Psychological Adaptation and Adjustment of Mothers of Children With Congenital Heart Disease: Stress, Coping, and Family Functioning

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Objective: Investigate support for the transactional stress and coping model for mothers of children with congenital heart defects, in accounting for the variance in maternal adjustment.

Methods: Participants were 52 mothers of children recruited from a university medical center. Measures included illness variables, cognitive processes (i.e., appraisals of stress, expectations, methods of coping, family functioning, and maternal psychological adjustment).

Results: Maternal adjustment was associated with high levels of daily stress and palliative coping techniques and was not significantly associated with severity of the cardiac defect. Together, the variables of the model accounted for approximately 38% of the variance in maternal adjustment.

Conclusions: The findings are in accord with previous research among other chronically ill populations in suggesting an association between stress, coping, and maternal adjustment. Within the limitations of the study, the data were interpreted to support the utility of theoretical models in identifying areas in need of intervention across chronic illness groups.

Key words: stress; coping; cardiac deficits; families.

Congenital heart defects are among the most pervasive and serious chronic illnesses found in children. It is estimated that 8 of every 1,000 babies are born with a congenital heart defect (Behrman, Kliegman, Nelson, & Vaughan, 1992). The defects are distributed among the entire population of children without distinction for social class or race (Fixler, Pastor, Sigman, & Eifler, 1993) and include a spectrum of severity ranging from minor defects that may spontaneously self-correct to more severe, even potentially life-threatening defects that require several surgical interventions (Behrman et al., 1992). Children frequently undergo a series of palliative surgical procedures to ameliorate the defect.

Due to significant advances in medical technology including innovative corrective surgeries, mortality rates for infants with congenital heart defects have decreased dramatically. As a result of these advances, caregivers of these children are subject to many potential stressors including the scheduling of frequent clinic visits, monitoring and limiting their child’s activities, and administering medication. Thus, they must adapt to novel responsibilities in the care of their children as well as endure continued psychological and financial stressors associ-
ated with having a child with a potentially life-threatening chronic illness.

Goldberg, Morris, Simmons, Fowler, and Levinson (1990) assessed the effects of childhood chronic illness on parents by examining the relationship between chronic illness in infants and parenting stress. Findings indicated that the parents of children with congenital heart disease reported greater amounts of stress than either parents of healthy infants or parents of children diagnosed with cystic fibrosis. Further, DeMaso et al. (1991) examined the association between the psychological adjustment of children with congenital heart disease, their mothers' perceptions of parenting skills, and the relationship between the mother and her child. Findings were that maternal perceptions were significantly associated with child psychological functioning rather than the severity of the cardiac defect.

Over the past several years, there has been a general shift from more descriptive accounts of chronically ill child populations (e.g., Kazak, 1989; Wallander & Thompson, 1995; Wallander, Varni, Babani, Banis, & Wilcox, 1988) to the development of more conceptually-based models to predict the adjustment of these children and their families (e.g., Brown, Doepke, & Kaslow, 1993; Wallander, Varni, Babani, Banis, & Wilcox, 1989). These studies have demonstrated the utility of using a theoretical framework to examine both the commonalities found across different childhood chronic illnesses as well as the characteristics unique to a particular disease or illness. Further, there has been mounting literature to support the hypothesis that parental adjustment to many different childhood chronic illnesses may be similar (e.g., Thompson et al., 1994; Wallander et al., 1988). The programs of research by Wallander et al. (1989) and Thompson and associates demonstrate the utility of theory-driven, model-based research. As Brown et al. (1993) have concluded, consistent use of a theory-based model can serve as a basis for the comparison of results across different groups of chronically ill children.

Recently, Thompson and associates have developed a transactional stress and coping model to account for the psychological adjustment of chronically ill children and their mothers. This model has been applied to children with various chronic illnesses in an attempt to examine associations among illness and demographic parameters, maternal and child mediational processes, and the psychological adjustment of both children and their mothers (Thompson, Gil, Burbach, Keith, & Kinney, 1993a; Thompson, Gil, Burbach, Keith, & Kinney, 1993b; Thompson et al., 1994; Thompson, Gustafson, Hamlett, & Spock, 1992; Wallander & Thompson, 1995). The transactional stress and coping model is presented in Figure 1.

Using the stress and coping model, Thompson and associates have found that approximately one third of the mothers with a chronically ill child meet the criteria for poor adjustment on the SCL-90-R (T > 63, above the 90th percentile) (Derogatis, 1983) (e.g., Thompson et al., 1993a; Thompson et al., 1994). In addition, these investigators have found that maternal adjustment is significantly related to the hypothesized psychosocial/mediational processes incorporated in the stress and coping model (Thompson et al., 1993a; Thompson et al., 1992). Furthermore, these mediational processes have accounted for independent and significant increases in the variance in maternal adjustment over and above that explained by illness and demographic characteristics (i.e., illness severity, gender, age, socioeconomic status).

