

Health Status and Peer Relationships in Early Adolescence: The Role of Peer Contact, Self-esteem, and Social Anxiety

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Abstract We examined associations between children's health status and the quality of their peer relationships, as well as factors that may account for individual variation in the quality of chronically ill and healthy children's peer relationships. Our sample included 268 children (138 boys; 130 girls) with 149 European-Americans and 119 African-Americans. There were 91 children with a chronic illness; 35 with asthma, 26 with diabetes, and 30 with obesity. Chronically ill children were characterized by teachers as displaying less prosocial behavior, less overt aggression, and less relational aggression with peers than healthy children. Chronically ill children reported lower levels of peer contact and higher levels of social anxiety than healthy children. Among chronically ill children those with high self-esteem were more prosocial and less aggressive than those with low self-esteem. Our findings suggest that chronically ill children are at risk for peer relationship difficulties, but that self-

esteem may serve as a protective factor against poor peer relationships for some chronically ill children.

Keywords Health status · Peer relationships · Self-esteem · Social anxiety · Early adolescence

Introduction

Children with a chronic health condition face numerous challenges to their adjustment that do not confront their healthy peers. In identifying areas of adjustment that may be problematic for children with a chronic illness, researchers have focused on children's social relationships (La Greca 1990; Schuman and La Greca 1999). Particular attention has been directed to the quality of children's peer relationships as having significance for chronically ill children's social adjustment (Reiter-Purtill and Noll 2003; Spirito DeLawyer and Stark 1991). Peer relationships are arguably the key index of children's social competence throughout early childhood and adolescence (Ladd 2006; Meece and Laird 2006). Research involving healthy child populations clearly demonstrates that positive peer relationships are linked to children's emotional well-being, school achievement (Buhs and Ladd 2001; Wentzel 2003), and psychosocial adjustment (Hymel et al. 1990; Ladd and Troop-Gordon 2003). Likewise, empirical work suggests that among chronically ill children positive peer relationships contribute to better management of illness (Skinner et al. 2000), lower levels of aggression (Gartstein et al. 2000), and emotional well-being (Noll et al. 1996). Comparatively speaking, however, little attention has been given to the peer relationships of children with chronic health conditions relative to healthy populations (La Greca 1992; Spirito et al. 1991).

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Research that has compared the peer relationships of healthy and chronically ill children suggests that chronic illness may contribute to lower levels of social competence (see Reiter-Purtill and Noll 2003, for review). However, the majority of studies that have been conducted on the peer relationships of chronically ill children focus on global measures of social competence, usually as reported by the child's mother (Reiter-Purtill and Noll 2003; Spirito et al. 1991). The problem with such measures is that they capture information about children's functioning in a broad array of social settings, including recreational and school performance. Consequently, it is not clear if they apply to children's peer relationships per se, or if they measure children's social contacts. In an effort to overcome this limitation, recent attention has been given to the assessment of overt-behavioral social skills of children with a chronic illness. For example, Nassau and Drotar (1995) compared the self-perceived social skills of children with diabetes, asthma, and healthy controls. They found no differences between the three groups of children. More recently, Meijer et al. (2000a) examined the behavioral, cognitive, and affective components of children's peer interactions. They found that chronically ill children displayed less aggression and more submissive behavior than healthy peers. The different findings of the two studies may be attributable to the fact that Nassau and Drotar (1995) had children report on their own social behavior, whereas Meijer et al. (2000a) included both parent and child perceptions of children's social skills. Even so, the discrepancies in the results of these studies suggest that additional research is needed to better understand the connection between health status and the quality of children's peer relationships.

Explication of the role that health status plays in children's social competence with peers calls for a multidimensional view of children's peer interactions. To date, the majority of research has focused on a deficit perspective in which chronic illness is viewed as contributing to negative patterns of peer interaction (Gartstein et al. 2000; Nassau and Drotar 1995). Consequently, researchers have primarily examined indices of aggression and social withdrawal in relation to children's health status. Although informative, links between health status and negative patterns of peer interaction do not necessarily mean that chronically ill children are socially unskilled, nor does the lack of association between chronic illness and aggressive behavior allow us to infer that children are socially adept. In order to provide a more comprehensive view of the link between health status and the quality of children's peer interactions it is important for research to examine indices of both prosocial and aggressive behavior in the same study. Moreover, recent work suggests that it is important to distinguish between overt aggression, which

involves the use of physical dominance and verbal threats of physical harm, and relational aggression characterized by purposeful verbal and behavioral manipulations intended to damage friendships or feelings of inclusion within a peer group (Crick and Grotpeter 1995; Tomada and Schneider 1997). Thus our goal in the present study was to take a multidimensional view of the quality of children's peer relationships in order to better understand the link between health status and children's social adjustment with peers.

In order to gain a full understanding of the consequences of illness for children's peer relationships, it is also important to consider the processes that may be involved in links between chronic illness and the quality of children's peer interactions. An underlying assumption of much of the current theorizing concerning the role that chronic illness plays in children's adjustment is that particular interpersonal and experiential factors may make chronically ill children more vulnerable to peer relationship difficulties than their healthy counterparts (Meijer et al. 2000a, b) and may account for individual differences in the quality of peer interaction among chronically ill children (Reiter-Purtill and Noll 2003). In other words, there may be factors that moderate the effect of health status on children's peer relationships. Identifying such moderating variables will assist expanding theoretical understanding of connections between health and peer relationships, as well as offer direction for intervention efforts to help chronically ill children improve their social adjustment with peers.

