Objective To determine the extent to which parental perceptions of child vulnerability predict school and social adjustment in children with chronic illness. Methods Sixty-nine child-parent dyads were recruited from pediatric rheumatology and pulmonary clinics. Parents completed a self-report measure of parental perceptions of child vulnerability. Children completed measures of social adjustment. Parents also provided written permission to obtain school attendance records. Physicians provided a global assessment of children’s disease severity. Results Increased parental perceptions of child vulnerability were related to increased social anxiety in children, even after controlling for child age and disease severity. Lower levels of parental education related to both increased perceptions of child vulnerability and increased school absences. Conclusions Health providers should assess parental beliefs and parenting practices in assessing the adjustment of children with chronic illness. Moreover, interventions aimed at enhancing child adjustment to chronic illness might best target parents as well as children.

Key words chronic illness; parental perceptions of child vulnerability; social adjustment; school attendance; parental beliefs.
Increased perceptions of child vulnerability have been linked to internalizing problems in children born prematurely or at a very low birthweight (e.g., Estroff, Yando, Burke, & Snyder, 1994). Perceptions of child vulnerability and related cognitions have been discussed in the health belief model to explain medical adherence and health care use (e.g., Bush & Iannotti, 1990). Increased health care use has been reported for children whose parents report worrying more about children’s susceptibility to illness (e.g., Fiegelman et al., 1990; Maiman, Becker, & Katlic, 1986). In children with asthma, Spurrier et al. (2000) reported that parents who perceive their children as vulnerable are more likely to take them to physicians for acute asthma care and to keep them home from school.

The goal of this study was to determine the extent to which parental perceptions of child vulnerability predict school absences and social anxiety in school-age children with rheumatic and pulmonary disease. Arthritis and asthma are among the most common childhood chronic diseases and have unpredictable courses characterized by periods of acute illness flares and quiescence. We hypothesized that increased parental perceptions of child vulnerability would predict increased social anxiety and more school absences.

**Method**

**Participants**

The sample consisted of 69 child-parent dyads recruited from the population of patients receiving follow-up care in the pediatric rheumatology (n = 34) and pulmonary (n = 35) specialty clinics at Duke University Medical Center from October 1999 through March 2000. Child-parent dyads were eligible to participate if children were 7 to 14 years old and had been diagnosed with a well-defined rheumatic or pulmonary disease. The final study sample represented 97% of families approached during recruitment. Two families declined participation due to time constraints.

The 43 girls and 26 boys in the sample had a mean age of 10.71 years and a mean grade level of fifth grade (SD = 2.30; range = 1st through 9th grade). Of children in the rheumatology sample, 70% were diagnosed with juvenile arthritis, 12% with mixed connective tissue disease, 9% with systemic lupus erythematosus, and 9% with other rheumatic diseases. Diagnoses in the pulmonary sample were asthma (63%), cystic fibrosis (28%), and related illnesses (9%). Sixty-four percent of children were Caucasian, 25% African American, and 11% of other minority groups. Fifty-nine (86%) parents were women and 72% were married. Average parent age was 39.28 years (SD = 7.60; range = 29–72 years). Average educational level of parents was 14 years (SD = 2.36; range = 6–12 years).

**Procedure**

Parents and children were recruited during routine clinic visits. Informed consent was obtained from parents according to procedures of the local institutional review board. Questionnaire data were obtained from the child and primary caretaker accompanying the child. Parents rated their child’s disease severity and were asked to sign a release granting access to school attendance records. Children under 10 years of age and older children requesting assistance were read the questionnaires. Finally, physicians rated disease severity, unaware of parental ratings. Families were compensated for their participation with a food coupon and a parking pass.

**Measures**

**Demographic Information and Disease Severity.** Parents provided child age, gender, race, and grade in school and parent age, gender, education level, and marital status. Physicians provided an independent rating of current disease severity on a 100-mm visual analogue scale anchored by “Asymptomatic” and “Very Severe.” This Physician’s Global Assessment Rating (PGA) is a well-accepted and widely used measure in medical practice and research (Gianinni et al., 1997). Parents provided a rating of child disease severity on a 100-mm visual analogue scale modeled after the PGA and anchored by “Not Severe at All” and “Very Severe.”