The purpose of this investigation was to examine the psychological adjustment of mothers of children with congenital heart defects in order to determine both commonalities in parental adjustment across childhood chronic illnesses and possible disease-specific factors unique to this chronic illness. The present study employed the transactional stress and coping model (Wallander & Thompson, 1995) that has demonstrated utility in delineating the psychosocial mediational processes that predict maternal adjustment in mothers of children with other chronic illnesses (i.e., cystic fibrosis, sickle cell disease). Because the model has been demonstrated to be effective in predicting psychological adjustment and adaptation in other chronic illnesses, we employed it for this investigation so that a study of children with congenital heart defects could be compared to the already existing literature of mothers of children with other chronic illnesses.

Based on previous research employing this model, we hypothesized that the manifestation of the severity of the children's cardiac defects or demographic variables will be mediated by the psychological processes (i.e., cognitive processes, methods of coping, and family functioning) depicted in the model (see Figure 1). In addition, we predicted that mothers exhibiting psychological distress will have higher levels of perceived stress stemming from
both daily and illness-related causes, lower levels of efficacy expectations, internal health locus of control expectations, higher levels of palliative coping, and family functioning characterized by higher levels of conflict and lower support than mothers exhibiting good psychological adaptation and adjustment. Finally, we hypothesized that maternal mediational processes would account for a significant amount of variance over and above that accounted for by illness and demographic parameters.

**Method**

**Participants**

Fifty-two mothers of children with congenital heart defects were recruited from a pediatric cardiology service at a major university-affiliated medical center.¹ The center is located in a major metropolitan area in the southeastern United States. Some of the children were being medically managed (i.e., regularly seen by a cardiologist, receiving medication on a regular basis, or being admitted to the hospital for postsurgical monitoring or complications stemming from a previously repaired cardiac defect). Mothers were recruited from a preoperative education class (n = 4, 7.7%), an outpatient pediatric clinic (n = 9, 17.3%), and a children’s hospital (n = 39, 75%), all of which were served by faculty at the university medical center.² The sample was predominantly Caucasian (n = 36, 69.2%). Of the sample, 30.8% (n = 16) were African American and 71.2% were married (n = 37). Most mothers were interviewed in the hospital setting. The mean age of the mothers in the sample was 28.5 years, SD = 7.9 (range = 16–50 years). Most of the children (n of females = 23, 44.2%) of the mothers in the sample were two years of age or younger (n = 45, 86%; M = 1.7 years, SD = 27.3, range = 9 days–13.6 years).

**Procedure**

All of the mothers were consecutively chosen based on their willingness to participate. After informed consent was obtained, self-report inventories and a brief structured interview were administered to the mothers in the hospital or during a regular clinic visit.

**Measures**

**Illness Variables.** The type of heart defect for each child was classified into one of the 15 major types of congenital heart defects depicted in Table I. Two cardiac nurses were requested independently to pro-

¹Six mothers declined to participate in this investigation because of time restraints. Of these mothers, two were African Americans, four were Caucasians. No other information was available about these mothers. Thus, the rate of participation was approximately 90%.

²A series of one-way ANOVAs was performed on each of the variables, with setting as the independent variable. Of the 11 ANOVAs performed, only the Daily Hassles scale yielded a significant main effect, F(2, 49) = 7.12, p < .01. An examination of the means indicated that mothers interviewed in the hospital reported fewer daily hassles (M = 27.1, SD = 19.6) than the mothers assessed in the outpatient pediatric clinic (M = 52.8, SD = 23.1) or the preoperative class (M = 45.5, SD = 5.1). When the site of the interview was correlated with mothers’ adjustment scores, no significant association was found (r = .18, df = 52).
provide a ranking of this list of 15 prevalent types of heart defects based on their general and overall impression of severity without regard to specific patients. The nurses were requested not to discuss their independent ratings with each other. The reliability of the two raters was .90, $p < .01$ (Pearson correlation coefficient). Based on this high reliability, the rankings of one nurse were chosen to quantify each child's defect in terms of severity. In cases where more than one major defect was present, the defect with the highest severity rating was chosen. Finally, the pediatric cardiologist (RC) was presented with the ratings of diseases and asked to attest to their validity based on the general and overall impression of severity. Validity of the ratings was confirmed. The frequency, severity, and percentage of each defect found in the sample are presented in Table I.