La Greca (1990) has identified several reasons why chronic illness might compromise peer relationship processes. For instance, a chronic illness may affect the way a child feels about him/herself, leading to the belief that he/she does not "fit in" with peers due to the chronic illness. In this way a child's health status may interact with self-esteem to influence the quality of peer relationships, making chronically ill children more vulnerable than healthy children to peer relationship difficulties. A chronically ill child may also experience elevated levels of anxiety relative to healthy age-mates based on the possibility of having some type of manifestation of their illness, such as an asthma attack or a diabetic insulin shock, in the presence of peers (La Greca 1990). High levels of anxiety may, in turn, cause the child to act in socially unskilled ways, or resort to aggressive behavior to solve problems, with peers. Thus, patterns of connection between social anxiety and peer relationships may differ for healthy and chronically ill children. Finally, some chronic conditions may limit the type and extent of contact the child has with peers. For example, if the child's condition restricts physical activity, interrupts daily activities, or requires life-style modifications, then peer relationships may suffer as a result. Heightened parental perceptions of a chronically ill

child's physical vulnerability might also lead the parent to restrict the child's activities. Lack of experience with peers may produce deficits in children's ability to enact prosocial behavioral strategies or inhibit aggressive behavioral tendencies. To the extent that health status produces variations in children's social contact with peers, it seems reasonable to suggest that the connection between social contact and peer relationship quality may vary for healthy and chronically ill children. Thus, La Greca (1990) suggested that self-esteem, anxiety, and limited social contact all are important factors to consider in elucidating connections between health status and the quality of children's peer relationships.

It is also possible that the effects of chronic illness on children's peer relationship are more pronounced at particular periods of development. One such period is early adolescence. During this time children are confronted with multiple challenges brought about by the co-occurrence of the onset of puberty and the transition into middle school. These normative transitions introduce challenges in the family and school that the adolescent must negotiate at the same time that significant developmental changes are occurring. Particularly relevant for our study, early adolescence marks a time of significant change in children's peer relationships with the movement from an adult centered to a peer centered social network (Fuligni et al. 2001), entry into more pronounced peer group hierarchies (Brown and Klute 2003), and an increase in the personal importance of social status and popularity for children's self-concept (de Bruyn and van den Boom 2005). The transitions experienced during early adolescence increase risk for adjustment difficulties, so that a significant number of youth experience the onset of short-term and long-term negative consequences in both academic and social adjustment (Anderman 2002; Simmons et al. 1991; Wigfield et al. 1991). Some children experience an increase in problem school behavior, a decrease in liking of school, and a drop in their grade point average (Simmons et al. 1991), as well as significant decreases in self-esteem during middle school (Hirsch and Rapkin 1987; Wigfield et al. 1991). Based on these findings, it seems reasonable for us to speculate that having the added stress of a chronic illness may make children even more vulnerable than their healthy peers to adjustment difficulties during this time of developmental change. Consequently, we felt that it was important to examine the role that health status may play in children's peer interaction during early adolescence.

In summary, it appears that peer relationships might be an area of vulnerability for children with chronic illness; however, empirical literature examining this topic is limited. Moreover, what research does exist is plagued by contradictions, with some investigators finding a

significantly higher incidence of peer adjustment problems among chronically ill children (Cadman et al. 1987; Drotar 1981; Wallander et al. 1988), whereas other studies show there to be no significant problems with peer relationships (Nassau and Drotar 1995). It seems safe to assume that children with a chronic illness might be at risk for developing difficulties in peer relationships, but problems are not likely to characterize all children with a chronic illness (La Greca 1990). Consequently, there may be a variety of factors that account for variations in the quality of peer relationships among chronically ill children.

The primary purpose of our study was to compare the peer relationships of chronically ill children and healthy children. In doing so we designed the study to address a number of limitations in existing research. First, we assessed two dimensions of peer interaction, namely children's peer aggression, and children's prosocial behavior. Moreover, both overt and relational aggression was examined. Second, we obtained information from multiple reporters, including mothers, children, and teachers. Finally, we restricted the age range of the sample to 11- to 12-year-olds, in order to examine connections between health status and peer relationships during a particularly vulnerable period of development. Our second aim is to expand existing literature by examining processes that may account for variations in healthy and chronically ill children's peer relationships. Specifically, we consider children's level of social contact, self-esteem, and social anxiety as characteristics that may affect the quality of children's peer relationships. Based on theoretical and empirical literature reviewed above, we hypothesized that chronically ill children will be less aggressive, and less prosocial than healthy children. We also hypothesize that chronically ill children will have less peer contact, lower self-esteem, and higher social anxiety than healthy children. Moreover, we will examine the possible moderating role that social contact, self-esteem, and social anxiety may play in connections between health status and children's peer relationships.

Method

Participants

The data for our study came from a larger research project examining children's transition through middle school. Data were collected from 300 mother-child dyads. Families were recruited from those with children attending 13 public schools in a metropolitan southeastern city. The public schools cooperated by providing rosters and demographic information concerning all children enrolled in the fifth grade at each school. Graduate students telephoned

families during the summer, briefly explained the study, and proceeded with further screening after obtaining verbal consent from mothers who were interested. Families were invited to participate if they included a child who was entering middle school in the fall, if they were African-American or European-American, and if the child was living with both biological parents. Out of 427 families who were contacted and met eligibility requirements, 341 agreed to participate. Data were collected from families at two times during the year, approximately 9 months apart. At the Time 1 (T1) assessment in the fall, 300 families completed the laboratory visit. At the Time 2 (T2) assessment the following summer, 37 families dropped from the study (i.e., 6 moved from the area, 10 were unable to find a time to schedule an appointment, and 21 for unknown reasons). Comparisons between families who remained in the sample and those who dropped out revealed no significant differences on any demographic or T1 variables that were used in this study (all $p > .10$).