**Predictor Variable.** The Child Vulnerability Scale assessed parents’ perceptions of children’s general vulnerability to health problems (Forsyth et al., 1996). Responses to the 8-item scale were made on a 4-point Likert scale ranging from “Definitely False” (0) to “Definitely True” (3). Sample items include “I sometimes get concerned that my child doesn’t look as healthy as s/he should,” and “I often check on my child at night to make sure s/he is okay.” The scale is scored by summing responses. Higher scores reflect increased perceptions of vulnerability. Adequate reliability has been demonstrated for the Child Vulnerability Scale with an internal consistency alpha of .74 (Forsyth et al.) and a test-rest reliability coefficient of .84 (Thomasmagd, Shonkoff, Metz, & Edelbrock, 1995). Convergent validity has also been demonstrated (Forsyth et al.). Internal consistency alpha in this sample was .82.

**Outcome Variables.** The Social Anxiety Scale for Children-Revised (SASC-R; La Greca & Stone, 1993) assessed children’s subjective experience of social anxiety along three factors: Fear of Negative Evaluation from Peers, Social Avoidance and Distress Specific to New Situations, and
Generalized Social Avoidance and Distress. Children responded to the 26-item scale by indicating how much each was true for them on a 5-point Likert scale ranging from “Not at all” (1) to “All the time” (5). Factor scores are obtained by summing scores for items in each factor. Higher scores indicate increased social anxiety. The SASC-R has demonstrated adequate levels of reliability and validity with Cronbach coefficient alphas above .65 for each factor and scores relating to perceived social acceptance and self-worth (La Greca & Stone).

Parents were asked to provide written permission to access children's school attendance records for the total number of missed school days for the 1999–2000 academic school year. Of the 69 parents in the sample, 63 provided permission. Reasons for not granting permission were disagreements with the school or being homeschooled. Of children for whom permission was obtained, school attendance records through May 15, 2000, were gathered for 51 children by contacting each school and providing a fax or mail copy of the permission form. Records for the remaining children were unavailable, despite several attempts to contact school officials.

Data Analysis

A series of hierarchical regressions was performed to determine relationships between predictor and outcome variables. To reduce Type I error, preliminary analyses (e.g., two-tailed Pearson-product moment correlations) were done to determine demographic and disease variables related to child outcomes. Variables with significant correlations with child outcomes were included in regression analyses. Child age was negatively correlated with generalized social anxiety ($r = -.32, p < .01$), higher physician-rated disease severity related to more school absences ($r = .49, p < .01$), and parental education in years negatively correlated with school absences ($r = -.35, p < .01$).

In total, four stepwise hierarchical regressions were performed: one predicting school absences and separate hierarchical regression analyses for each factor of the SASC-R because results of a multivariate hierarchical regression analysis were significant, Wilk’s lambda, $F(3, 62) = 6.24, p < .01$. In each regression, child age and PGA were entered in Steps 1 and 2, respectively. In Step 3, two parent variables were entered: parental education in years and perceptions of child vulnerability. This strategy was used to examine the unique contribution of the parental variables after controlling for the observed influences of child demographic and disease variables on the child outcomes.

Results

Descriptive Statistics

Table I presents descriptive information on the mean, standard deviation, and range of scores for the predictor and outcome measures and ratings of child disease severity. Predictor Variables. On average, parents endorsed perceptions of vulnerability near the level proposed as the cutoff for “high perceptions of vulnerability” (a score of 10) (Forsyth et al., 1996). With this cutoff to dichotomize the sample, 42 (61%) children were perceived as vulnerable by their parents. Increased parental perceptions of child vulnerability were related to increased disease severity as rated by physicians and parents ($r = .28, p < .05$ and $r = .49, p < .01$, respectively) and fewer completed years of parental education ($r = -.38, p < .01$).

Child Outcomes. As shown in Table 1, children varied widely in the amount of school they missed, with some children missing relatively few days and others missing a considerable amount (e.g., 48–60 days). The distribution for school absences was highly skewed (skewness = 2.52); thus, a natural log transformation was performed to normalize the distribution. The transformed scale of school absences was used in all subsequent analyses. Regarding social anxiety, compared to norms reported by La Greca and Stone (1993), children in this sample generally reported levels similar to those reported by a sample of fourth through sixth grade public school students.

