esteem or self-concept; and (d) studies presented data in a manner that permitted calculation of effect sizes through comparison of a chronic arthritis group with a study control group or with normative data. In cases in which adjustment data for the same sample of partici-
pants was presented in more than one report, the sample was counted only once in the analyses.

**Sample Sizes and Patient Demographics**

Based on the above criteria, 21 studies were selected for inclusion in the meta-analysis (indicated by an asterisk in the references). Sample sizes ranged from 8 to 272 chronic arthritis subjects, with a median sample size of 39 participants. Across studies, participants ranged in age from 1 to 20 years, with the majority of samples spanning a wide age range (e.g., early childhood through late adolescence). Approximately 50% to 85% of participants within each study were female, consistent with the higher observed prevalence of chronic arthritis among girls than among boys. Only two studies, however, reported results separately for boys and for girls. (See Table I for detailed information regarding sample size and gender breakdown for the 21 studies included in the meta-analysis.) For studies that provided information regarding participants’ ethnic backgrounds ($n = 8$), the majority (66% to 100%) were Caucasian.

**Medical Conditions**

Five studies included participants with diseases other than chronic arthritis. Of these five samples, 8% to 22% included children with other diseases, generally nonarthritic rheumatic diseases, including systemic lupus erythematosus, dermatomyositis, vasculitis, scleroderma, fibromyalgia, and mixed connective tissue disease. One of the five studies also included a JRA observation group (patients who had symptoms of JRA but did not meet diagnostic criteria) that included 13% of the sample. Across all of the studies included in the meta-analysis, children with diseases other than chronic arthritis constituted only 6% of the total number of participants. (See Table I for information regarding participants’ diagnoses in each of the studies.)

**Control Groups**

Eleven studies recruited control groups of children without chronic arthritis. In eight of these studies, potential control participants were excluded if they had a chronic medical condition. For nine studies, control participants

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**Table I. Characteristics of Individual Studies Included in the Meta-analysis**

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>JRA</th>
<th>Spondylo-arthropathy</th>
<th>Other</th>
<th>Female %</th>
<th>Diagnosis (%):</th>
<th>d for Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aasland &amp; Diseth (1999)</td>
<td>23</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>52</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Baldaim et al. (1995)</td>
<td>29</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>48</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Brace et al. (2000)</td>
<td>16</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>75</td>
<td>N/A</td>
<td>.95</td>
</tr>
<tr>
<td>Daltroy et al. (1992)</td>
<td>99</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>76</td>
<td>.22</td>
<td>.42</td>
</tr>
<tr>
<td>Daniels et al. (1987)</td>
<td>93</td>
<td>82</td>
<td>0</td>
<td>18</td>
<td>74</td>
<td>.43</td>
<td>N/A</td>
</tr>
<tr>
<td>Degotardi et al. (1999)</td>
<td>30</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>80</td>
<td>.03</td>
<td>.09</td>
</tr>
<tr>
<td>Flato et al. (1998)</td>
<td>39</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>61$^a$</td>
<td>−.30</td>
<td>.10</td>
</tr>
<tr>
<td>Frank et al. (1998)</td>
<td>92</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>64$^a$</td>
<td>.28</td>
<td>N/A</td>
</tr>
<tr>
<td>Garstein et al. (1999)</td>
<td>35</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>69</td>
<td>.26</td>
<td>.21</td>
</tr>
<tr>
<td>Haggland et al. (2000)</td>
<td>53</td>
<td>90$^a$</td>
<td>0</td>
<td>10$^a$</td>
<td>64$^a$</td>
<td>.63</td>
<td>.82</td>
</tr>
<tr>
<td>Harris et al. (1991)</td>
<td>12</td>
<td>92</td>
<td>0</td>
<td>8</td>
<td>58</td>
<td>.89</td>
<td>.40</td>
</tr>
<tr>
<td>Huygen et al. (2000)</td>
<td>46</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>68$^a$</td>
<td>.13</td>
<td>.33</td>
</tr>
<tr>
<td>Lavigne et al. (1992)</td>
<td>8</td>
<td>86</td>
<td>14</td>
<td>0</td>
<td>86</td>
<td>.34</td>
<td>.51</td>
</tr>
<tr>
<td>McAnarney et al. (1974)</td>
<td>42</td>
<td>88</td>
<td>0</td>
<td>12</td>
<td>NR</td>
<td>.52</td>
<td>N/A</td>
</tr>
<tr>
<td>Noll et al. (2000)</td>
<td>64</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>53</td>
<td>.16</td>
<td>.27</td>
</tr>
<tr>
<td>Timko et al. (1992)</td>
<td>80</td>
<td>77$^a$</td>
<td>1$^a$</td>
<td>22$^a$</td>
<td>68</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Ungerer et al. (1988)</td>
<td>272</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>67</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Van der Net et al. (1977)</td>
<td>17</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>67$^a$</td>
<td>.41</td>
<td>.84</td>
</tr>
<tr>
<td>Vandvik (1990)</td>
<td>75</td>
<td>77$^a$</td>
<td>11$^a$</td>
<td>12$^a$</td>
<td>60$^a$</td>
<td>.28</td>
<td>.51</td>
</tr>
<tr>
<td>Wallander et al. (1988)</td>
<td>24</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>NR</td>
<td>.15</td>
<td>.70</td>
</tr>
<tr>
<td>Weiss et al. (2001)</td>
<td>20</td>
<td>70</td>
<td>0</td>
<td>0</td>
<td>65</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