The final sample included a total of 268 children, with 149 European-Americans and 119 African-Americans, and 138 boys, and 130 girls. Ninety-one of the children (34% of the sample) had been identified by mothers as having some form of chronic illness; 35 (13%) of the children had asthma, 26 (9%) had diabetes, and 30 (11%) of the children were identified by their mother and by BMI assessment as being obese. The incidence of chronic illness in the sample is comparable to that of national statistics for children below the age of 18, which indicate that 15% have asthma, 6% have diabetes, and 18% are obese (Bloom et al. 2006; Perrin et al. 2007). The remaining 177 children (66% of the sample) were labeled as healthy. Average family income ranged from \$10,000 to \$90,000 with 70% of families having an annual income below \$50,000. Of the mothers, 2% had less than a high school education, 34% had received a high school diploma or GED, 46% of the mothers had completed some college or professional education, 12% had completed a bachelor's degree, and 6% had completed education beyond a bachelor's degree. Two hundred and fifty-eight of the mothers were in their first marriage, 8 mothers were in their second marriage, and 2 of the mothers were divorced and unmarried, but living with a partner. Participating families were paid \$35, and children were compensated with rewards after each interview.

Procedure

All procedures used in this study were approved by the IRB of the University of North Carolina at Greensboro. Upon their arrival at the research laboratory (T1), mothers and children were greeted by a trained undergraduate or graduate interviewer. The interviewer escorted the

mother–child dyad to a comfortably furnished room (e.g., containing a sofa, chairs, and table) and proceeded to describe the study in detail and obtained written consent from both mother and child. Subsequently, the mother and child were separated to complete questionnaires in privacy. Once both had completed their respective questionnaires they were reunited and videotaped while participating in a 20-min interaction activity. However, data from this interaction session will not be used in the current study, thus it is not describe further. The entire data collection session took approximately 2 h and families were compensated for their time with \$35.

During the final assessment (T2), approximately 9 months after the initial data collection period, information was collected from the adolescents themselves, their teachers, and their mothers. For the purpose of this study, only data from teacher's rating of children's peer relationships is considered, thus no other measures that were part of the larger study are described. Questionnaires were mailed to children's English and Math teachers at the school and included self-addressed stamped envelopes for teachers to return the questionnaires to researchers when they were completed. Teachers were compensated for their time with a gift certificate in the amount of \$25.00.

Mother Report Measures

At T1 mothers reported on family demographic characteristics and children's health status through the use of questionnaires. The exact instruments mothers completed from which data were included in this study are described below.

Family Demographics

At T1 mothers completed the Family History Inventory (MacKinnon-Lewis et al. 1992) during the pre-entry data collection, which asked questions regarding marital status, ethnicity, education, and family income.

Children's Health Status

At T1 mothers completed the Child Behavior Checklist-Parent Report Form (CBCL-P; Achenbach and Edelbrock 1983), a 113-item questionnaire used to assess children 4 years of age and older in nine areas of problem behavior (e.g., aggression, anxiety, depression). A section of the CBCL-P also asks mothers to identify if their child had a chronic health condition and the specific type of condition. Information from this portion of the CBCL-P was used to identify the presence or absence of a chronic condition for each child. Children were subsequently grouped into two *health status* categories 1 = healthy, 2 = chronically ill.

Child Measures

Children's social contact, self-esteem, and social anxiety were assessed through self-report questionnaires. We also measured children's height and weight in order to calculate their Body Mass Index (BMI).

Peer Contact

At T1 children completed the self-report version of the Child Behavior Checklist-Child Report Form (CBCL-C; Achenbach 1991). The CBCL-C includes a social competence section consisting of 20 questions subdivided into 3 categories: recreational activities, social activities, and school competence. The "social activities" subscale of the social competence section consists of six items referring to the number of friends, time spent with friends, and the behavior with siblings and other family members. For the purpose of our study, the two items pertaining to children's number of friends and time spent with friends were summed to form a *peer contact* score for each child. Internal consistency for the scale was $\alpha = .77$. A high score on this scale means that the child is in active social contact with peers. The CBCL has good reliability: the test-retest correlation of the social activities scale is .84 (Achenbach 1991).

Self-Esteem

At T1 adolescents' perception of their competence in non-academic (athletic, peer social relations, physical attractiveness) domains was measured using scales developed by Eccles and her colleagues (Eccles et al. 1989). All of the questions are rated on a seven-point response scale anchored at the extreme with appropriate descriptors (e.g., 1 = not at all good and 7 = very good). Because our focus was on children's peer relationships, only the perception of social skill with peers scale was used in the current study. This scale was measured with five items (e.g., "How good are you at making friends?") ($\alpha = .75$), which were summed to form a single score representing children's self-perceived social competence with peers, with a high score indicating a child's having a high self-perception of their social competence. All of the self-concept scales have been shown to have good discriminant and predictive validity (Eccles et al. 1993).

Social Anxiety

At T1 children completed the Social Anxiety Scale for Children (SASC; La Greca and Stone 1993). The SASC investigates the extent to which children experience social anxiety using 22 items divided into three subscales: fear of

negative evaluation (FNE), social avoidance/distress in meeting new situations and unfamiliar people (SAD-New), and generalized social avoidance/distress (SAD-General). In the current sample, internal consistency scores for the subscales were: $\alpha = .85$ for FNE, $\alpha = .76$ for SAD-New, and $\alpha = .73$ for SAD-General.

The average of these subscales was used as a measure of children's *social anxiety*, $\alpha = .80$. A high score on social anxiety means that the child feels anxious in social situations.

Child Weight Status

Following the completion of all questionnaires at T1, we measured children's height in inches and weight in pounds. Based on these two variables and the child's age and gender, the algorithm used by the Center for Disease Control (CDC) to identify weight status was used. Each child was categorized as obese, overweight, normal, or underweight, according to their BMI. We then compared this information to the mother's report of children's weight as being a health concern, and only those children for whom both mother report and BMI indicated that weight was a health concern were included in the chronically ill group. Based on this criterion there were four children whose mother's identified their weight as a health concern, but who's BMI fell in the normal range of the CDC weight status. These children were included in the healthy group ($n = 177$) for all analyses.

Teacher Report Measures

For measures completed by children's teachers at T2: items were standardized within classrooms [In classrooms with only one participant, standardization was not possible. Items were systematically rescaled, allowing their midpoints to equal those of standardized items (midpoint = 0)]; the mean of math and English teachers' responses was computed for each item. The resulting mean scores were used to compute all variables based on teacher ratings (single reports were used in the few cases for which only one teacher reported, $n = 15$).

