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## The Influence of Parent Attributional Style and Family Structure on Adolescent Adjustment to Chronic Illness

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THE INFLUENCE OF PARENT ATTRIBUTIONAL STYLE  
AND FAMILY STRUCTURE  
ON ADOLESCENT ADJUSTMENT TO CHRONIC ILLNESS

by

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A DISSERTATION

Submitted to the graduate faculty of The University of Alabama at Birmingham,  
in partial fulfillment of the requirements for the degree of  
Doctor of Philosophy

BIRMINGHAM, ALABAMA

2010

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THE INFLUENCE OF PARENT ATTRIBUTIONAL STYLE AND FAMILY  
STRUCTURE  
ON ADOLESCENT ADJUSTMENT TO CHRONIC ILLNESS

KIMBERLY GUION

MEDICAL/CLINICAL PSYCHOLOGY

ABSTRACT

Adolescents diagnosed with a variety of chronic diseases are at increased risk for developing internalizing and externalizing problems. Various family factors may play an important role in adolescent adjustment, particularly in the chronic illness population given the important role that family members play in medical care and coping. Previous literature has demonstrated the separate contributions of parental attributions and adolescent attributions to adolescent adjustment. However, it is unknown whether parental coping affects adolescent mental health outcomes directly or indirectly by influencing children's attributional style. Further, there is a dearth of research examining the role of family structure in coping in pediatric populations. The current project examined the relationships between parental coping style and family structure to adolescent adjustment. Adolescents ( $N=123$ ;  $M= 14.4$  yrs.) diagnosed with cystic fibrosis, diabetes, or muscular dystrophy and a caregiver completed measures of attributional style and adolescent adjustment. Mediation analyses indicated that adolescent attributions did not mediate the relationship between parent attributions and adolescent adjustment. However, both adolescent and parent attributions predicted teen externalizing problems, and adolescent attributions predicted depression and anxiety. Regression analyses indicated the number of active caregivers reported, but not family structure, was related to adolescent externalizing problems. Age and parental distress were also significant

predictors of adolescent outcomes. These data represent a novel look at complex relations between family factors and adolescent adjustment. Results suggest that a key entry point for intervention may relate to parental mental health and adolescent coping.

Keywords: chronic illness, attribution style, coping, adolescents, family structure

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THE INFLUENCE OF PARENT ATTRIBUTIONAL STYLE  
AND FAMILY STRUCTURE  
ON ADOLESCENT ADJUSTMENT TO CHRONIC ILLNESS

Thousands of children are diagnosed each year with chronic illnesses that increase their risk for a variety of mental health problems (Wallander, Thompson, & Alriksson-Schmidt, 2003; Wallander & Varni, 1998). The risk-resistance model of coping with chronic illness posits that a variety of parent and child factors, coping processes, disease characteristics, and demographic factors interact to influence children's adjustment to chronic illness and resulting mental health (Wallander et al., 1992). In order to improve the mental and physical health outcomes of these children, it is critical to target the factors that are modifiable and have a demonstrated and significant influence on mental health outcomes. The current study will examine the role of parent attributional style and family structure on adolescents' adjustment to chronic illness.

*Attributional Style and Psychopathology in Chronically Ill Children*

Attributional style refers to the way that people explain negative or positive events in life and is defined by three dimensions describing the cognitive appraisal of the event: internal-external, global-specific, and stable-unstable. Seligman's theory (Seligman, Abramson, Semmel, & von Baeyer, 1979) posits that specific patterns of attributions that reflect learned helplessness will increase the risk for depression and other mental health problems. In particular, internal, global, and stable attributions for negative events are considered maladaptive, or pessimistic, while the same attributions related to positive events are considered adaptive or optimistic (Peterson et al., 1982). A pessimistic pattern of attributions reflects the cognitive belief that one is not in control of his or her

environment, resulting in hopelessness, diminished self-esteem and self-efficacy, and depression (Sweeney, Anderson, & Bailey, 1986). For instance, a child's report that receiving a poor grade in school was his own fault (internal), happens on many occasions (global), and is likely to happen again in the future (stable) may reflect an overall pessimistic attributional style, placing the child at increased risk for depression and other adjustment problems. Attributional style is considered an important aspect of coping, as evidenced by its impact on medical and psychological adjustment in chronically ill children and adolescents. As in non-pediatric samples, chronically ill children with pessimistic attributional styles are more likely to develop depression and anxiety than those who utilize optimistic attributional styles (Frank, Blount, & Brown, 1997; Schoenherr, Brown, Baldwin, & Kaslow, 1992). Clinically significant levels of externalizing symptoms have also been demonstrated in those with more negative attributions (Schoenherr et al., 1992). Given the existing literature indicating the importance of attributional style in pediatric populations, we anticipate that attributions will also have important health implications for pediatric populations. This hypothesis is supported by the finding that chronically ill children who demonstrate behaviors consistent with learned helplessness (i.e., perceived lack of control) are at increased risk for non-adherence to medical treatment in addition to psychopathology (Thompson & Gustafson, 1996).

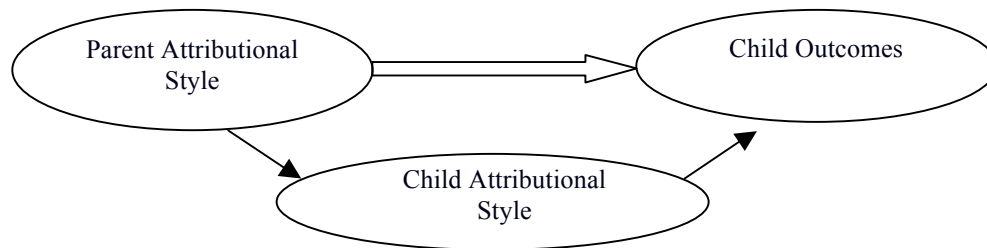
A unique aspect of studying pediatric populations is the fact that parents play an important role in the functioning of children with a chronic illness (Wallander & Varni, 1998). Developmental literature demonstrates the importance of parents in the development of children and adolescents' coping and adjustment (Power, 2004). In fact,

many family-based psychological interventions in medical settings focus on parents' coping with the premise that parents provide important modeling and guidance for their children's coping (Johnson, Kent, & Leather, 2005). Additionally, parenting style has been related to adolescents' attribution style in a healthy sample, demonstrating the important role that parents play in the development of children's attributions (Li & Qian, 2000). However, the influences of parental attributions on children's attributional style and outcomes have rarely been examined. In two studies of children who were not chronically ill, parents' attributional style was cross-sectionally, but not longitudinally, predictive of children's attributions (Gibb, 2004; Gibb et al., 2006). Using a sample of chronically ill children, Antshel, Brewster, and Waisbren (2004) examined parents and their children with PKU, finding moderate to high correlations ( $r = .57-.87$ ) between parent and child attributional styles. Although there is limited information regarding the link between parent attributions, children's attributions, and adjustment, there may be particularly important implications for chronically ill populations given their increased risk for adjustment difficulties and the importance of coping for medical outcomes such as treatment adherence.

There are two hypothesized pathways through which parental attributional style may impact adjustment outcomes in chronically ill adolescents. First, parents may overtly or subtly model an attributional style through their own appraisal of situations or coaching their children through stressful events. Adolescents may then learn and utilize a similar style, which will directly affect their adjustment. Parents' attributions in this case would incur an indirect effect on adolescent adjustment. In contrast, parent attributional style may have a more direct impact on their children's outcomes. Since parents are

frequently responsible for maintaining their child's treatment regimen (e.g., taking medications, managing medical appointments), parent attributional style is likely to affect their own behavior and subsequently children's outcomes. Parent attributional style has been linked to treatment adherence (Antshel et al., 2004), which may mediate the direct impact of parent attributions on the child's health and mental health outcomes.

The first goal of the current project is to expand our understanding of the relationship between parental and child attributional style in relation to mental health in the chronically ill population. It is hypothesized that pessimistic parent attributional style will correspond to higher rates of adjustment difficulties for their children and that this relationship will be partly mediated by adolescents' attributional style (see Figure 1). Thus, we expect that there will be both a direct and indirect relationship between parent attributions and adolescent adjustment.



*Figure 1.* Proposed mediation model of parent attributions and child mental health outcomes.