<table>
<thead>
<tr>
<th>Measure</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Vulnerability Scale (Total Score)</td>
<td>69</td>
<td>9.62</td>
<td>4.09</td>
<td>0–17</td>
</tr>
<tr>
<td>Social Anxiety Scale for Children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of negative evaluation</td>
<td>67</td>
<td>18.34</td>
<td>8.52</td>
<td>8–39</td>
</tr>
<tr>
<td>Social avoidance and distress</td>
<td>67</td>
<td>15.19</td>
<td>5.00</td>
<td>6–30</td>
</tr>
<tr>
<td>Generalized social distress</td>
<td>67</td>
<td>8.21</td>
<td>3.81</td>
<td>4–18</td>
</tr>
<tr>
<td>School absences (days)</td>
<td>51</td>
<td>11.31</td>
<td>10.58</td>
<td>0–60</td>
</tr>
<tr>
<td>Disease severity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician global assessment</td>
<td>68</td>
<td>34.65</td>
<td>24.50</td>
<td>0–98</td>
</tr>
<tr>
<td>Parent-rated disease severity</td>
<td>69</td>
<td>46.04</td>
<td>24.81</td>
<td>0–100</td>
</tr>
</tbody>
</table>

Table I. Descriptive Information on Predictor and Outcome Measures
Parents who perceived their children as more vulnerable had children who were more socially anxious (see Table II). Controlling for child age and physician-rated disease severity, parent perceptions of child vulnerability predicted a significant proportion of variance on two factors of the SASC-R: Generalized Social Distress ($R^2$ change = .18, $p < .01$) and Social Avoidance and Distress in New Situations ($R^2$ change = .07, $p < .05$). Child age and physician-rated disease severity predicted a significant proportion of variance in generalized social distress.

**School Absences.** Physician-rated disease severity predicted a significant proportion of the variance in children’s missed school ($R^2$ change = .25, $p < .01$). Neither parental variable reached statistical significance in the prediction of school attendance when entered in the third step using stepwise selection procedures with an entry criterion of $p < .05$. With a less stringent entry criterion of $p < .10$, parental education was retained in the third step of the regression, suggesting a trend toward significance in the relationship between lower levels of parent education and increased school absences ($R^2 = .06$, $p = .06$). The results of this regression are summarized in Table II.

**Regression Models**

**Social Anxiety.** Parents who perceived their children as more vulnerable had children who were more socially anxious (see Table II). Controlling for child age and physician-rated disease severity, parent perceptions of child vulnerability predicted a significant proportion of variance on two factors of the SASC-R: Generalized Social Distress ($R^2$ change = .18, $p < .01$) and Social Avoidance and Distress in New Situations ($R^2$ change = .07, $p < .05$). Child age and physician-rated disease severity predicted a significant proportion of variance in generalized social distress.

**School Absences.** Physician-rated disease severity predicted a significant proportion of the variance in children’s missed school ($R^2$ change = .25, $p < .01$). Neither parental variable reached statistical significance in the prediction of school attendance when entered in the third step using stepwise selection procedures with an entry criterion of $p < .05$. With a less stringent entry criterion of $p < .10$, parental education was retained in the third step of the regression, suggesting a trend toward significance in the relationship between lower levels of parent education and increased school absences ($R^2 = .06$, $p = .06$). The results of this regression are summarized in Table II.

**Discussion**

Parents endorsed perceptions of child vulnerability at an average level near the cutoff for “high perceptions of vulnerability” (Forsyth et al., 1996), suggesting that parents of children with chronic illness generally have increased perceptions of child vulnerability. Indeed, children with greater physician-rated disease severity whose parents perceived their disease as more severe were more likely to be perceived as vulnerable, reflecting the true medical vulnerability of these children. However, there was variability in perceptions of vulnerability and only small to medium correlations between disease severity ratings and parent ratings of child vulnerability. These findings extend the literature by describing parental perceptions of child vulnerability in childhood chronic illness. Some parents may perceive their child as more susceptible to health problems than is indicated by their health status (Leslie & Boyce, 1996). In future studies, objective measures of child disease severity should be included to reduce confounds of using self-report measures. Factors influencing anxious cognitions, such as parent adjustment or illness experience, should be clarified.