Children's Peer Relationships

Children's teachers completed the Ratings of Children's Social Behavior Scale-Teacher Form (CSBS-T; Crick 1996), which includes three subscales: (a) relational aggression (7 items; e.g., gets even by keeping the person from being in their group of friends, spreads rumors or gossips), (b) overt aggression (4 items; e.g., this child hits, pushes or shoves peers, this child tried to bully or dominate peers), and (c) prosocial behavior (4 items; e.g., this child

says supportive things to peers, this child is helpful to peers). The response scale for each item ranged from 1 (this is never true of this child) to 5 (this is almost always true of this child). The mean of the four prosocial items was used as a measure of children's *prosocial behavior* ($\alpha = .89$), the mean of the four overt aggression items was used as a measure of children's *overt aggression* ($\alpha = .95$), and the mean of the seven relational aggression items was used as a measure of children's *relational aggression* ($\alpha = .84$). A high score represents a high level of the particular behavior. Teacher's responses to the items on this instrument have been shown to be internally consistent, and test–retest reliability has been demonstrated (Crick 1996).

Results

Preliminary Analyses

Because there was a large difference in the number of healthy youth compared to chronically ill youth, preliminary multivariate analysis of covariance (MANCOVA) was conducted to examine the homogeneity of the two samples on major family demographic characteristics. Illness status served as the between subjects independent variable. Dependent variables included family income, mother education, child gender, child ethnicity, and child age. The Wilks' Lambda criterion and an alpha level of $p < .05$ were used in the MANCOVA. The analysis revealed that there was no significant main effect for health status on any of the demographic variables: family income, $F(1, 267) = .11$, *ns*, mother education, $F(1, 267) = 1.22$, *ns*, child gender, $F(1, 268) = .07$, *ns*, child ethnicity, $F(1, 268) = 1.12$, *ns*, and child age, $F(1, 267) = .91$, *ns*. These results indicate that the two groups were relatively homogenous on family background characteristics.

Pearson product moment correlations were conducted to determine if child age and family income were associated with any variables used in this study. Results revealed no significant associations for child age. However, family

income was associated with a number of variables of interest. Specifically, there was a significant positive correlation between family income and child self-esteem, $r = .11$, $p < .05$, indicating that children from families with high income had higher levels of self-esteem. In addition, family income was positively associated with teacher ratings of children's prosocial behavior, $r = .14$, $p < .01$, and negatively associated with teacher ratings of overt aggression, $r = -.11$, $p < .05$. This indicates that children from families with higher income levels were viewed by teachers as being more prosocial and less overtly aggressive. No other significant associations were found between family income and variables used in this study. Because of these associations between family income and child characteristics, family income was used as a covariate in all subsequent analyses.

Differences Between Healthy and Chronically Ill Children

Means for all variables used in analyses are presented in Table 1. Multivariate analysis of covariance (MANCOVA) was conducted to test for difference based on sex, race, and chronic illness status, controlling for family income, using one-tailed tests. The between subjects independent variables were sex (male vs. female) race (Caucasian vs. African-American), and chronic illness status. Initial analyses examining separate groups of children based on type of illness revealed no significant differences between chronically ill and healthy children. Consequently, all chronically ill children were combined into one group and a two category health status variable (healthy vs. chronically ill) was used in all analyses. Dependent variables included children's report of their self-esteem, social anxiety, and peer contacts, and teacher's ratings of children's prosocial behavior and aggression. The Wilks' Lambda criterion and an alpha level of $p < .05$ were used in the MANCOVA. Follow-up univariate analyses examined significant multivariate effects.

A significant main effect was found for health status, $F(7, 261) = 2.61$, $p < .01$. Follow-up univariate analyses

Table 1 Partial correlations among and between measures of socio-emotional functioning and peer relationship quality for healthy and chronically ill children controlling for family income, race and gender

| | 1 | 2 | 3 | 4 | 5 | 6 |
|-------------------|--------|--------|---------|-------|---------|---------|
| 1. Self-esteem | | -.16** | .13* | .12* | -.08 | -.11 |
| 2. Social anxiety | | | -.25*** | .14* | -.15* | -.07 |
| 3. Peer contact | | | | .11 | .20** | .17** |
| 4. Prosocial | | | | | -.51*** | -.31*** |
| 5. Overt Agg. | | | | | | .42*** |
| 6. Relation Agg. | | | | | | |
| Mean | 5.31 | 25.72 | 2.99 | 3.03 | 2.04 | 2.26 |
| (SD) | (1.86) | (2.57) | (.56) | (.86) | (1.00) | (.76) |

* $p < .05$, ** $p < .01$,

*** $p < .001$

indicated that healthy children reported more peer contacts than chronically ill children, $F(1, 267) = 8.72, p < .01$, that healthy children reported lower social anxiety than chronically ill children $F(1, 267) = 5.64, p < .05$, and that chronically ill children were rated by teachers as being less prosocial, $F(1, 267) = 4.28, p < .05$, as displaying less overt aggression $F(1, 267) = 7.45, p < .01$, and as displaying less relational aggression $F(1, 267) = 5.12, p < .05$, compared to healthy children. There was no significant difference between healthy and chronically ill children on self-esteem, $F(1, 267) = 1.13, ns$.

Analysis also revealed a significant main effect for sex, $F(7, 261) = 3.78, p < .01$. Subsequent univariate analyses revealed that girls were rated by teachers as displaying more prosocial behavior $F(1, 267) = 7.48, p < .01$, and relational aggression $F(1, 267) = 10.22, p < .001$, than boys, whereas boys were rated by teachers as displaying more overt aggressive than girls, $F(1, 267) = 8.33, p < .01$. There was no significant difference between boys and girls on self-esteem $F(1, 267) = 1.05, ns$, social anxiety $F(1, 267) = .55, ns$, or peer contacts, $F(1, 267) = .03, ns$.