### *Family Structure and Adjustment to Chronic Illness*

When children are diagnosed with a chronic illness, related adjustment, role-shifting, and changes in daily life reverberate throughout the entire family system (Rolland, 2005). Parents face a number of challenges when coping with a child's chronic illness, ranging from worry and stress to dealing with the high costs of caring for a chronically ill child (Coffey, 2006; Jacobs & McDermott, 1989). A rich body of literature

has examined coping in families with chronically ill children and adolescents, but these studies typically only include two-parent families. Very little is known about children's adjustment to chronic illness in single-parent families and more generally, the relationship between family structure and child mental health. Indeed, a recent review of pediatric research reported a notable absence of studies examining family structure (single vs. two-parent status) in pediatric populations (Brown et al., 2008). Family structure is a notoriously difficult construct to measure in research. Further, the number of parents in the home does not necessarily correspond to the available resources in a family system (e.g., care giving adults, income). In the current study, we explore the role of family structure by expanding its definition beyond the typical dichotomous measure (i.e., one vs. two-parent homes) to also include the number of active caregivers available.

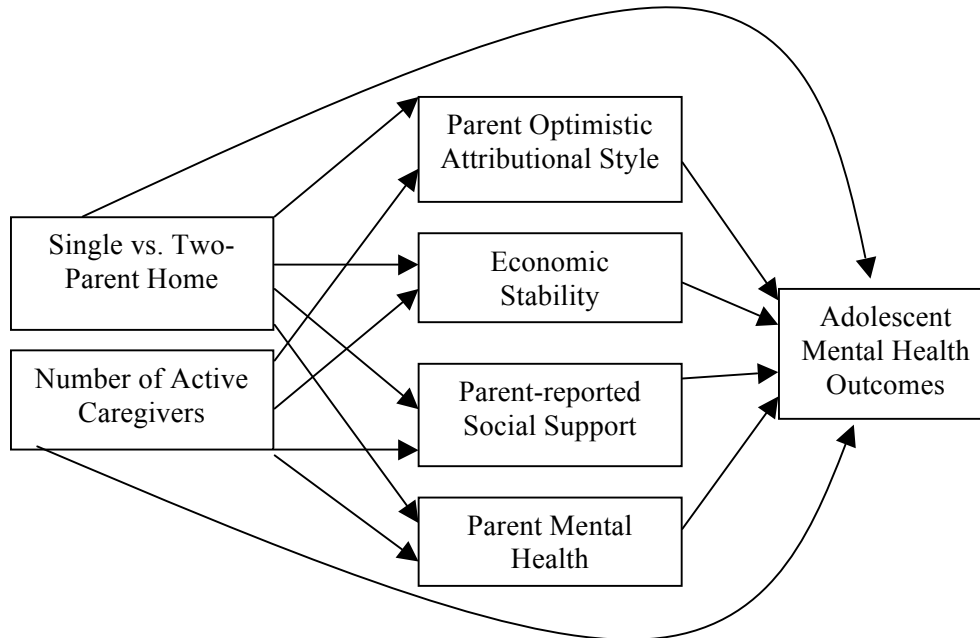
The few existing studies that have examined the impact of family structure on child adjustment to chronic illness indicate that children in single-parent homes are at increased risk for adjustment problems. One study demonstrated that parental ratings of illness severity and psychosocial adjustment were worse for chronically ill children in single-parent homes than those in two parent homes (Mulhern, Wasserman, Friedman, & Fairclough, 1989). A second study found that illness severity was more strongly related to child adjustment in homes including a single mother or single mother plus a non-family member as opposed to two-parent homes or homes including the mother and a second adult family member (Silver, Stein, & Dadds, 1996).

Refining our understanding of the processes by which family structure impacts adolescent outcomes is important for developing more efficient and effective interventions to improve chronically ill adolescents' outcomes. Children from single-

parent families may be at a higher risk for adjustment difficulties because of the absence of two care giving adults, the diminished income typically found in single-parent homes, or another factor such as parental psychopathology that may have contributed to or resulted from the parents separating. The significance of these stressors is likely compounded when caring for a chronically ill child, putting these children at additional risk for adjustment problems. The current study provides an important extension of the literature regarding the impact of family structure on mental health outcomes in chronically ill adolescents by examining specific factors that may account for this relationship (cf. Thompson S.J. & Gustafson, 1996; Wallander et al., 2003).

Specifically, we will focus on single vs. two-parent status and the number of active caregivers in relation to adolescent adjustment and four factors that may mediate these relationships – attribution style, parental mental health, social support, and economic stability. All of these putative mediators are likely to be affected by family structure. First, family structure may impact the attributional style of the parent, thereby influencing the adolescent’s likelihood of developing depression or anxiety problems. Also, single mothers report higher rates of depression and lower levels of perceived social support (Barrett & Turner, 2005; Cairney, Boyle, Offord, & Racine, 2003; Cunningham & Knoester, 2007), as well as greater economic strain (Lino, 1995). In turn, these factors are likely to have an impact on child and adolescent outcomes. Research has demonstrated that children with depressed parents and children in families experiencing economic hardship are at higher risk for psychopathology (Bolger, Patterson, Thompson, & Kupersmidt, 1995; Cummings & Davies, 1994; Goodman & Gotlib, 1999; Lempers, Clark-Lempers, & Simons, 1989). Low ratings of social support have also been linked to

parental difficulties adjusting to having chronically ill children (Quittner, LaGreca, Siegel, Wallander, & Walker, 1992), which may negatively affect adolescent adjustment as well.



*Figure 2.* Proposed model of the relationship between family structure and child mental health.

### *Current Study*

The current project provides a systematic investigation of several family-based risk and protective factors that may affect the mental health outcomes in chronically ill adolescents. We hypothesized that parent attributional style would predict adolescent outcomes, and that this relationship will be partially mediated by child attributional style. In other words, parent attributional style was expected to predict adolescent adjustment, in part, because of the positive relationship between parent and adolescent attributional style. We also anticipated that parent attributions would directly impact adolescent adjustment. Additionally, we hypothesized that children in single-parent homes and those with fewer active caregivers would demonstrate worse adjustment than children from



homes with two parents or more active caregivers, and that these associations would be mediated by more negative parent attributional style, fewer economic resources, lower parental social support, and parental depression. Ultimately, this research will provide mental health professionals with critical information in order to effectively identify adolescents that are at increased risk for adjustment problems related to chronic illness and efficiently direct resources towards preventative and treatment protocols targeting risk factors specific to each family, thus lowering the burden of mental illness in this population.

## Method

### *Participants*

Participants included 123 adolescents diagnosed with type 1 diabetes, cystic fibrosis (CF), or Duchene's Muscular Dystrophy (MD). One MD participant did not have Duchene's MD but was diagnosed with a muscular dystrophy with a similar course and functional impact. From a theoretical standpoint, these three disease groups were chosen in an effort to reflect multiple chronic disease processes, in particular a progressive (e.g., cystic fibrosis, muscular dystrophy) and constant (e.g., diabetes) course as described by Rolland (2005). Based on Rolland's model and research summarized by others (Wallander et al., 1998), many psychosocial factors that impact adjustment to chronic illness are not disease specific, but are common across disease groups. However, Rolland posits that chronic illnesses with differing progressions or prognoses may impact families and patients differently due to related differences in functional impact and perceived stress. The current disease groups provide some variation in disease course to continue to

shed light on those factors that are disease-specific as compared to those that are common across disease groups.

All adolescents were recruited during routine outpatient medical visits at the Children's Hospital of Alabama in Birmingham. Adolescents ages 12-17 ( $M=14.4$ ) and one primary caregiver were asked to participate. Out of 165 dyads who were approached, 25 refused and 17 did not return their surveys or returned blank surveys. The sample size of 123 thus reflects a 75% participation rate. Fifty-two of these surveys (42%) were returned via mail, whereas the rest was completed at the clinic.

Adolescents included 52% males and 48% females; 83.7% Caucasians, 13% African Americans, and 3.3% other ethnicities. The male/female ratio in each diagnostic group was representative of the population. The proportion of Whites vs. minorities in the current sample was also representative of national trends in the diabetes and muscular dystrophy groups. While a higher percentage of Whites reflects national trends in the cystic fibrosis group, the proportion of Whites was slightly lower in the current sample (85% vs. 95%; Cystic Fibrosis Patient Registry, 2007) likely reflecting a larger African American population in the Southeast. Primary caregivers included 76% mothers, 14% fathers, and 11% grandparents or other family members. Single-parent families comprised 27% of the current sample (16% were divorced, 6% single, and 3% separated). The median family income was \$50,000-80,000. Inclusion criteria for parents and adolescents included fluency in English and no known diagnosis of a Pervasive Developmental Disorder, Psychosis, or Mental Retardation in the child.