$N$ indicates the number of participants in each study used for calculation of means and standard deviations on the measures of adjustment used for the meta-analysis (although some studies have a larger overall sample size). Percentage diagnosis indicates the percentage of children meeting criteria for JRA or spondyloarthropathy, based on ACR or EULAR criteria. NR indicates that the information for that cell of the table was not reported. N/A indicates that study did not provide applicable information.

$^a$Signifies that percentage is based on information provided in the original study for the overall sample, but descriptive data for the subset of participants used in the meta-analysis was not provided in the original study.
were drawn from the communities or classrooms of children with arthritis. These control children were generally matched with children with arthritis on characteristics such as age, gender, and ethnicity. Control groups were generally similar to arthritis groups on characteristics such as socioeconomic status and number of parents living in the home. For two studies, control groups included siblings closest in age to the children with arthritis.

Ten studies in the meta-analysis did not recruit control groups. One of these studies provided normative data on the Child Behavior Checklist (CBCL) for purposes of comparison with participants with chronic arthritis, three provided normative data for measures of self-concept, and the remaining six required comparison with published normative data at the time of this review.

**Measurement of Psychological Adjustment**

In total, 9 studies presented data on overall psychological adjustment problems (e.g., internalizing and externalizing symptoms), 13 on the frequency of internalizing symptoms (e.g., anxiety, depression, social withdrawal), 13 on the frequency of externalizing symptoms (e.g., hyperactivity, oppositional behavior, aggression), and 9 on self-concept. The outcome measure used in the majority of studies of internalizing or externalizing symptoms \( (n = 13) \) was the CBCL (Achenbach & Edelbrock, 1983), a parent-report measure of emotional and behavior problems. Two studies used the Youth Self-Report (YSR; Achenback & Edelbrock, 1987), the child self-report version of the CBCL. Among studies of self-concept, the most common outcome measure \( (n = 4) \) was the global self-worth subscale of the Self-Perception Profile for Children (Harter, 1985). Studies of self-concept yielded the greatest number of comparisons of arthritis and control groups based on child self-report. There was not a sufficient number of studies specifically measuring depression \( (n = 5) \) or anxiety \( (n = 1) \) to include these studies in the analysis.

**Computation and Analysis of Effect Sizes**

Methodology for the meta-analysis followed that of Lavigne and Faier-Routman’s (1992) meta-analytic review of children’s adjustment to pediatric physical disorders. For studies in which control groups were recruited, effect sizes were calculated by comparing results for chronic arthritis groups and study controls. For studies without control groups, effect sizes were calculated based on comparisons with normative data provided by the authors or available published normative data when the authors did not provide this data.