Finally, analysis revealed a significant main effect for race, $F(7, 261) = 2.31, p < .01$. Follow-up analyses indicated that African-American children had higher self-esteem scores than Caucasian children, $F(1, 267) = 4.54, p < .05$. There was no significant difference between Caucasian and African-American Children on social anxiety, $F(1, 267) = .54, ns$, peer contact, $F(1, 261) = 1.20, ns$, prosocial behavior, $F(1, 261) = .85, ns$, overt aggression, $F(1, 267) = .77, ns$, or relational aggression, $F(1, 267) = 1.06, ns$.

No significant two-way multivariate interaction was found for sex \times race, $F(7, 261) = 1.37, ns$, for sex \times health status, $F(7, 261) = 1.50, ns$, or for race \times health

status, $F(7, 261) = 1.90, ns$, nor was there a significant three-way multivariate interaction for sex \times race \times health status, $F(7, 261) = 1.10, ns$.

Correlations Among Variables

Partial correlations were used to examine associations among variables, while controlling for family income, race, and gender for the entire sample (see Table 1). Analyses revealed that high self-esteem was associated with low social anxiety, high peer contact, and high teacher ratings of prosocial behavior. In addition, high social anxiety was related to low levels of peer contact and low levels of overt aggression, but high ratings of prosocial behavior. High peer contact was associated with high ratings of overt and relational aggression.

Predictors of Healthy and Chronically Ill Children’s Peer Relationship Quality

Next we tested the links between demographic characteristics, children’s health status, socioemotional functioning, and peer relationship quality. Three regressions were conducted, predicting, respectively, teacher ratings of child prosocial behavior, overt aggression, and relational aggression. Demographic characteristics (i.e., family income, race, child gender) were entered simultaneously in the first step to control for their effects. In step 2, child health status was entered. In step 3, the three indicators of children’s socioemotional functioning were entered simultaneously (i.e., peer contact, self-esteem, and social anxiety). In step 4, the interaction terms between child health status and each of the three indicators of socioemotional functioning were entered simultaneously (see Table 2).

Table 2 Regressions examining the associations between children’s health status, socio-emotional functioning, and peer relationship variables

| Regression | Teacher rated prosocial peer behavior | | | Teacher rated overt aggression | | | Teacher rated relational aggression | | |
|--------------------------------|---------------------------------------|----------------|------------------|--------------------------------|----------------|------------------|-------------------------------------|----------------|------------------|
| | B | R ² | R ² Δ | B | R ² | R ² Δ | β | R ² | R ² Δ |
| Step 2: Health status | -.31** | .08 | .05* | -.42** | .11 | .07** | -.33* | .09 | .05* |
| F for step | F(1, 267) = 5.77* | | | F(1, 267) = 5.77* | | | F(1, 267) = 7.12** | | |
| Step 3: Psychosocial | | .14 | .08** | | .09 | .05* | | .08 | .05* |
| Peer contact | .18* | | | .20* | | | .23* | | |
| Self-esteem | .39** | | | -.17* | | | -.11 | | |
| Social anxiety | -.20* | | | .14 | | | -.06 | | |
| F for step | F(3, 265) = 10.22** | | | F(3, 265) = 10.22** | | | F(3, 265) = 7.35* | | |
| Step 4: Interaction terms | | .07 | .03* | | .08 | .04* | | .08 | .04* |
| Health \times Peer contact | -.10 | | | -.08 | | | -.12 | | |
| Health \times Self-esteem | -.22* | | | .25** | | | .28** | | |
| Health \times Social anxiety | .16* | | | -.11 | | | -.14 | | |
| F for step | F(3, 265) = 6.59* | | | F(3, 265) = 6.71* | | | F(3, 265) = 6.68* | | |

* $p < .05$, ** $p < .01$, *** $p < .001$

In the regression predicting teacher ratings of prosocial behavior, after controlling for family income and child gender, health status was a significant predictor of prosocial behavior, with healthy children receiving higher teacher ratings of prosocial behavior than chronically ill children. At step 3, peer contact, self-esteem, and social anxiety each accounted for significant unique portions of the variance in prosocial behavior. High levels of peer contact and self-esteem were linked to higher teacher ratings of prosocial behavior, whereas high social anxiety was linked to lower teacher ratings of prosocial behavior. At step 4 of the regression analysis, small but significant interactions were found for health status \times self-esteem and health status \times social anxiety, in the prediction of prosocial behavior.

We interpreted significant interactions by plotting the regression lines for the predicted high (+1 SD) versus low (-1 SD) values of the moderator (Aiken and West 1991). As seen in Fig. 1, among chronically ill children, prosocial behavior increased as self-esteem increased. Among healthy children, however, there was no association between self-esteem and prosocial behavior. As can be seen in Fig. 2, among healthy children high levels of prosocial behavior decreased as social anxiety increased. In contrast, there was no association between social anxiety and prosocial behavior for chronically ill children.