A summary of demographic information can be found in Table 1. Diagnostic group differences were examined using analysis of variance for continuous dependent

variables and chi-squared tests for categorical variables. Participants were not distributed evenly across the three disease groups; the diabetes group was the largest followed by cystic fibrosis and muscular dystrophy groups. Further, due to the sex-linked genetic factors associated with muscular dystrophy, males were over-represented in the muscular dystrophy group; however, this sex difference between groups was not statistically significant. The diabetes group had a significantly lower time since diagnosis than the muscular dystrophy and cystic fibrosis groups and a higher mean income than the muscular dystrophy group. There were no differences between diagnostic groups on child age, ethnicity, caregiver relationship (e.g., mothers vs. fathers), or the proportions of single vs. two-parent homes.

Table 1  
*Participant Demographics*

	<b>Overall M (SD)</b>	Range	Diabetes	Cystic Fibrosis	Muscular Dystrophy	Test of Group Differences	Group Differences
<i>N</i>	<b>123</b>		70	45	8	$X^2(2)=47.5^{***}$	D>CF>MD
Child Age in Years	<b>14.4 (1.8)</b>	12-17	14.4 (1.8)	14.2 (1.8)	15.3 (1.3)	$F(2,120)=1.11$	
Male %	<b>52%</b>		51.4	48.9	75	$X^2(2)=1.9$	
White %	<b>83.7%</b>		82.9	86.7	75	$X^2(2)=.8$	
Mothers %	<b>75.6%</b>		77.1	77.8	50	$X^2(2)=2.7$	
Fathers %	<b>13.8%</b>		11.4	13.3	37.5	$X^2(2)=2.7$	
Single- parent %	<b>26.8%</b>		24.3	26.7	50	$X^2(2)=2.4$	
Years Since Dx	<b>8.5 (4.6)</b>	0-16.8	6.0 (3.6)	12.1 (3.7)	9.6 (2.6)	$F(2,120)=40.1^{**}$	MD, CF>D
Median Family Income	<b>\$30-80K</b>	<\$10K to >\$100K	\$50-80K	\$15-20K	\$40-50K	$F(2,120)=4.6^*$	D>MD

Note: \* $p<.05$ , \*\* $p<.01$

The decision to include multiple disease groups was supported by prior literature that demonstrated no differences in attributional styles based on disease (Lash, 2005; Schoenherr et al., 1992) and no consistent differences in the adjustment among children with different chronic diseases (Wallander et al., 2003). Combining several disease populations provided ample sample size to run complex analyses and resulted in greater generalizability of the results to multiple pediatric patient populations.

### *Procedure*

Recruitment occurred in three outpatient clinics at the Children's Hospital in Birmingham, AL. The diabetes, cystic fibrosis, and muscular dystrophy clinics are independently scheduled and each has specific half-days of the week during which they see patients. Research staff were present in all scheduled clinics throughout the week. Once triaged in the clinic, the treating physician introduced the study to parents and their children. Research staff members then approached patients to review the consent documents and the details of the study. Interested participants completed the consent documents during their appointment time. Participants who enrolled in the study completed a 45-minute survey either during their visit or they were given a stamped and addressed envelope to mail in the survey after completion at home. Participants were provided with written instructions for all measures and verbal instructions for two of the parent measures (i.e., family structure, Attribution Style Questionnaire) and one adolescent measure (Child Attribution Style Questionnaire) to facilitate participant understanding. Each adolescent/caregiver dyad was compensated for their time. Physicians also completed a brief Likert-scale measure of disease severity while the patient was in clinic.

## Measures

### *Attributional Style*

*Parent attributional style.* Parent attributional style was measured using the Attribution Styles Questionnaire (ASQ; Peterson et al., 1982; Seligman, Abramson, Semmel, & von Baeyer, 1979). The ASQ includes 12 hypothetical situations, 6 positive events and 6 negative events such as “You become very rich,” or “You have been looking for a job unsuccessfully for some time.” For each scenario, parents indicated a probable cause for the situation using an open-ended format and then rated the locus of control (myself vs. other people), stability (never vs. always will be present), and globality (general vs. specific to the situation) on a 7-point scale. Composite positive and negative attribution scales were derived from the ratings by calculating the average sum of the three ratings on each of the 6 items. Higher scores on the positive and negative scales correspond to more internal, stable, and global ratings. A composite scale was computed by subtracting the negative scale from the positive scale (the correlation between the two scales for adults was  $r = .00, p > .05$ ), thus higher total scores are considered more optimistic, while lower scores reflect a pessimistic, or maladaptive attributional style. The composite score was used for all analyses. Internal reliabilities for the positive and negative scales were adequate ( $\alpha = .73, \alpha = .80$  respectively).

*Adolescent attributional style.* Adolescents’ attributional style was assessed with the Children’s Attributional Styles Questionnaire Revised (CASQ-R), developed by Kaslow and colleagues (1991). The CASQ-R contains 24 hypothetical situations (e.g., “A team that you are on loses a game,” or “You make your friends happy.”) about which children make forced-choice ratings of locus of control, stability, and globality, similar to

the adult measure. As with the parent measure, composite positive attribution style and composite negative attribution style scales were computed, and then a composite, positive minus negative (the correlation between the positive and negative scales was  $r = -.38$ ,  $p < .01$ ), attribution was derived and used for analyses. As with the adult measure, high scores on the positive and negative scales of the CASQ-R indicate more internal, global, and stable attributions, thus higher composite scores were more optimistic. Internal consistencies were low with alpha = .53 and .52 for the positive and negative composite scales, respectively, which are consistent with internal consistencies found in previous research (Thompson, Kaslow, Weiss, & Nolen-Hoeksema, 1998). Despite its low internal consistency, others have argued that the scale is an appropriate and adequate instrument to use in studies involving multiple batteries; although the limited number of items may decrease its internal consistency, it results in decreased burden on child respondents. Further, this measure has demonstrated concordant validity, as low composite scores correspond to measures of depression (Thompson et al., 1998).

### *Family Structure*

Family structure is an inherently difficult construct to measure because of the variety of family structures in the U.S. To provide the most accurate reflection of the family structure of participants in the study, a standard questionnaire was completed by the primary caregiver to provide information on their marital status and enumerate members in the child's household and their role in relation to the child. Subsequently, family structure was coded into two variables: 1) single-parent vs. two-parent homes; and 2) the total number of active caregivers (e.g., families with a mother and grandmother actively participating in childcare/medical care will count as having two adults).

### *Mental Health Outcomes*

The Behavioral Assessment System for Children-Second Edition (BASC-2; Reynolds & Kamphaus, 2004) is comprised of a parent-report (*Parent Rating Scale, PRS*) and adolescent report (*Adolescent Self-Report Measure, SRP-A*) form, each comprised of 150-176 statements rated on a 4-point Likert scale (never, sometimes, often, always) or rated true/false. The *Externalizing Problems scale of the BASC-2, PRS* was utilized in the current study to assess parent-report of behaviors related to hyperactivity, aggression, and conduct problems. The *Depression* and *Anxiety* scales from the *BASC-2, SRP-A* were used in the current study to assess the frequency of depressive and anxious symptoms such as worry, feelings of sadness, guilt, and hopelessness in adolescents. These three scales are each derived using a subset of items from the complete measures and reported as T-scores ( $M= 50, SD=10$ ; scores greater than or equal to 70 are considered clinically significant; scores greater than or equal to 60 are considered at risk). Externalizing, depression and anxiety scores were considered as separate outcomes in all analyses. Internal consistencies of the parent-report adolescent forms of these scales are typically high, ranging from .90 to .95, while the adolescent self-report forms are somewhat lower ( $\alpha= .67- .88$ ; Reynolds & Kamphaus, 2004).

### *Parent and Family Functioning*

*Parent mental health.* The Brief Symptom Inventory-18 (BSI-18; Derogatis, 2004) was used to assess caregivers' mental health, including symptoms of somaticizing, depression, and anxiety. Using a 5-point Likert scale ranging from "not at all" to "extremely," caregivers rated how distressing each of 18 symptoms has been for them

over the previous 7 days. The General Symptom Index (GSI) score, a sum of all 18 items, was used in this study. Reliability of this scale was high ( $\alpha = .94$ ).