Effect sizes were calculated using the procedures described by Glass, McGraw, and Smith (1981) and Wolf (1986). Nineteen of the 21 studies reported means and standard deviations on outcome measures, from which effect sizes could be calculated by comparing arthritis groups to control groups or to normative data. For these studies, the effect size index calculated was \( d \), the difference between the arthritis and control group means, divided by the standard deviation of the control group. Cohen (1977) has provided rough guidelines for “small,” “medium,” and “large” effect sizes in the behavioral sciences (for the effect size \( d: .20, .50, \) and .80, respectively).

One study reported no significant difference between the chronic arthritis group and the control group on a measure of self-concept, but did not report information necessary to calculate an effect size. For this study, the conservative strategy of assigning an effect size of zero was used, indicating exactly no difference between the two groups. Another study reported the percentages of children in the arthritis and control groups who exceeded a cutoff score on a measure of behavioral and emotional problems and who endorsed negative self-comments on a measure of self-concept. For this study, the effect sizes were determined by consulting a table using probit transformation methods to convert differences in proportions to effect size (Glass et al., 1981).

For studies that reported outcome data separately for subgroups of the sample (e.g., reported outcomes separately for boys and girls or for different age groups) but did not report adjustment data for the sample as a whole \( (n = 4) \), we created a composite effect size for the entire study by averaging the effect sizes calculated for each subgroup of the sample. Similarly, for one study that reported data separately for mother and father ratings on outcome measures, we created composite effect sizes by averaging the effect sizes for both parents’ ratings. The decision to combine mother and father ratings was made because parent ratings consisted of a combination of mother and father reports in the majority of studies. A composite effect size was also created for one study that reported data separately for parent and child ratings to avoid artificially inflating the number of effects beyond the number of independent studies (Wolf, 1986). For this study, parent ratings were also examined separately from child ratings.

For studies that reported internalizing and externalizing symptom frequency but did not report data on overall psychological adjustment problems \( (n = 6) \), we created a composite effect size for overall psychological functioning for that sample by averaging a study’s effect sizes for internalizing and externalizing problems. Using this strategy, we could calculate an effect size for overall psychological adjustment problems for 15 of the studies included in the meta-analysis.
To determine whether the total group of children and adolescents with chronic arthritis differed from controls on outcome measures, we averaged individual effect sizes for each of the studies in the meta-analysis to create an average effect size for each outcome measure of interest (e.g., overall psychological adjustment problems [based on 15 studies], internalizing symptoms [based on 13 studies], externalizing symptoms [based on 13 studies], and self-concept [based on 9 studies]).

**Results**

Table I lists the effect sizes obtained for each of the studies included in the meta-analysis, for overall psychological adjustment problems, internalizing symptom frequency, externalizing symptom frequency, and self-concept.

**Preliminary Analyses**

There were no significant relationships between study sample size or year of study publication and effect sizes for overall adjustment problems, internalizing symptoms, externalizing symptoms, or self-concept.

**Overall Adjustment Problems and Internalizing/Externalizing Symptoms**

The differences in overall psychological adjustment problems, internalizing symptom frequency, and externalizing symptom frequency between arthritis groups and study-recruited and normative control groups are summarized in Table II using mean effect sizes across studies. A higher level of adjustment problems in the arthritis group is indicated by a positive mean effect size. Statistical significance was determined by calculating 95% confidence intervals (CIs) for the mean effect sizes and determining if the means differed from an effect size of .00.

The first analyses combined data from both parent report and the two studies that obtained child report of psychological data. As seen in Table II, the effect sizes for overall adjustment problems and for internalizing symptoms differed significantly from zero, indicating higher levels of these problems for the total group of children and adolescents with arthritis than for controls. There was no difference in the level of externalizing symptom frequency between arthritis and control groups. The effect size for internalizing symptoms was significantly larger than the effect size for externalizing symptoms, t(24) = 3.14, p = .00.