In the second set of regressions predicting teacher ratings of children's overt aggressive behavior at step 2, health status was a significant predictor, with chronically ill children being rated by teachers as lower in overt aggression than healthy children. At step 3, both peer contact and self-esteem accounted for significant unique portions of the variance in overt aggression. High peer contact predicted

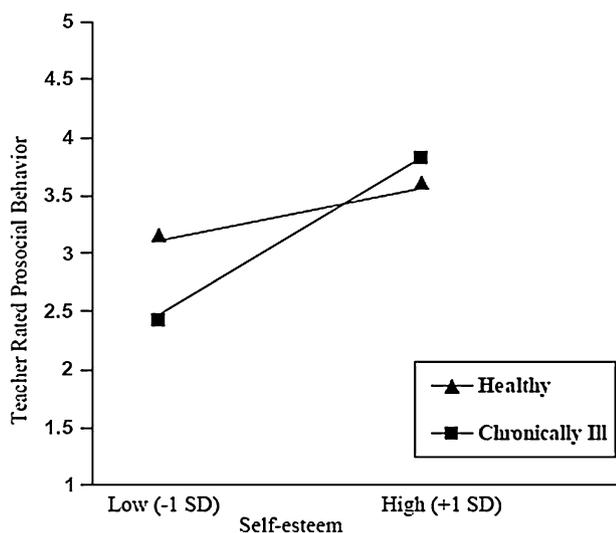


Fig. 1 Health status \times self-esteem interaction effects on teacher rated prosocial behavior. Lower scores indicate low levels of self-esteem

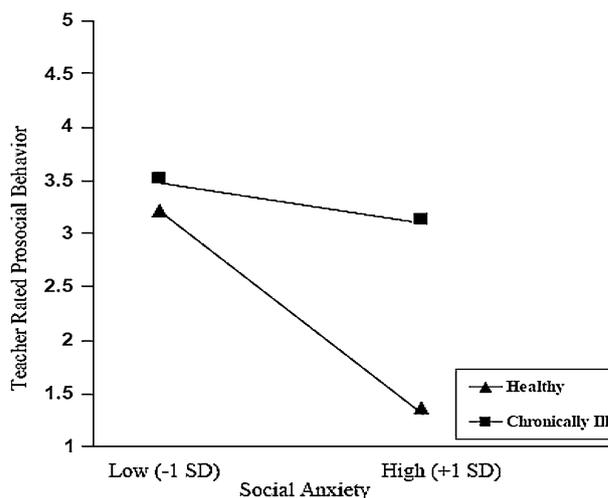


Fig. 2 Health status \times social anxiety interaction effects on teacher rated prosocial behaviour. Lower scores indicate low levels of social anxiety

high teacher ratings of overt aggression. In contrast, high levels of self-esteem were linked to lower teacher ratings of overt aggression. At step 4, a small but significant interaction was found for health status \times self-esteem, in the prediction of overt aggression.

Again, the significant interaction for health status \times self-esteem was interpreted by plotting the regression lines for the predicted high (+1 SD) versus low (-1 SD) values of self-esteem (Aiken and West 1991). As depicted in Fig. 3, among chronically children, overt aggressive behavior decreased as self-esteem increased, whereas there was no association between self-esteem and aggression for healthy children.

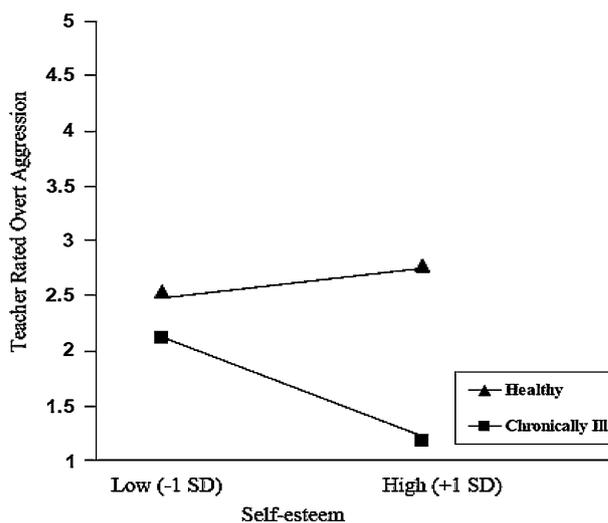


Fig. 3 Health status \times self-esteem interaction effects on teacher rated overt aggression. Lower scores indicates low levels of self-esteem

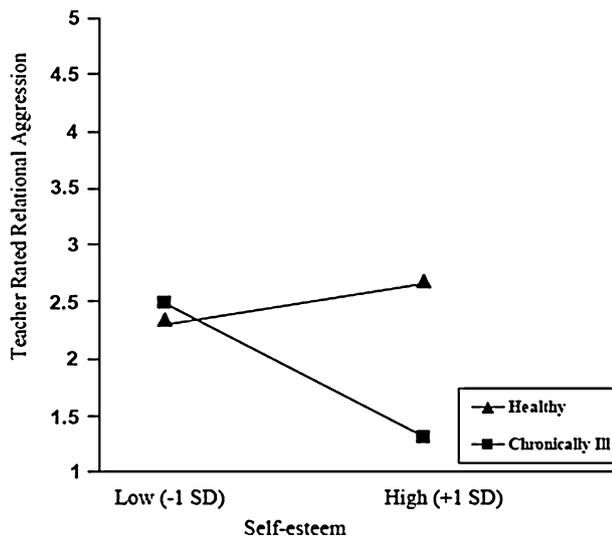


Fig. 4 Health status \times self-esteem interaction effects on teacher rated relational aggression. Lower scores indicate low levels of self-esteem

In step 2 of the third set of regressions predicting teacher ratings of children's relational aggression, health status was a significant predictor, with chronically ill children being rated by teachers lower in aggression than healthy children. At step 3, only peer contact accounted for significant unique portions of the variance in relational aggression. High levels of peer contact were linked to lower teacher ratings of relational aggression. At step 4, a small but significant interaction was found for health status \times self-esteem, in the prediction of aggression.

Again, the significant interaction for health status \times self-esteem was interpreted by plotting the regression lines for the predicted high (+1 SD) versus low (-1 SD) values of self-esteem (Aiken and West 1991). As depicted in Fig. 4, among chronically ill children, relational aggressive behavior decreased as self-esteem increased, whereas there was no association between self-esteem and relational aggression for healthy children.