*Economic stability.* Parents reported on economic hardship/stability using the Economic Adjustments Scale (EAS; R. D. Conger, A.J. Conger, Elder, & Lorenz, 1992). The EAS includes 10 items assessing recent economic adjustments due to financial difficulties (e.g., “During the last 12 months has your family moved to save money?”). Respondents rated each item on a three-point scale (often, sometimes, or never), with higher scores reflecting *less* financial burden (i.e, more financial stability). This scale demonstrated good reliability ( $\alpha = .85$ ).

*Social support.* The shortened, six-item version of the Social Support Questionnaire-Brief (SSQ-6; I. Sarason, B. Sarason, Shearin, & Pierce, 1987) was administered to caregivers to assess their perceived level of social support. Respondents listed up to 9 individuals they would seek for emotional support in each of six different situations, and then rated their level of satisfaction with the support they would receive on a 6-point Likert scale (very dissatisfied to very satisfied). The average satisfaction with social support was derived from this measure and used in analyses. The current sample demonstrated high internal reliability on this scale ( $\alpha = .95$ ).

*Low disease impact on family.* The Impact on Family Scale (IFS; Stein & Riessman, 1980) is a 27-item measure assessing the negative impact of childhood disease on the family. Parents rated statements related to the impact of a child’s illness on economic stability, coping, and personal strain were rated on a 4-point Likert scale from strongly agree to strongly disagree. Fifteen items were used for the current scale, as suggested by Stein and Jessop (2003). Several items were recoded such that higher



overall scores indicated a lower disease burden on the family (i.e., fewer adjustments made due to the illness). Reliability for this measure was good ( $\alpha = .92$ ).

### *Demographics and Disease Characteristics*

An additional questionnaire asked caregivers to report on basic demographic information including the child and caregiver's ethnicity, gender, age, and family income as these variables have been shown to influence adjustment to chronic illness (Wallander et al., 1992). Due to the small number of respondents who indicated another ethnicity besides White or African American, ethnicity was recoded into two categories, White and Other. Key disease related variables included diagnosis, duration of diagnosis (in months), and a disease severity rating completed by the physician on a 4-point Likert scale ranging from very mild, somewhat mild, somewhat severe, to very severe. Physicians' disease severity ratings were standardized within each illness group in order to account for differences among the different diagnoses. Categorical variables with more than two levels were recoded into dichotomous indicators (e.g., diagnosis was coded into two variables with the diabetes group serving as the reference variable).

## Results

### *Missing Data and Outliers*

For scales used as independent variables in the current analyses, data were imputed for any scale for participants who were missing fewer than 50% of the scale items. Between 5 and 20 participants were missing items on 11 out of the 12 scales. Independent samples t-tests indicated that participants who had any missing data did not differ from those with complete data on key predictor or outcome variables. Missing items were imputed based on other items from the same scale with the Expectation-

Maximization (EM) procedure using the Missing Values Analysis module in SPSS version 13. Data were not estimated using information from other scales to prevent inflating inter-scale correlations. Most adolescent subjects with missing data were missing only 1 item on any scale (range 1-16; median 1); most parents with missing data were missing seven or fewer items on any scale (range 1-41; median 7); overall, .9% of all items were imputed.

Missing items were not estimated for 15 caregivers who omitted more than 50% of the items on the Parent Attribution Style Questionnaire Positive and Negative scales (the same participants provided insufficient data on both scales); 2 caregivers who were missing more than half items on the PASQ Positive Scale only; and 1 caregiver who provided insufficient data on the Economic Adjustment Scale. These participants were excluded from analyses that required these variables.

Descriptive analyses identified one outlier with a z-score above 3.5 in the outcome variable of parent-reported externalizing problems. The outlier score was truncated to a raw score corresponding to a z-score of 3.5 (J. Cohen, P. Cohen, West, & Aiken, 2003). Two caregivers had missing scaled scores on the Externalizing scale, and five adolescents had missing scores on all outcome measures. These cases were excluded from analyses of these variables.

### *Preliminary Analyses*

#### *Descriptives and Group Differences*

Table 2 contains descriptive information for all independent and dependent variables. Mean externalizing, anxiety, and depression scaled scores fell below the level of clinical significance (greater than or equal to 60= at risk, 70= clinically significant).

Although mean scores on the outcomes fell near the average population mean, indicating healthy functioning, a notable subset of the sample did report clinically significant symptoms. Specifically, 12.4% of parents reported clinically significant or at-risk levels of adolescent externalizing symptoms. Similarly, 14.1% of the adolescent sample self-reported at-risk or clinically significant levels of depression, and 21% of the sample indicated at-risk or clinically significant levels of anxiety. The latter number may be slightly inflated, as a portion of the anxiety scale of the BASC includes somatic concerns (e.g., stomach aches, dizziness).

Analysis of variance tests were conducted to examine the relationships between demographic and disease-related variables and all study variables. Significant results for disease group were followed by t-tests to examine specific group differences. As can be seen in Table 2, significant differences were found between diagnostic groups in parent distress, low impact on family, and adolescent optimistic attributions. The diabetes and cystic fibrosis groups reported more parental distress, lower disease impact on the family, and more optimistic adolescent attributions than the muscular dystrophy group. In contrast, there were no disease group differences on outcome variables, parent attributions, economic burden, reported social support, the number of active caregivers, adolescent age or ethnicity, supporting the premise that although these disease groups differ in course (and the variables noted above), they contain important similarities, particularly regarding adolescent outcomes. Thus, the three disease groups were combined in all primary analyses.

Regarding outcome variables, adolescents from single-parent homes reported significantly more anxiety ( $M=53.3$  vs.  $49.3$ ;  $t(116)=1.98$ ,  $p<.05$ ) and more symptoms of

Table 2  
*Descriptive Information for All Predictor Variables and Outcomes*

	Mean (SD)	Range	Diabetes (D)	Cystic Fibrosis (CF)	Muscular Dystrophy (MD)	Test of Group Differences	Group Differences
Disease Severity Rating (1-4 scale)	1.9 (.74)	1-4	1.8 (.69)	1.9 (.81)	2.4 (.52)	$F(2,120)= 0.00$	
Parent Attribution Style Composite Scale	13.8 (3.3)	-18 – 18	3.7 (3.3)	3.0 (3.6)	1.5 (3.9)	$F(2,103)=1.41$	
Child Attribution Style Composite Scale	5.9 (3.3)	-12 – 12	6.3 (3.1)	5.8 (3.4)	3.0 (2.9)	$F(2,120)=3.8^*$	D, CF > MD
Number of Active Caregivers	3.6 (1.9)	1-11	3.6 (1.9)	3.7 (2.0)	3.0 (1.5)	$F(2,120)= .49$	
Parent Mental Health (BSI)	11.3 (12.3)	0-72	10.0 (11.8)	11.3(10.6)	23.1 (19.5)	$F(2,120)=4.3^*$	D, CF > MD
Financial Stability (EAS)	24.5 (4.0)	10-30	24.7 (3.7)	24.8 (3.6)	22.0 (6.8)	$F(2,119)=1.79$	
Social Support Satisfaction	5.0 (1.3)	1-6	5.1 (1.3)	5.0 (1.3)	4.6 (.83)	$F(2,120)= .62$	
Low Impact on Family Scale	44.8 (9.1)	15-60	46.7 (8.6)	43.9 (8.5)	32.8 (6.8)	$F(2,120)= 10.2^{**}$	D, CF > MD
Parent-Reported Externalizing Problems	50.2 (9.8)	36- 82.8	49.6 (9.0)	49.7 (10.4)	57.6 (11.5)	$F(2,119)=2.56$	
Adolescent-Reported Anxiety	50.3 (9.8)	33-72	47.0 (9.6)	46.7 (10.0)	51.0 (9.5)	$F(2,115)= 1.74$	
Adolescent-Reported Depression	47.2 (7.9)	38-74	49.9 (8.1)	49.9 (7.9)	56.5 (6.4)	$F(2,115)= 1.01$	

Note:  $*p < .05$ ;  $**p < .01$

depression ( $M=49.8$  vs.  $47.2$ ;  $t(116)=2.13$ ,  $p<.03$ ) than adolescents from two-parent homes, respectively. However, parents in single and two-parent homes did not report different levels of adolescent externalizing problems. There were also no differences in externalizing, anxiety, or depression scores by diagnostic group, gender, or ethnicity. Finally, there were no differences in parent or adolescent attributions, economic stability, social support, parent distress, low impact on family, or the number of active caregivers by single vs. two-parent status or adolescent gender or ethnicity.