Because there were only two studies in which outcome data were based on child self-report (Degotardi et al., 1999, in which only child-report data were available for overall, internalizing, and externalizing problems, and Brace, Smith, McCauley, & Sherry, 2000, which, included both child and parent report for internalizing problems), we recalculated mean study-level effect sizes excluding child ratings. Comparing average effect sizes based only on parent report, we found that results remained the same. Arthritis groups had significantly higher levels of overall psychological adjustment problems (d = .31; CI = .17, .46; p = .00) and internalizing problems (d = .53; CI = .34, .72, p = .00) than did control groups. There was no difference in the level of externalizing symptom frequency between arthritis and control groups.

**Comparisons of Study Controls Versus Norms.** There may be differences in the effect sizes across studies when illness groups are compared to normative data versus study-recruited control groups (Lavigne & Faier-Routman, 1992). If adjustment measures are sensitive to demographic characteristics and these characteristics vary between study and normative samples, group differences may be inappropriately attributed to the effect of the illness (Lavigne & Faier-Routman, 1992). To determine whether the type of control group used influenced results, we calculated mean effect sizes for overall psychological adjustment separately for the eight studies that compared arthritis groups to study-recruited controls and the seven studies that compared arthritis groups to normative data. For studies using study-recruited controls, arthritis groups had significantly higher levels of overall psychological adjustment problems than did controls (d = .37; CI = .20, .54; p = .00). For studies comparing adjustment of children with arthritis to normative data, however, there was no significant difference in levels of psychological adjustment problems between arthritis groups and controls. The difference between effect sizes for studies using control participants versus studies using normative data was not significant.

**Comparisons of Samples With Chronic Arthritis Only Versus Mixed Rheumatic Disease Groups.** Children with rheumatic diseases other than chronic arthritis may experience more fatigue, significant disease in other organs, or risk of mortality than children with arthritis (Billings...
et al., 1987; Cassidy & Petty, 1995). Therefore, we calculated mean effect sizes and confidence intervals separately for the five studies with mixed disease groups and for the ten studies including only participants with arthritis to determine whether the inclusion of mixed samples may have influenced overall results. For both studies including only participants with arthritis and studies with mixed samples, the disease samples had significantly higher levels of overall psychological adjustment problems than controls (for arthritis only, $d = .17; CI = .04,.29; p = .02$; for mixed samples, $d = .55; CI = .35,.75; p = .01$). Effect sizes for studies with mixed disease samples, however, were significantly larger than effect sizes for studies including only children and adolescents with chronic arthritis, $t(13) = 3.35, p = .01$, indicating higher levels of overall adjustment problems among children in the mixed disease groups than among children in the arthritis only groups.

**Self-Concept**

The difference in child-reported self-concept between arthritis groups and study-recruited and normative control groups is reported in Table II. More positive self-concept in the arthritis group is indicated by a positive mean effect size. As seen in Table II, based on calculations of 95% CIs, the effect size for self-concept did not differ significantly from zero, indicating no difference between arthritis and control groups.

**Comparisons of Study Controls Versus Norms.** Mean effect sizes for self-concept were calculated separately for the five studies that compared arthritis groups to study-recruited controls and the four studies that compared arthritis groups to normative data. Because the number of studies is small, results are suggestive of differences between the types of controls. For studies using recruited controls, the mean effect size was negative, suggesting a trend toward more negative self-concept among children with arthritis than controls ($d = -.26; CI = -.55,.03$), although for studies using normative data, the mean effect size was positive, suggesting a trend toward more positive self-concept among children with arthritis than controls ($d = .46; CI = -.13,1.05$). The number of studies in each group was small, however, and the standard error large, so effect sizes did not differ from zero. Effect sizes for studies using recruited controls were, however, significantly lower than effect sizes for studies using normative data, $t(7) = 2.36, p = .05$, indicating a tendency for comparisons with normative data on self-concept measures to underestimate self-concept problems of children with arthritis.