Discussion

Our results confirmed predicted differences between healthy and chronically ill children's peer relationships. Specifically, chronically ill children were rated by teachers as displaying less prosocial, less overt, and less relational aggression with peers than their healthy counterparts. Our findings are consistent with previous work that found chronically ill children reported engaging in less prosocial behavior with peers compared to normative data on healthy children (Meijer et al. 2000b), and with evidence that both peers and teachers identify chronically ill children as being less aggressive (Gartstein et al. 2000; Noll et al. 1996). It is

worth noting that the research by Meijer et al. (2000a, b), and Noll and his colleagues (Gartstein et al. 2000; Noll et al. 1996) included children with serious, physically debilitating chronic illnesses, such as cystic fibrosis, juvenile chronic arthritis, constitutional eczema (Meijer et al. 2000a, b), and sickle cell disease (Gartstein et al. 2000; Noll et al. 1996), whereas our investigation focused only on children with asthma, diabetes, and obesity. Given the similar findings across studies, it appears that chronic illness status, regardless of the particular type of illness, influences children's prosocial and aggressive behavior with peers.

Our study also examined how chronic illness affects multiple measures of children's socioemotional functioning. Consistent with some previous work (Reiter-Purtill et al. 2003; Wallander and Varni 1989), but contrary to findings by Meijer and her colleagues (Meijer et al. 2000a, b), we found differences between healthy and chronically ill children in the amount of peer contact they had. Specifically, chronically ill children reported having less peer contact than their healthy peers. The discrepancy between studies may be due to the fact that in the research Meijer and her colleagues (Meijer et al. 2000a, b) peer contact was reported by parents, whereas in the present study, as well as the study by Reiter-Purtill et al. (2003), children reported on their peer contact. It may be that chronically ill children and their mothers have different perceptions of peer contact. As suggested by other researchers (La Greca 1990), the physical limitations associated with having a chronic illness, such as asthma, obesity, or diabetes, may limit children's peer contact. At the same time, social stigma or stereotyped beliefs about children with chronic illness may contribute to reluctance on the part of others to include chronically ill children in social activities. Given the importance of peer relationships for children's long-term adjustment and psychosocial well-being (Ladd and Troop-Gordon 2003; Meece and Laird 2006), the lack of social contact with peers may pose a significant risk for chronically ill children. Further research that compares mother's and children's report of peer contact may help to elucidate current discrepancies in the literature. Furthermore, understanding the mechanism that accounts for chronically ill children's lower level of peer contact relative to healthy peers is an important endeavor for future research.

Also contrary to findings by Meijer and her colleagues (Meijer et al. 2000a, b), we found differences between healthy and chronically ill children in levels of social anxiety. Specifically, chronically ill children reported having more social anxiety than their healthy peers. This lack of consistency with previous work may be attributable to differences in the types of chronic illnesses characterizing the samples, as mentioned previously. The discrepant findings may also be related to the narrow age of the

subjects in the current study compared to that of Meijer et al. (2000a, b). Specifically, it may be that experiences associated with the transition to adolescence, and the accompanying transition to middle school, heighten levels of social anxiety among chronically ill children relative to their healthy peers, resulting in differences between the two groups. That is, chronically ill children may experience greater anxiety about the physical changes that accompany puberty, or about entering a new school environment, than their healthy peers because of the added challenge that such changes likely pose in dealing with their health condition. The higher levels of social anxiety among chronically ill children in our sample are consistent with theoretical proposals concerning links between illness status and problems with social functioning (La Greca 1990). That is, chronic illness can be considered a stressor that increases children's anxiety when it comes to interacting with others and considering the perceptions that others may have of them. Given the discrepancy in research findings, however, additional work is needed before definitive conclusions can be made concerning differences between chronically ill and healthy children. It may be worthwhile for future longitudinal work to ascertain whether there are developmental differences in social anxiety within chronically ill and healthy children, and to identify earlier factors that may be associated with subsequent differences in the social anxiety of healthy and chronically ill children.

Similar to previous investigations (Nassau and Drotar 1995; Noll et al. 1996), in our sample there were no differences between chronically ill and healthy children's level of self-esteem. Nevertheless, analyses did reveal that the patterns of association between self-esteem and teacher ratings of children's peer relationships differed for chronically ill and healthy children. Most notably, self-esteem was associated with higher ratings of prosocial behavior and lower ratings of overt and relational aggression with peers for chronically ill children, but not for healthy children. Thus, it appears that teachers perceive chronically ill children with higher self-esteem as being more prosocial and less aggressive than chronically ill children with low self-esteem. Particularly noteworthy is the fact that these patterns held true even after controlling for family income, and children's race and sex. When considered together with the group comparison data, our findings indicate that although chronically ill children do not differ from healthy children in level of self-esteem, individual differences in chronically ill children's self-esteem are associated with variations in the quality of their peer interactions in ways that differ for healthy children. Thus it appears that self-esteem is one factor that accounts for individual differences among chronically ill children's peer relationships. This finding is consistent with theoretical proposals arguing that self-esteem may affect how a child copes with chronic

illness (La Greca 1990; Schuman and La Greca 1999). High self-esteem may help a child overcome negative feelings about their health condition, as well as the possible negative reactions of others, reducing the likelihood of negative peer interactions. Additional research examining the actual peer behavior of chronically ill children is needed to better understand the role that self-esteem plays in connections between chronic illness and the quality of children's peer relationships.

Health status also interacted with social anxiety in predicting teacher ratings of prosocial behavior. Specifically, healthy children with higher levels of social anxiety were rated by teachers as being less prosocial than healthy children with low levels of social anxiety. In contrast, there was no significant association between social anxiety and teacher rated prosocial behavior for chronically ill children. This finding may reflect the fact that social anxiety is more normative among chronically ill children than healthy children (Nassau and Drotar 1995), as indicated by a difference in the mean level of social anxiety across the two groups. That is, because chronically ill children share common fears about fitting in with age mates and encountering negative responses to their health status from others (Schuman and La Greca 1999), levels of social anxiety are likely to be more uniform among a given group of chronically ill youth, whereas there is greater individual variation in social anxiety among healthy children.