As implied by models of adaptation to childhood chronic illness, children whose parents perceived them as more vulnerable reported more generalized social distress and distress in response to novel social situations. Future studies are necessary to determine the mechanism by which perceptions of child vulnerability influence children’s anxiety in social situations and to examine relationships between perceptions of vulnerability and other aspects of child adjustment, including quality of life and health care use. Parental cognitions may affect parenting behaviors, such as overprotection, which may then influence how children respond to novel situations. However, because this study was cross-sectional, one cannot rule out the possibility of a “third variable” explaining that the relationships or parent cognitions were influenced by observations of children in social settings. Also, because

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Total $R^2$</th>
<th>$df$</th>
<th>Overall $F$</th>
<th>$R^2$ change</th>
<th>$F$ change</th>
<th>Standardized $\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized Social Distress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1: Child age</td>
<td>.09</td>
<td>1, 64</td>
<td>5.73**</td>
<td>.09</td>
<td>5.73**</td>
<td>–.567</td>
</tr>
<tr>
<td>Step 2: PGA</td>
<td>.12</td>
<td>1, 63</td>
<td>3.92**</td>
<td>.03</td>
<td>2.02</td>
<td>.120</td>
</tr>
<tr>
<td>Step 3: Child vulnerability</td>
<td>.30</td>
<td>1, 62</td>
<td>7.89***</td>
<td>.18</td>
<td>14.04***</td>
<td>.446</td>
</tr>
<tr>
<td>Social Avoidance and Distress in New Situations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1: Child age</td>
<td>.03</td>
<td>1, 64</td>
<td>1.85</td>
<td>.03</td>
<td>1.85</td>
<td>–.45</td>
</tr>
<tr>
<td>Step 2: PGA</td>
<td>.05</td>
<td>1, 63</td>
<td>1.62</td>
<td>.02</td>
<td>1.38</td>
<td>.03</td>
</tr>
<tr>
<td>Step 3: Child vulnerability</td>
<td>.12</td>
<td>1, 62</td>
<td>2.62*</td>
<td>.07</td>
<td>4.42**</td>
<td>.346</td>
</tr>
<tr>
<td>School Absences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1: Child age</td>
<td>.01</td>
<td>1, 43</td>
<td>22</td>
<td>.01</td>
<td>22</td>
<td>.01</td>
</tr>
<tr>
<td>Step 2: PGA</td>
<td>.26</td>
<td>1, 42</td>
<td>7.30***</td>
<td>.25</td>
<td>14.32***</td>
<td>.01</td>
</tr>
<tr>
<td>Step 3: Parent education</td>
<td>.32</td>
<td>1, 41</td>
<td>6.48***</td>
<td>.06</td>
<td>3.85*</td>
<td>–.04</td>
</tr>
</tbody>
</table>

PGA = Physician Global Assessment.

*p < .10.

**p < .05.

***p < .01.
only two illness groups were studied, the findings may not generalize to illness groups with a less fluctuating course or poorer prognoses. A normal health comparison group was also not included, making it difficult to determine whether the findings are unique to childhood chronic disease.

Contrary to our hypotheses and the findings of Spurrier et al. (2000), parental perceptions of child vulnerability did not predict variance in school absences, possibly because we examined the influence of parental education on perceptions of child vulnerability and child outcomes. Parents with fewer years of education were more likely to perceive their children as vulnerable and to have children with more school absences. These parents may differ from more highly educated parents in the quality of their interactions with health care professionals, for example, asking fewer questions or failing to get clarification (e.g., Street, 1992). Lack of information could lead to fears that going to school may be overly tiring for children or lead to illness complications (e.g., Shapiro et al., 1995).

These results have important implications for the care of families of children with chronic illness, implications that mirror recommendations families themselves have made for improving services for children (Garwick, Kohrman, Wolman, & Blum, 1998). Families should be educated about the symptoms, course, and functional impact of children’s illnesses. Guidelines for children's participation in school and social activities should be provided. Perceptions of child vulnerability should also be directly explored. Parents should be assured that while it is reasonable to have and act on anxious cognitions about children's health, these thoughts may not correspond with children's health status. Moreover, they should be assisted in the development of realistic cognitions and expectations for their children based on objective measures of children's disease activity and functional status. This information could be disseminated by health professionals, educational materials, workshops, and parent support groups. In this process, health professionals may need to target families with less education, encouraging questions and facilitating access to resources.

Acknowledgments

This research was based on Kelly K. Anthony’s master’s thesis at the University of North Carolina at Chapel Hill under the direction of Karen M. Gil, PhD, and supported in part by a Doctoral Dissertation Award from the Arthritis Foundation. We thank all of the staff and families of the Pediatric Rheumatology and Pulmonary Specialty Clinics at Duke University Medical Center for their cooperation and participation in this research. We also thank Amanda Brown, Kelly Chadwick, Cheryl Fonda, and Amanda Mabry for their involvement in data collection and management.

Received October 29, 2001; revisions received March 28, 2002; accepted June 4, 2002

References