**Comparisons of Samples With Chronic Arthritis Only Versus Mixed Rheumatic Disease Groups.** Mean effect sizes and confidence intervals were calculated separately for the four studies with mixed disease groups and for the five studies including only participants with arthritis. Effect sizes did not differ significantly from zero for either comparison. The difference between effect sizes for studies using mixed samples and studies using only participants with arthritis was not significant, suggesting that the inclusion of mixed disease samples did not influence study findings on measures of self-concept.

**Calculation of the Fail-Safe N**

Published studies may be a biased sample of the studies that are actually carried out, since nonsignificant findings are rarely published (Rosenthal & Rosnow, 1991; Wolf, 1986). The “fail-safe N” is an estimate of the number of additional studies averaging nonsignificant results that would be necessary to reverse the conclusion drawn from a meta-analysis (e.g., bring the average effect size below a particular criterion value; Cooper, 1979; Rosenthal & Rosnow, 1991). Calculation of the fail-safe N was conducted using guidelines provided by Orwin (1983) for outcome measures that showed significant differences between children with arthritis and controls. Seven additional studies averaging nonsignificant results would be required to bring the average effect size for total adjustment problems down to $d = .20$, a small effect size based on the guidelines provided by Cohen (1977). Eighteen studies would be required to bring the average effect size for internalizing problems down to $d = .20$. This would constitute a 47% increase in the existing number of studies of overall problems and a 138% increase in the existing number of studies of internalizing problems meeting criteria for inclusion in the meta-analysis.

**Discussion**

Results of the meta-analysis indicate that children and adolescents with chronic arthritis are at increased risk for psychological adjustment problems in comparison with controls, according to parent report. Specifically, children with arthritis appear to be at risk for the development of overall adjustment problems and internalizing symptoms, but not for externalizing problems. Youths with arthritis were not found to be at greater risk for poor self-concept or self-esteem problems than controls were. For the purposes of this meta-analysis, effect sizes indicate the degree to which, in standard deviation units, the average participant with chronic arthritis differs from the average
control child. The average arthritis child was .30 standard deviation above the average control child on overall adjustment problems, .47 standard deviation above the average control child on internalizing problems (effect sizes between the small and medium range for behavioral research), and only .04 and .06 standard deviation above the average control child on externalizing problems and self-concept, respectively.

It is of interest that children and adolescents with chronic arthritis appear to be more likely to exhibit internalizing than externalizing symptoms. The pattern of greater risk for internalizing problems is consistent with findings from epidemiological research and literature reviews of psychological adjustment in pediatric chronic illness (Gortmaker, Walker, Weitzman, & Sobol, 1990; Lavigne & Faier-Routman, 1992; Thomspson & Gustafson, 1996). It is not entirely clear, however, why children with arthritis display more internalizing than externalizing problems. One possibility is that the physical limitations associated with this disease constrain “acting out” behaviors, such as getting into fights. The gender distribution of children within studies may have influenced results. Although depression occurs at approximately the same rate in childhood, by adolescence the female-to-male ratio is approximately 2:1 (Birmaher et al., 1996). Because all but one of the studies in the meta-analysis included adolescents in their samples, and the majority of children with arthritis were girls, these factors may have contributed toward the higher rate of internalizing problems in this population.

Participants with arthritis had significantly higher rates of overall psychological adjustment problems when compared to study-recruited controls, but not when compared to normative data. In their meta-analytic review of psychological adjustment to pediatric physical disorders, Lavigne and Faier-Routman (1992) found that the more careful the matching of chronic illness and control samples on demographic characteristics, the greater the effect sizes for comparisons between the two groups on adjustment measures. As studies using controls in this meta-analysis generally used careful matching procedures, such procedures may have contributed to the larger effect sizes for comparisons using study-recruited controls.

Studies including children and adolescents with rheumatic diseases other than chronic arthritis demonstrated significantly larger differences from control samples on overall adjustment problems than did studies with pure arthritis samples. This difference may be related to greater risk for complications in other rheumatic diseases than in chronic arthritis, including risk of mortality and more significant involvement of other organ systems such as the heart, lungs, liver, and central and peripheral nervous systems (Cassidy & Petty, 1995), and requirement for more complex medical care. These findings suggest the importance of greater specificity in future research (e.g., presenting results for diagnostic groups separately, as well as for the total sample in studies using mixed rheumatic disease populations).