### *Correlations*

A summary of correlations is presented in Table 3; all continuous demographic, predictor, and outcome variables were included. As would be expected, older adolescent age was associated with a longer time since initial diagnosis. Time since diagnosis was also associated with low impact on family, such that fewer disease-related disruptions were reported for more recent diagnoses. Age, physician disease severity rating, and time since diagnosis were not correlated with any other predictor variables.

Parent optimistic attributions were associated with adolescent optimistic attributions. More economic stability, lower disease impact, and lower parental distress were also associated with more optimistic parent and adolescent attributions. As might be expected, higher parent ratings of satisfaction with social support were associated with more reported active caregivers, lower disease impact on the family, more economic stability, and lower parental distress. Financial stability and lower disease impact on the family were also associated with lower parental distress. Financial stability was also correlated with lower disease impact on the family.

Table 3  
*Correlations Between All Predictor Variables and Outcomes*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Physician-Rated Disease Severity	1															
2. Years Since Diagnosis	.16	1														
3. Age	-.00	.28*	1													
4. Gender	.10	.12	.07	1												
5. Minority	.24**	.03	-.05	.06	1											
6. Income	-.21*	-.28**	-.08	.01	-.39**	1										
7. Number of Active Caregivers	-.13	-.01	-.12	-.08	-.16	.18	1									
8. Low Disease Impact on Family	-.15	-.19*	-.09	.10	.07	.18	.01	1								
9. Financial Stability	-.12	-.06	-.10	.08	-.08	.38**	.04	.44**	1							
10. Parent Distress	-.02	.09	.06	.04	.13	-.21*	-.14	-.46**	-.40**	1						
11. Social Support Satisfaction	.00	-.07	-.10	-.03	.13	.05	.23*	.37**	.23*	-.30**	1					
12. Parent Optimistic Attributions	-.06	-.06	-.06	.08	.18	-.07	.09	.46**	.20*	-.40**	.25*	1				

13. Child Optimistic Attributions	-.11	-.15	-.14	.05	-.03	.20*	.16	.26**	.28*	-.29**	.13	.20*	1			
14. Parent- Reported Externalizing Problems	.02	.13	.29**	-.11	-.04	-.10	-.26**	-.28**	-.26**	.29**	-.26**	-.40*	-.44**	1		
15. Adolescent- Reported Depression	.04	.14	.31**	-.08	.13	-.12	-.08	-.13	-.19*	.29**	.10	-.02	-.25**	.20*	1	
16. Adolescent- Reported Anxiety	-.07	.08	.30**	.13	.18	-.05	.02	-.03	-.12	.23*	-.11	-.11	-.45**	.34**	.53*	1

Note: \* $p < .05$ , \*\* $p < .01$ .  $N=103-123$ .

Correlations indicated that higher ratings of adolescent externalizing, depression, and anxiety were associated with each other. Older adolescent age, greater caregiver distress, and less adaptive child attributions were associated with more externalizing problems, depression, and anxiety. Additionally, financial stability was related to fewer externalizing and anxiety symptoms, but not depression. Finally, lower disease impact on the family, optimistic parent attributions, more active caregivers and greater parent satisfaction with social support were associated with fewer externalizing problems, but neither of the internalizing variables.

#### *Effects of Parent and Adolescent Attributional Style on Adolescent Outcomes*

We expected adolescent attributions to mediate a relationship between optimistic parent attributions and fewer externalizing, depression, and anxiety symptoms. Structural equation modeling (SEM) was used to examine the direct and indirect effects of parent attributions in separate models for each adolescent outcome using Mplus 4.2 (Muthén and Muthén, 1998-2006). Demographic or disease-related variables that were found to be associated with any outcomes or predictor variables (age, ethnicity, diagnosis, low impact on family, and 1 vs. 2-parent family status) were included in all pathways of the mediation analyses. Other demographic and disease-related variables that were not related to any outcome or predictor variables (i.e., gender, time since diagnosis, physician-rated disease severity) were excluded from analyses.

The model predicting externalizing problems (Figure 3) was saturated (i.e.,  $df = 0$ ) so it had a perfect fit. All predictors accounted for 34% of the variance in externalizing problems. The standardized path coefficients for the model of externalizing behaviors are presented in Figure 3; most paths from covariates are omitted for clarity. In



this model, externalizing problems were associated with pessimistic parent and adolescent attributions as well as older age. The effects of parent attributions were not mediated by adolescent attributions, because of the absence of a significant relationship between parent and adolescent attributions.

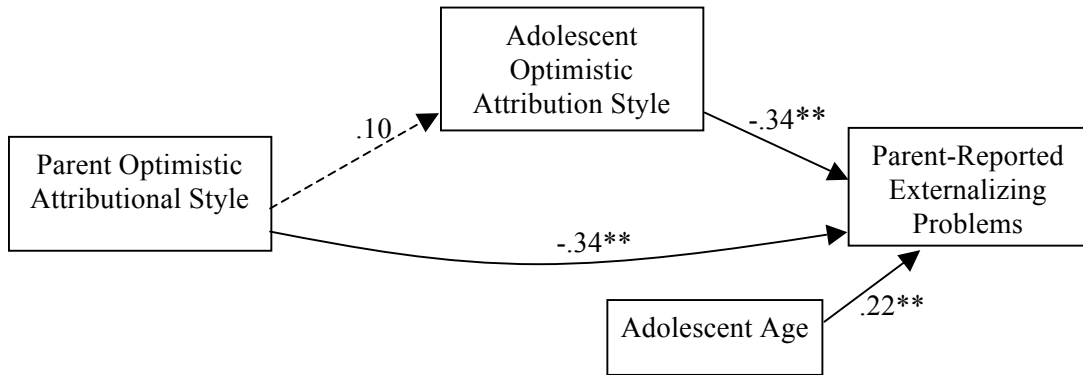


Figure 3. Model predicting externalizing problems from parent attributions. All paths in model are adjusted for age, ethnicity, diagnosis, single vs. two-parent status, and disease impact on family. \* $p < .05$ , \*\* $p < .01$ .

The overall fit of the model predicting anxiety problems (Figure 4) was also saturated, thus having a perfect fit. The model accounted for 17% of the variance in anxiety scores. Only pessimistic adolescent attributions and older age significantly predicted anxiety. Parent attributions were not significantly related to either anxiety or adolescent attributions, thus the mediation was not significant.

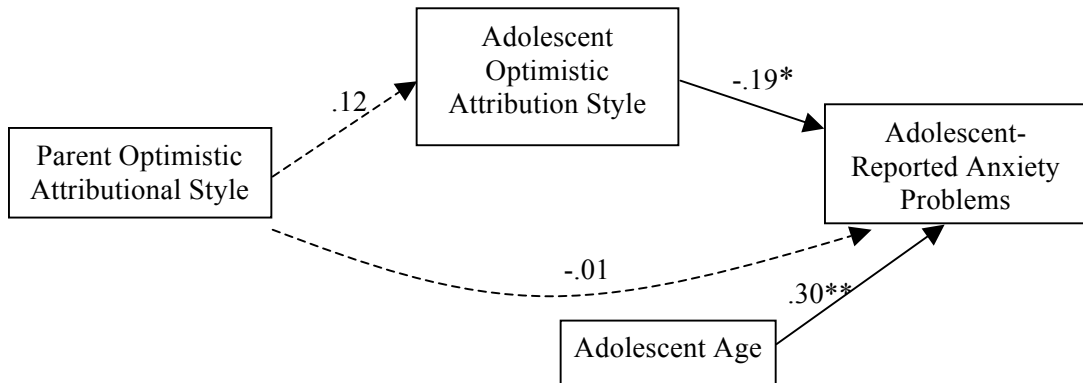


Figure 4. Model predicting anxiety from parent and adolescent attributions. All paths in the model are adjusted for age, ethnicity, diagnosis, single vs. two-parent status, and disease impact on family. \* $p < .05$ , \*\* $p < .01$ .