We examined three types of chronic health conditions: asthma, obesity, and diabetes. Initial analyses examining separate groups of children based on the type of illness revealed no significant differences between chronically ill and healthy children. It was only when chronically ill children were combined into one group that the significant differences that we report between chronically ill children and healthy children reported were found. Our finding is consistent with literature on connections between health status and children's psychological functioning in that studies examining specific illness conditions often fail to find differences between healthy and chronically ill children, whereas studies that include multiple chronic illness conditions are more likely to find differences (La Greca 1990; Spirito et al. 1991). One likely reason for the difference across studies is simply the increase in statistical power that comes from a larger sample size. That is, studies examining children with a specific illness generally have very small samples compared to studies that examine multiple illness types. Thus, the ability to detect significant differences is limited in studies with small samples. A second reason may involve selection factors in the identification of subjects. Most studies with smaller samples recruit subjects from patient populations who are compared with matched controls recruited from the community at large. This approach may result in unidentified variations

between the chronically ill and healthy children that limit the ability to detect differences. For example, children from patient populations may have less regular social contact with peers than children from a community sample, which in turn could create systematic differences in the two group's level of prosocial or aggressive behavior. It may also be that families recruited from patient samples for the express purpose of studying factors related to an illness condition differ in systematic ways from families recruited from community populations. Because we recruited a community sample as part of a larger study and subsequently identified a subsample of chronically ill children within the larger sample, we may have reduced variations linked to selection criteria between the two groups in our sample. However, our strategy did limit the number of youth who fell into a particular illness category. Consequently, it is important to consider that there may be meaningful variations between children with different chronic illnesses that could not be captured in the present sample.

Our findings must be interpreted cautiously due to the fact that children's chronic illness status was determined based on maternal reports. Although some support for the validity of maternal report was obtained for obese children by obtaining assessments of children's height and weight, objective reports of other chronic health conditions were not obtained. Consequently, the accuracy of children's classification as chronically ill or healthy may be suspect. Some mothers may have failed to report a chronic illness, whereas others may have reported a chronic illness based on their own perceptions rather than an actual clinical diagnosis. It is also possible that reliance on mother report of child chronic illness introduced a confound in the connection between child illness status and measures of children's peer relationships. That is, the association between health status and peer relationships may be driven by parental anxiety, which makes mother's more likely to identify their child as having an illness, to limit their child's contact with peers, and to promote their child's anxiety about social interactions. Because we did not assess other aspects of mother's cognitive or emotional functioning we could not control for their possible confounding effects on the associations observed in this study.

Caution when making interpretations of our results also is warranted because the number of children with specific illnesses was relatively small and may have limited our ability to detect differences between children with specific illness conditions. Future research should include larger numbers of children with different types of chronic illnesses to examine variability in the experiences of chronically ill children based on illness type. In addition, although multiple informants were used for the various constructs investigated in the study, data for each measure

was only provided by one individual (i.e., child, parent, or teacher). Having multiple informants supply information on similar instruments may have improved the predictive validity of the variables examined. Furthermore, gathering data from the peers of chronically ill children would yield useful insight into the processes linking health status to peer relationships. Thus, the results should be considered in light of these limitations and they need to be replicated with larger samples.

The data in our study replicate and extend findings in the extant literature indicating that a broad and inclusive view of children's functioning is necessary to accurately reflect the complex multivariate processes that predict the quality of children's peer relationships. One of the implications of our study for intervention and practice is that any effort to assist chronically ill children will need to be multidimensional in nature, targeting areas of both interpersonal and intrapersonal functioning. Specifically, our findings of differences between healthy and chronically ill children's level of peer contact point to the importance of providing chronically ill children with opportunities to interact with peers. School and family based interventions that help chronically ill children spend more time in constructive and effective interactions with peers may give children the opportunity to practice important peer interaction skills in an environment that is less intimidating than more natural settings. Including parents to a greater degree in interventions may also be helpful in promoting their ability to facilitate their children's social contact with peers. At the same time, however, our results suggest that interventions will need to engage chronically ill children in learning exercises that increases their awareness of prosocial strategies for interacting with peers. That is, simply giving chronically ill children additional opportunities to spend time with peers is not likely to be effective if the intervention does not also contain an educational component where they are provided with social skills training. Likewise, our results suggest that effective interventions should target chronically ill children's social-cognitive functioning, to help reduce levels of social anxiety that are elevated relative to healthy peers. In addition, self-esteem appears to be a domain that accounts for individual differences in the quality peer relationships among chronically ill children. Thus incorporating strategies that specifically target improving the self-esteem of chronically ill children are likely to crucial to the efficacy of any intervention.

In conclusion, our investigation supports previous research suggesting that there are differences in the quality of peer relationships of healthy and chronically ill children. Moreover, our study extends previous literature by suggesting that children's self-esteem accounts for individual differences in the quality of chronically ill children's peer relationships, and the role of self-esteem in determining the

quality of children's peer relationships varies depending on children's health status. Our study also offers guidance for future research. Specifically, our results suggest that further attention should be given to the role of children's self-perceptions in connections between health status and interactions with peers. It may be useful to consider different domains of self-perceptions as they relate to peer relationship quality in order to better pinpoint how chronic illness affects children's relationship with peers. In addition, it will be worth while to consider how chronically ill children's self-perceptions translate into actual behavior with peers through the use of observational research. Our investigation also represents a call for additional research that takes into account developmental issues that may affect particular processes of children's adjustment. The fact that our study focused on children making the transition to adolescence may have contributed to our ability to detect connections between health status and peer relationships where other researchers have failed. Future research employing cross-sectional and longitudinal designs will prove beneficial in determining how these processes may vary for different developmental time periods. There also are questions concerning the role of family context in the connection between health status and children's peer relationship outcomes, given that family income and child race played a role in the connections observed. Future studies should examine other family characteristics that may account for variations in connections between children's health status and children's peer relationships. In pursuing the answers to these questions perhaps researchers can gain a better understanding of how health status, and specific chronic illnesses impact children's social adjustment.

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