Although youths with arthritis were not found to be at greater risk for poor self-concept than controls, the number of studies was small. Nonetheless, examination of the impact of the type of control group used suggests that researchers should use caution in drawing conclusions about the self-concept of children with arthritis based solely on comparison with normative data, as this practice may underestimate the impact of arthritis on self-esteem. Of note, several of the studies in the meta-analysis reported data on domain-specific assessments of competency (e.g., scholastic competence, athletic competence, physical appearance, social acceptance, etc.) in addition to total self-concept/self-esteem scores or assessments of global self-worth. Although these were too few in number to include in the meta-analysis, future research with this population may benefit from examination of the ways in which children's assessments of specific competencies relate to their global sense of self-worth, an issue addressed only in one study to date (Aasland & Diseth, 1999).

Several potential limitations of this review should be addressed. As noted earlier, published research tends to be biased in favor of significant findings, since nonsignificant findings are rarely published (Wolf, 1986). Calculation of the fail-safe N, however, indicates that 18 additional studies with nonsignificant results would be necessary to alter the findings of increased risk for internalizing problems among children and adolescents with chronic arthritis. It is unlikely that an additional 18 studies, all nonsignificant, on this topic remain unpublished.

Although statistical differences were found between levels of adjustment problems in arthritis and control samples, suggesting the importance of assessing for adjustment problems in this population, the results of the meta-analysis do not directly address the issue of clinical significance. It is not known, for example, how many children with chronic arthritis experience problems that would meet criteria for a psychiatric diagnosis and require clinical intervention. Examination of the mean T scores and standard deviations on the CBCL and YSR for studies included in the meta-analysis, however, can provide information regarding the percentage of children and adolescents who scored above clinical cutoffs on these measures.
Assuming that $T$ scores were normally distributed in the study samples, across studies, 13% to 45% (median = 20.5%) of youths with arthritis scored above clinical cutoffs for internalizing problems.

This meta-analysis relied heavily on studies using the CBCL as a measure of child psychological adjustment. Concerns have been raised regarding the use of the CBCL in research with children with a chronic illness (Perrin, Stein, & Drotar, 1991). The CBCL and YSR include eight items that refer to physical symptoms “without medical cause,” the majority of which are scored on the somatic complaints subscale and contribute toward the internalizing problems score. Because the designation “without medical cause” is open to subjective interpretation by the respondent, endorsement of illness-related symptoms (e.g., aches/pains or fatigue for youths with arthritis) could artificially inflate internalizing problem scores (Perrin et al., 1991).

It is unclear to what extent endorsement of somatic items on the CBCL may have elevated internalizing scores in the studies included in the meta-analysis. For three of these studies, authors examined the impact of dropping physical symptom items from raw scores on the CBCL. Vandvik (1990) and Noll et al. (2000) found that when somatic components were subtracted from internalizing raw scores, differences between arthritis and control group scores were no longer significant. Daltroy et al. (1992), however, found that adjusted and unadjusted scores were extremely highly correlated with one another ($r = .98$), and that removal of somatic items reduced the percentage of their sample falling in the clinical range for overall problems only slightly, from 18% to 15%. Unfortunately, none of these studies reported adjusted means and standard deviations on the CBCL following the removal of physical symptom items from the internalizing scale. Therefore, it was not possible to determine whether the removal of physical symptom items would change the magnitude of the effect size for the difference between scores of children with arthritis versus controls and thus influence the results of this meta-analysis. Future research may benefit from use of measures with demonstrated validity in populations of children with chronic illness. One example is the Personal Adjustment and Roles Skills Scale III (Stein & Jessop, 1990; Walker, Stein, Perrin, & Jessop, 1990), which does not include items about physical symptoms that could bias results.