As with the other models, the depression mediation model (Figure 5) was saturated. The model accounted for 30% of the variance in depression scores. Adolescent pessimistic attributions predicted higher depression scores, as did older age. Parent attributions were not significantly predictive of adolescent depression or attributions; subsequently, the indirect effect was not significant.

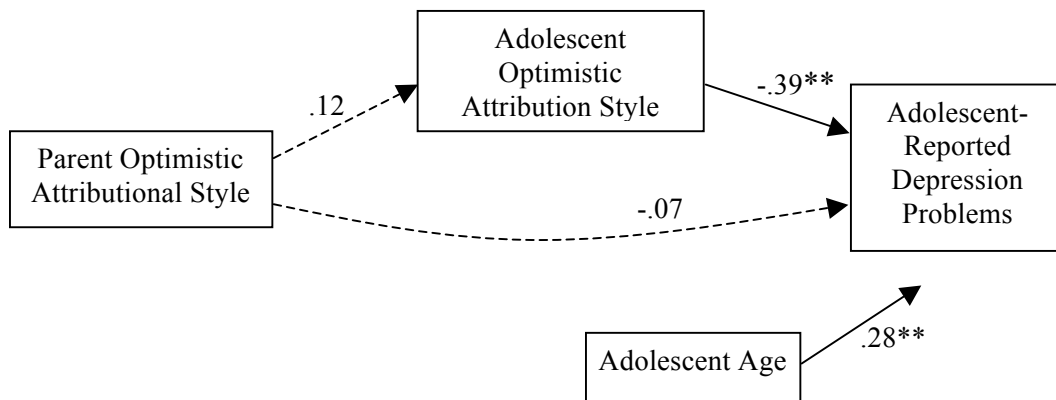


Figure 5. Model predicting depression from parent and adolescent attributions. All paths in the model are adjusted for age, ethnicity, diagnosis, single vs. two-parent status, and disease impact on family. \* $p < .05$ , \*\* $p < .01$ .

### *Effects of Family Structure on Adolescent Outcomes*

Using SEM in Mplus, we examined the relationship between family structure and adolescent adjustment as well as whether that relationship is partly or fully explained by parent attributions, economic stability, satisfaction with social support, and parent distress (see Figure 2). One mediation model was examined for each of the three outcomes separately, using single- vs. two-parent family and the number of active caregivers as independent variables. The four proposed mediation variables were

included in each model, thus both the direct and indirect effects of the primary family structure IVs were examined. Adolescent age, minority status, family income, diagnosis, and the impact on family score served as covariates in all paths in the models, as these variables were correlated with other variables in the model. Other demographic and disease-related variables that were not related to any outcome or predictor variables (i.e., gender, time since diagnosis, physician-rated disease severity) were excluded from analyses.

Analyses indicated relatively poor model fit for the model predicting externalizing problems ( $\chi^2(6) = 15.6, p = .02$ ; CFI = 0.91; RMSEA = 0.12). In general, a good fit of an SEM model is indicated by a non-significant chi-square test,  $\chi^2/df$  ratio of less than 2, CFI values above 0.95, and RMSEA values equal to or lower than 0.05 (Hu and Bentler 1999). In this model (see Figure 6), higher numbers of active caregivers and younger age ( $\beta = .22, p < .01$ ) predicted fewer externalizing problems. Further, optimistic parental attributions, but no other proposed mediators, predicted fewer reported externalizing problems. However, single vs. two-parent status and the number of active caregivers were not associated with the four proposed mediators; subsequently, there was no mediating effect of those variables on family structure.

The models predicting anxiety ( $\chi^2(6) = 14.6, p = .02$ ; CFI = 0.91; RMSEA = 0.12) and depression ( $\chi^2(6) = 14.6, p = 0.02$ ; CFI = .91; RMSEA = .12) had similarly poor fit. In these models neither single/two-parent status nor the number of active caregivers were associated with anxiety and depression. However, higher parental distress ( $\beta = .25-.24$ , respectively,  $p < .01$ ) and older age ( $\beta = .30-.29$ , respectively,  $p < .01$ ) were associated with higher reported anxiety and depression scores. Again, the family structure variables were

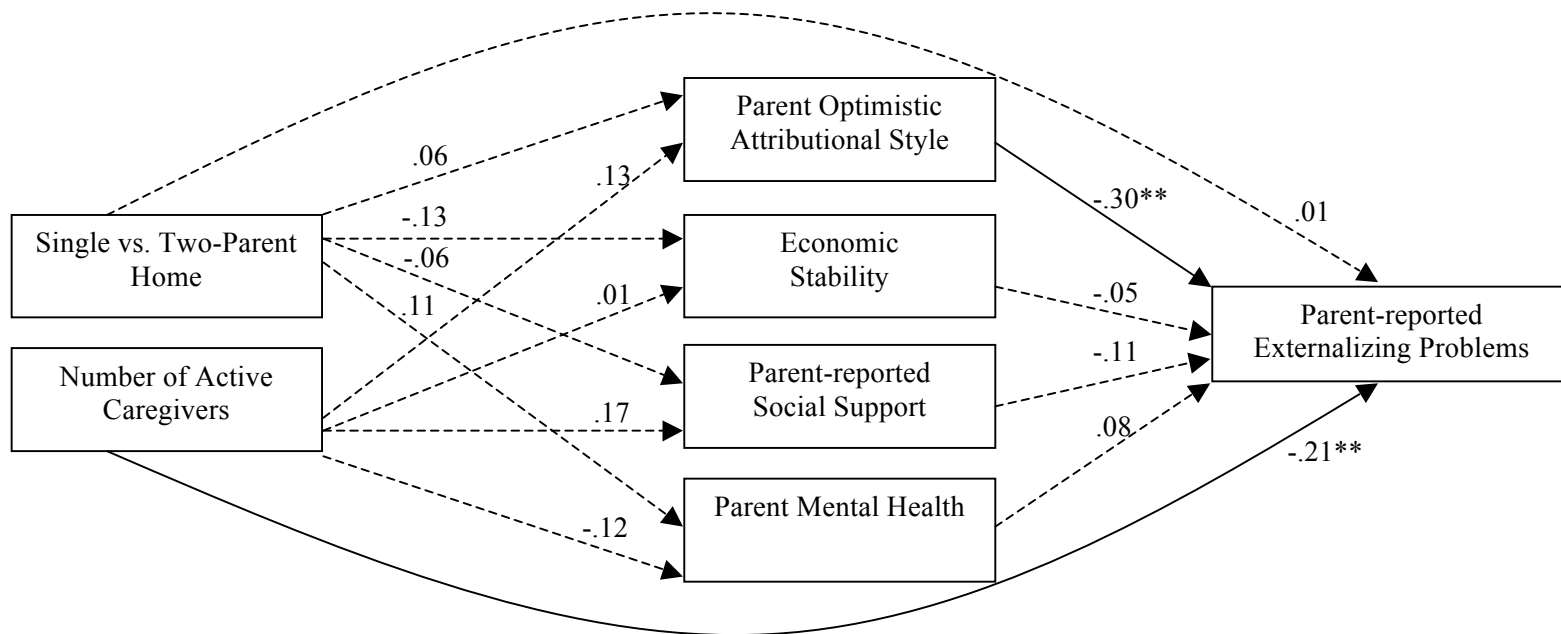


Figure 6. Mediation model predicting externalizing problems from two family structure variables. Age, minority, diagnosis, income, and impact on family were adjusted for in all pathways of the model. \* $p < .05$ , \*\* $p < .01$

not associated with the proposed mediators; thus, the tested mediation paths between family structure variables and internalizing problems were not significant.

Due to the poor fit of the SEM models and a lack of hypothesized mediation links, a series of linear regressions (Table 4) were conducted using Mplus to examine the unique effects of disease-related and demographic variables that were correlated with other variables in the model (diagnosis, adolescent age, ethnicity, income, and low family impact), both family structure variables, and the four originally proposed mediators.