**Cognitive Processes.** This domain was conceptualized as consisting of two major areas, each with two subareas. The first area is appraisal of stress. Its two subareas are daily hassles and illness tasks. The second area is expectations. Its two subareas are efficacy in handling illness-related tasks and health locus of control. A brief, 9-item structured interview based on the work of Moos and Tsu (1977) was used in order to assess maternal appraisal of stress relating to four illness-related tasks: (a) dealing with medical problems and symptoms experienced by her child; (b) maintaining her child's emotional stability and well-being; (c) maintaining her own emotional stability and well-being; and (d) dealing with or preparing for an uncertain future. This measure yielded two scores, one for the illness tasks subarea and one for the efficacy subarea. Illness tasks stress was quantified by obtaining a sum score based on the mother's report of stress level for each illness task on a scale ranging from not stressful at all (1) to very stressful (100). Efficacy was reflected in a sum score of the items constituting the problem area with respect to the overall illness of her child. A 4-point scale was used (none or not applicable, somewhat, quite a bit, a great deal). A sum score was derived that reflected both the frequency and severity of maternal daily stress.

Health locus of control expectations were assessed using the three dimensions of the 18-item Multidimensional Health Locus of Control Scales (Wallston, Wallston, & DeVellis, 1978), which yielded three scores for the following dimensions: Internal, Powerful Others, and Chance. Due to the low reliability of the Powerful Others dimension (in this study, $\alpha = .39$), only the remaining two scores were considered for subsequent analyses: Internal ($\alpha = .71$) and Chance ($\alpha = .73$).

**Methods of Coping.** Coping was assessed using the 65-item Ways of Coping questionnaire (Folkman & Lazarus, 1980). Mothers were instructed to indicate how often they used each given coping behavior with respect to the overall illness of her child. A 5-point scale was used (never, seldom, sometimes, often, most of the time). Two broad-band measures of coping were derived from the mother's responses. Palliative coping ($\alpha = .79$) was reflected in the sum score of the items constituting the emotion-focused, avoidance, wishful thinking, and self-blame factors. Adaptive coping ($\alpha = .84$) was the sum of the items constituting the problem-focused, cognitive restructuring, seeking information, and seeking social support factors. A palliative coping ratio was ultimately derived by dividing palliative coping methods by the sum of palliative and adaptive coping methods (Vitaliano et al., 1985). This ratio was multiplied by 100 for ease in explicated data. This score was obtained in order to provide

### Table I. Frequency and Severity of Congenital Heart Defects in the Sample

<table>
<thead>
<tr>
<th>Type of defect</th>
<th>Severity ranking</th>
<th>$n$</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent ductus arteriosus</td>
<td>1</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Coarctation of aorta</td>
<td>2</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Atrial septal defect (ASD)</td>
<td>3</td>
<td>4</td>
<td>(7.7)</td>
</tr>
<tr>
<td>Ventricular septal defect (VSD)</td>
<td>4</td>
<td>13</td>
<td>(25.0)</td>
</tr>
<tr>
<td>Tetralogy of fallot (TOF)</td>
<td>5</td>
<td>5</td>
<td>(9.6)</td>
</tr>
<tr>
<td>Pulmonary valve stenosis</td>
<td>6</td>
<td>1</td>
<td>(1.9)</td>
</tr>
<tr>
<td>Aortic valve stenosis</td>
<td>7</td>
<td>1</td>
<td>(1.9)</td>
</tr>
<tr>
<td>Complete AV canal</td>
<td>8</td>
<td>3</td>
<td>(5.8)</td>
</tr>
<tr>
<td>Transposition of great arteries</td>
<td>9</td>
<td>1</td>
<td>(1.9)</td>
</tr>
<tr>
<td>Total anomalous pulmonary venous return</td>
<td>10</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Single ventricle</td>
<td>11</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Double-outlet right ventricle</td>
<td>12</td>
<td>2</td>
<td>(3.8)</td>
</tr>
<tr>
<td>Pulmonary atresia</td>
<td>13</td>
<td>5</td>
<td>(9.6)</td>
</tr>
<tr>
<td>Hypoplastic left/right ventricle</td>
<td>14</td>
<td>16</td>
<td>(30.8)</td>
</tr>
<tr>
<td>Truncus arteriosus (TA)</td>
<td>15</td>
<td>1</td>
<td>(1.9)</td>
</tr>
</tbody>
</table>

Davis, Brown, Bakeman, and Campbell
an index of maladaptive coping behavior in mothers with respect to their child’s heart defect.