Other potential concerns regarding the use of the CBCL with children with chronic illness may be less relevant to the results of this study. Caution has been advised in making inferences about the frequency of behavioral problems based on comparison to CBCL norms instead of to recruited control groups. The CBCL standardization sample excluded children with recent mental health referrals; thus, comparison to norms could exaggerate differences from a study’s sample of interest (Perrin et al., 1991). It is unlikely that use of normative data artificially inflated effect sizes for this meta-analysis, however, because greater risk for adjustment problems was found in studies using recruited controls than for studies using comparison to norms. Additionally, concerns have been raised regarding the limited ability of the CBCL to detect subtle adjustment problems among youths with chronic illness (Perrin et al., 1991). In this study, however, clinically relevant differences from controls were of greater concern than variations within the normal range.

Another limitation of the meta-analysis is the potential impact of rater bias on results. Assessment of internalizing and externalizing symptoms in the studies included in the meta-analysis was based almost exclusively on parent report. For the one study that included both child and parent report of adjustment problems, no analyses were provided comparing problem reports by rater. Of note, a handful of studies of adjustment to chronic arthritis have included child self-report in the form of depression and anxiety symptom rating scales, but as noted earlier, not a sufficient number to include in the meta-analysis. It is unclear to what extent inclusion of child report of adjustment problems would change the nature of the results of the meta-analysis, however. Studies comparing parent and child reports of psychiatric symptoms and problem behaviors have found that children and adolescents tend to report more internalizing problems than their parents (Edelbrock, Costello, Dulcan, Conover, & Kala, 1986; Herjanic & Reich, 1982; Rey, Schrader, & Morris-Yates, 1992). If this population follows the pattern found by others, the average effect size for the difference between youths with chronic arthritis and controls on internalizing problems likely would actually increase based on child report. Clearly, more routine inclusion of the child’s perspective in future research with this population will be necessary for a more complete picture of adjustment to this illness.

One of the strengths of this review is its use of a meta-analytic approach to integrate the seemingly inconsistent results among studies investigating risk for adjustment problems in children and adolescents with chronic arthritis. A recent review of meta-analytic studies in PsychInfo shows that more than 200 have been published overall, with the technique applied to both basic questions about the nature of disorders and to the effects of treatments for different problems. The procedure is applied much less commonly to address problems in the
clinical child and pediatric psychology areas, with no more than 20 papers reported in PsychInfo. Although comparisons between arthritis samples and controls may not reach statistical significance in individual studies, this quantitative integration of findings across studies allows for a clearer view of the direction and magnitude of differences between these two groups. Particularly, the results of this study suggest the importance of assessment for internalizing problems among children and adolescents with chronic arthritis.

Given the results of this meta-analysis, an important direction for future research may be to move beyond the broad focus on internalizing problems toward the examination of specific domains of psychopathology or adjustment that may account for higher scores on parent-report measures of internalizing symptoms among children and adolescents with chronic arthritis. For example, it may be useful to look more carefully at symptoms of anxiety and depression, or at other psychosocial domains, such as peer relations, withdrawal, or dependency. A clearer understanding of the specific areas in which these youths face challenges will be important for improving screening and intervention efforts.

Whereas the results of the meta-analysis suggest that children and adolescents with chronic illness, as a group, face greater risk for the development of internalizing problems, there are significant individual differences in response to the life stress of chronic illness (Wallander & Thompson, 1995). Examination of factors associated with resilience or poor adjustment will be important in promoting positive outcomes for these children. At the time the literature review was conducted for this study, we reviewed a number of studies examining correlates of adjustment among youths with chronic arthritis. Although there was not a sufficient number of studies examining any specific risk or resistance factor to conduct a meta-analysis of correlates of adjustment, several areas appear promising for further investigation, including the children’s social support and social involvement (Timko, Stovel, Baumgartner, & Moos, 1995; Ungerer et al., 1988), family coping strategies (Degotardi et al., 1999), and child perceived burden of illness (Ennett et al., 1991). As more research is conducted in this area, a quantitative review of findings may be helpful in integrating results.

Acknowledgments
We thank Sara Knight, PhD, for her thoughtful comments on a draft of this manuscript.

Received October 12, 2001; accepted March 14, 2002

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Asterisk indicates studies included in the meta-analysis.