Table 4  
*Linear Regressions with Family Structure as a Predictor for Internalizing and Externalizing Outcomes*

Predictor	Externalizing Problems		Anxiety		Depression	
	$\beta$	$R^2$	$\beta$	$R^2$	$\beta$	$R^2$
		.31**		.20*		.22*
Diagnosis (muscular dystrophy code)	.04		.11		.02	
Diagnosis (cystic fibrosis code)	.03		.01		.00	
Age	.21*		.30**		.29**	
Minority	-.08		.18		.19†	
Family Income	-.02		.23†		.11	
Low Disease Impact on Family	.05		.05		.06	
Family Structure	.01		-.10		-.08	
Number of Active Caregivers	-.21*		.09		.03	
Economic Stability	-.05		-.05		-.04	
Parent Distress	.08		.25*		.24*	
Satisfaction with Social Support	-.11		.06		-.13	
Parent Optimistic Attributions	-.30**		.06		-.01	

Note: † $p < .10$ , \* $p < .05$ , \*\* $p < .01$ .  $N$  ranged from 102-123. Reported betas are standardized.

The overall model fit predicting externalizing problems was significant and accounted for approximately 35% of the outcome variance. A higher number of active caregivers was uniquely related to fewer externalizing problems, while the number of parents in the home was not related to the outcome. In addition, older adolescent age and pessimistic parent attributions were uniquely associated with more externalizing problems. The models predicting anxiety and depression problems were also significant, accounting for 21- 26% of the variance. Neither of the family structure variables predicted internalizing problems. However, unique predictors of higher depression and anxiety included older age and higher parent distress.

### Discussion

Current results provide important insight regarding variables related to adolescent mental health in three chronically ill populations. Regarding our initial hypothesized relationships between attribution style and adolescent mental health, results indicated that optimistic adolescent attributions were associated with fewer adjustment problems, while the relationship with parent attributions was inconsistent. Additionally, family structure variables did not play a significant role in adolescent-reported internalizing problems. However, having more active caregivers was related to fewer parent-reported externalizing problems. Analyses indicated that older age consistently predicted worse outcomes for teens, even when multiple other factors were considered. Parent distress was also associated with more adolescent internalizing problems.

#### *Demographic and Diagnostic Group Differences*

Group differences between the three diagnostic groups were tested on all independent, dependent, and demographic variables. Participants in the muscular

dystrophy group reported worse parental distress, higher disease impact on the family, and more pessimistic adolescent attributions than those in the other two disease groups. Elevated parental distress (Thompson & Gustafson, 1996) and less adaptive adolescent attributions in this case may be reflective of higher disease severity. Although adolescents with cystic fibrosis experience functional limitations related to respiratory difficulty and frequent hospitalizations in some cases, all of the participants with muscular dystrophy who participated in this study were non-ambulatory, suggesting a higher level of functional impairment than participants from other disease groups. This also indicates the potential for higher levels of caregiver burden and less adolescent independence. Further, the disease progression in muscular dystrophy is typically faster than in cystic fibrosis (Roberts, 2003) as evidenced by earlier mortality; the median life span of patients with cystic fibrosis is 34.7 as compared to approximately 20 years in muscular dystrophy patients (Kanehiro, 2009). The prognosis for diabetes is notably better than both of the other diagnoses in the current sample. Physician-rated disease severity in the current study was rated within each diagnostic group and then standardized, and thus does not provide an adequate measure for between-group comparisons. Future research including additional measures of disease severity and disease burden is warranted, particularly quantitative medical measures. However, it is difficult to measure disease burden across different diagnostic groups, as the related functional limitations and measures of medical health are highly variable. Because of these differences, medical measures of disease severity can thus be most meaningfully used for within-group comparisons.

### *Attribution Style*

Results indicated that adolescent attribution style was a significant predictor of both internalizing and externalizing problems. In particular, more negative attributions corresponded to worse outcomes. Parent attributional style also predicted adolescent outcomes, but only in the externalizing domain. Contrary to our hypotheses, the relationship between parent attributional style and adolescent outcomes was not mediated by adolescent attributions due to the absence of a significant relationship between parent and adolescent attributional styles.

The direct relationships between adolescent attributions and internalizing problems shown here are consistent with the attribution style literature indicating that internal, global, and stable appraisals of negative situations are associated with higher rates of depression and anxiety (Sweeney, Anderson, & Bailey, 1986). More specifically, when teens believe that a negative event, for example a bad grade in school or poor blood-glucose levels, are internally driven and unlikely to change, they are more likely to report internalizing symptoms. Fewer studies have examined attribution style in relation to externalizing problems (Schoenherr et al., 1992); however, the current results indicate the same relationship between attributions and maladaptive functioning in both internalizing and externalizing domains.

In the domain of parent-reported externalizing symptoms, pessimistic parent attributions also predicted worse adjustment. In this case, multiple explanations should be considered. First, parents who demonstrate a negative appraisal style may also demonstrate more harsh parenting, resulting in more externalizing problems in their children (Cummings, Davies, & Campbell, 2000; Deater-Deckard & Dodge, 1997).



Alternatively, these parents may be demonstrating a negative reporter bias such as the bias seen in depressed parents (Berg-Nielsen, Vika, & Dahl, 2003), reflecting more of a problem in the parent rather than the child. Further investigation utilizing longitudinal data will be necessary in order to establish causal relationships. Additionally, reports of externalizing behaviors from additional informants (e.g., teacher) may help clarify the role of parents' reporter bias.

As noted previously, the current results indicated that adolescent attributional style did not mediate the relationship between parent attribution style and adolescent outcomes. In fact, parent attributions played a limited role in predicting teen outcomes, as they were only related to parent-reported externalizing problems. Parent attributions may play a more minimal role in adolescent outcomes than predicted.

Further, parent and adolescent attribution style were correlated but there was no predictive relationship between the two once other variables were included in the model. The relationship between parent coping and child coping found in previous studies (Johnson, Kent, & Leather, 2005; Power, 2004) may diminish as children enter adolescence, or may be measured more effectively using other coping constructs besides attributional style. To examine whether age played a role in the relationship between parent and adolescent attributions, we conducted correlations comparing participants in three age groups (12-13, 14-15, and 16-17). Although none of the correlations between parent and adolescent attributions were significant, they indicated the possibility of a curvilinear trend, with a lower correlation for younger and older teens ( $r = .10-.17$ ) and a higher correlation among the 14-15 year olds ( $r = .30$ ). It is thus possible that age acts as a

moderator between parent attributions and adolescent attributions and perhaps also internalizing problems.

Among the covariates, age was the only significant predictor of adolescent adjustment in these attribution models. In particular, older adolescents reported more depression, anxiety, and externalizing problems than younger teens. It is of note that the current analyses utilized standardized scores on the BASC scales, rather than raw scores. The BASC norms were developed by separating 12-14 year olds and 15-18 year olds into two groups for the teen-reported anxiety and parent-reported externalizing scales due to differences in these scales based on age. The teen-reported depression scale was normed using the complete 12-17 year-old group because there were no differences based on age (Reynolds & Kamphaus, 2004). Thus, while it is possible that the increase in adjustment problems with age in the current study is a normative trend, the standardization procedures of the BASC provide some evidence that this relationship is in fact unique to the current sample. However, future analyses may benefit from using the raw BASC scores to confirm the association between age and adolescent outcomes.

The relationship between age and externalizing behaviors is well documented, and is often explained by older teens' exposure to opportunities for risky behaviors (e.g., substance use, driving) and increasing independence (Bornstein & Lamb, 2005). Multiple pathways likely play a role in the relationship between age and internalizing symptoms. Specifically, older teens are more cognitively aware of their environment, and in chronic illness populations this may be associated with more pessimistic thinking about their current and future situations. In addition, older teens may view chronic illness as a larger disruption than younger teens given their higher level of social engagement (Rubin,

Chen, Coplan, Buskirk, & Wojlawowicz, 2005). Another possibility is that older teens with chronic illness are physically more ill, and would thus be more likely to feel depressed or anxious. This is particularly relevant in both the cystic fibrosis and muscular dystrophy groups, as these diseases are progressive, worsening as patients get older. Older teens with cystic fibrosis and muscular dystrophy are also facing complex issues related to having a shortened lifespan.

In an attempt to illuminate the relationship between age and adjustment problems, we conducted correlations between age and each outcome for each diagnostic group separately. Reports of depression, anxiety, and externalizing problems in the cystic fibrosis group were significantly correlated with age ( $r = .46- .48, p < .01$ ), whereas correlations in the diabetes group were not significant ( $r = .10- .21, p > .05$ ). Interestingly, the relationship between age and mental health symptoms was also not significant in the muscular dystrophy group ( $r = -.11$  for depression,  $r = .19$  for anxiety, and  $r = .42$  for externalizing,  $p > .05$  in all cases). This pattern is most consistent with the idea that higher levels of internalizing symptoms are related to novel or increasing disruptions in functioning. Specifically, the participants with muscular dystrophy have been functionally limited and perhaps somewhat distinct from their peer group for a longer period of time and may have acclimated to these differences. However, the course of cystic fibrosis often incurs notable disruption in social and academic functioning in mid-adolescence (Roberts, 2003) when these domains are particularly salient to patients. Alternatively, the pattern may be reflective of the notably smaller sample of muscular dystrophy patients (resulting in less reliable correlations in this group), but it certainly warrants further investigation.

### *Family Structure*

Contrary to our hypotheses, neither single-parent status nor the number of active caregivers was significantly associated with adolescent-reported internalizing outcomes. Although these variables were significantly correlated with depression and anxiety (see Table 2), and t-tests indicated group differences between teens from single and two-parent homes on internalizing outcomes, family structure variables were not uniquely predictive of anxiety and depression when other demographic and parent-related variables were included in the model. One interpretation of these results is that while teens in single-parent homes may be at higher risk for internalizing difficulties, which has been demonstrated in previous literature with non-pediatric samples (Lamb & Lewis, 2005), other, related factors may be stronger or more important risk variables for these types of problems. Specifically, older age and higher parent distress proved to be unique predictors of adolescent depression and anxiety. The relationship between parental distress and child's internalizing problems is a robust finding in existing literature (Cummings & Davies, 1994; Goodman & Gotlib, 1999), highlighting the importance of caregiver mental health for their children's adjustment.

Consistent with our hypotheses, a higher number of active caregivers was associated with fewer parent-reported externalizing problems. This may be due to the fact that when more adults are providing active support to a family, the children receive more attention, nurturance, and supervision and are thus less likely to demonstrate externalizing behavior problems (Lamb & Lewis, 2005; Lahey, Hulle, D'Onofrio, Rodgers, & Waldman, 2008). Alternatively, parents' report of more externalizing problems in conjunction with fewer active caregivers may reflect a reporter bias. Parents

who perceive or actually have very limited functional support may judge their child's behavior more harshly due to the increased stress of caring for a chronically ill child without sufficient support (Quittner et al., 1992). Including reports of externalizing behaviors from other sources than parents (e.g., adolescents, teachers) would help differentiate between these alternatives.

### *Clinical Implications*

Clarifying the contributions of adolescents' and parents' attributions to mental health outcomes provides important information for planning interventions and could potentially aid in reducing the prevalence of psychopathology in chronically ill adolescents. For instance, given the current results, it may be more cost effective and appropriate to assess and target adolescents with a negative appraisal style, as it appears to be consistently related to internalizing and externalizing outcomes. Chronically ill pediatric patients with a negative attributional style are likely to be at increased risk for these problems. In contrast, it may be best to target parental attributions for intervention only in cases where parents voice concerns about their adolescent externalizing behaviors.

Regarding the implications of the findings related to family structure, the current results suggest that single-parent status is not a unique risk factor for adolescent maladjustment in chronic illness populations. However, the finding that the number of active caregivers was associated with externalizing problems indicates the importance of identifying functional social supports for families with chronically ill teens. Regardless of whether elevated externalizing problems are a true or perceived phenomenon related to reporter bias, helping families identify a functional support network will likely alleviate

parental stress, and may result in fewer adolescent externalizing problems. Additionally, despite the fact that we did not find a direct relationship between single-parent status and adolescent outcomes, there may be other reasons to target single-parent families for intervention, such as differences in parent mental health (Brown et al., 2008; Cunningham & Knoester, 2007).

Finally, the finding that age and parental distress were strong predictors of adolescent adjustment difficulties has important implications for physicians and mental health clinicians who provide care for these families. Specifically, younger teens may benefit from preventative interventions before mental health symptoms arise, whereas indicated interventions may be needed at older ages. Further, the important relation between parent distress and adolescent outcomes indicates that routinely assessing caregiver distress (and providing help when needed) should be an integral aspect of providing care for chronically ill adolescents.

#### Limitations and Future Directions

A common limitation in research with chronically ill pediatric populations is the availability of research participants. While the Children's Hospital of Alabama serves children from a large surrounding region, the number of patients with a single diagnosis seen within a given year is typically smaller than the sample size required to examine complex predictive models, such as those conducted in the current study. To achieve sufficient sample size, the current study included three patient populations, those with diabetes, cystic fibrosis, and muscular dystrophy. Previous research has shown a number of psychosocial commonalities across disease groups, including adjustment outcomes and attributions (Lash, 2005; Schoenherr et al., 1992). Although the three disease groups

reported no differences in adjustment outcomes in the current study, muscular dystrophy patients reported more pessimistic attributions than participants with diabetes or cystic fibrosis. The use of additional diagnostic groups would improve the generalizability of the current results. A larger overall sample and larger groups per disease category would allow for more powerful tests of complex analyses and inter-group comparisons, which would promote tailoring interventions to more specific populations.

Relatedly, there is current debate among researchers regarding the utility of combining multiple disease groups. Research has demonstrated that the impact of various psychosocial variables seem to be consistent across chronic illness groups (Wallander et al., 1992). Further, the comprehensive theoretical model proposed by Rolland (2005) describes that factors across disease groups such as disease severity and psychosocial variables are related to adjustment and outcomes and are not disease specific. Indeed, in the current sample, outcome measures did not differ by diagnostic group. However, it is important to attend to the fact that research findings derived from the combination of multiple disease groups may mask and thus limit the applicability of disease-specific patterns of adjustment. Specifically, because the current study indicates that attribution style may vary depending on disease severity or disease group, future investigation including attribution style or other measures of cognitively-based coping should interpret results cautiously.

The cross-sectional design of the current study design precluded any causal interpretations of the obtained relationships. Longitudinal data collection is underway in a follow up study to identify which risk and protective factors predict long-term mental

health outcomes. Data collection at one time point was chosen to ensure the feasibility of the current study, given the available time frame and resources.

Another limitation of the current study was the shared method variance in the predictors and outcome variables. Specifically, the positive relationships found between parent-reported attributional style and parent-reported adolescent adjustment, and likewise adolescent-reported attributions and adolescent-reported internalizing problems, may in part be an artifact of shared variance. Future analyses or research should include multiple reporters of adolescent outcomes, including third-party reports if possible. Alternatively, utilizing parent and teen reports of outcomes to derive latent outcome variables or another method of combining parent and child reports would enhance the validity of conclusions.

Results in the current study may also be somewhat hampered by the amount of missing data, particularly on the parent attribution style measure. Although conservative data imputation minimized this problem in the current study, future studies would benefit from modifying administration procedures to increase survey completion rates. In particular, we found higher completion rates (100% vs. 84%) on the Parent Attribution Style Questionnaire after providing both verbal and written instructions compared to written instructions alone.

Another limitation is the low reliability of the child attribution measure (CASQ), which replicates similar findings from previous research (Thompson et al., 1998). Future research may benefit from utilizing alternative measures of cognitive coping and further measure development seems to be warranted in the area of attribution style. Although several measures related to attribution style in children exist (see Connell, 1985;



Crandall, Katkovsky, & Crandall, 1965; Hoza, Bukowski, & Pelham, 1993), only the CASQ has scales that correspond to the adult measure. In addition, there are a limited number of pediatric-specific measures of attribution style. A potentially valuable tool would be a collection of disease-specific measures of attribution style developed for children<sup>1</sup>. For example, medical compliance in teens with diabetes may be heavily dependent upon self-efficacy and whether they believe their own actions affect their medical outcomes such as blood glucose levels.

Finally, the current study provided an important look at the role of family structure in outcomes for chronically ill adolescents. There is a notable dearth of research in this area (Brown, et al., 2008), and it is critical that research on this topic continue. The current study employed several measures of family structure including single vs. two-parent homes and the number of active caregivers providing functional support as well as measures of emotional social support. Future investigations may incorporate other ways to quantify family structure, particularly to address complex family structures with multiple parent and sibling groups. The potential strengths and weaknesses of blended, traditional, and transitioning family structures will be an important issue to consider as we continue to study and serve medically ill children.

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<sup>1</sup> A commonly used attribution style questionnaire used with adults with medical illness is the Symptom Interpretation Questionnaire (Robbins M.J. & Kirmayer L.J., 1991).

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APPENDIX  
INSTITUTIONAL REVIEW BOARD APPROVAL