**Family Functioning.** Family functioning was assessed using the Family Environment Scale (FES; Moos & Moos, 1981), which consists of 90 true-false items. Three higher order FES factors delineated by Kronenberger and Thompson (1990) were utilized that pertain to families with chronically ill children. The Supportive factor reflects the degree of mutual commitment and support for expression and feelings and for active participation in social and recreational activities. The Conflicted factor reflects high levels of conflict, poor organization, and a lack of mutual commitment and support. The Controlling factor reflects an emphasis on control, ethical and religious values, achievement orientation, and a lack of independence.

**Maternal Psychological Adjustment.** Maternal adjustment was assessed using the Brief Symptom Inventory (BSI; Derogatis, 1975). The BSI is a 53-item self-report measure of psychological distress with respect to nine symptom dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism (α = .96). A sum score was used, which indicates the extent of psychological distress. The measure was then reverse scored so that higher numbers would indicate maternal adjustment instead of maternal distress.

**Results**

Descriptive statistics for each of the variables are presented in Table II. Mothers’ adjustment scores on the BSI suggested significant variability, ranging from the 5th percentile to above the 80th percentile. The mean adjustment score on the BSI corresponded to the 80th percentile of the normative sample. When we used the 90th percentile as clinically elevated, (T ≥ 93), 19 (37.3%) mothers met criteria for poor adjustment, while 32 (62.7%) demonstrated adequate adjustment. No differences were found on the BSI scores as a function of children’s gender.

First, zero-order correlations obtained on all measures were examined among the variables and the distribution of scores. Due to the limited sample size, one variable was chosen to represent each of the three hypothesized adaptational processes domains depicted in the transactional stress and coping model (see Figure 1). The selection of these three variables was based on three factors: (1) the strength of the correlation between each variable and maternal adaptation within a given domain, (2) the strength of intercorrelations among variables in each domain, and finally, (3) the findings of past research employing this model.

The results of the bivariate correlation coefficients are presented in Table III. First, in spite of its negligible zero-order correlation with the dependent variable (r = .09), defect severity was included in each analysis due to its primary theoretical importance. Second, due to the fact that both maternal age (r = .31, p < .05) and maternal education (r = .37, p < .01) correlated with maternal adjustment, both were considered for subsequent analyses. Third, due to the fact that daily hassles correlated significantly with maternal adjustment (r = −.29, p < .05) and also were a significant predictor of maternal adaptation and adjustment in several past studies employing the transactional stress and coping model (i.e., Thompson et al., 1993a; Thompson et al., 1993b), we consequently chose it to represent the cognitive processes domain. Fourth, in order to determine the effect of coping style on maternal adjustment, we chose one ratio-based measure of coping for analysis (r = −.52, p < .01). Finally, due to its significant correlations with both the conflicted and controlling factors (r = −.79, p < .01 and r = −.53, p < .01,
respectively), the family supportiveness factor was chosen to represent the family functioning domain (see Table III).

Based on the transactional stress and coping model, these variables were then analyzed using three stepwise hierarchical regression analyses (Cohen & Cohen, 1983). First, because significant correlations were found between the dependent variable and both maternal age and maternal education, BSI scores were first regressed on these variables in order to determine whether maternal age contributed to a significant amount of variance in maternal adjustment above and beyond that of maternal education. Results of this preliminary analysis indicated that, while educational level accounted for a significant amount of variance in BSI scores ($R^2 = .137; F[1, 50] = 7.94, p < .01$), the addition of maternal age into the regression equation failed to account for a significant amount of additional variance ($\Delta R^2 = .017; p = .32; df = 1, 49$). Based on this finding, parental education only was considered in subsequent analyses to represent the demographic variables domain.

Second, due to its primary hypothetical interest, we examined the effect of defect severity on maternal adjustment. Based on the past research that demonstrated the negligible effect of illness severity on maternal adjustment, we did not expect to account for a significant amount of variance in maternal adaptation scores. A multiple regression analysis was performed in order to determine whether type of defect accounted for a significant amount of variance in maternal adjustment above and beyond that of maternal education. The results of this regression analysis indicated that defect severity accounted only for approximately 1% of the variance in mothers’ BSI scores ($\Delta R^2 = .016, n.s.$).

Third, we conducted an analysis to address the hypothesis that the three domains together com-
Mothers of Children With Congenital Heart Defects

Table IV. Summary of Stepwise Regression Analysis for Maternal Education, Defect Severity, Daily Hassles, Palliative Coping, and Family Support Predicting Maternal Adaptation and Adjustment

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable</th>
<th>$R^2$</th>
<th>$\Delta R^2$</th>
<th>$\Delta df$</th>
<th>$\Delta F$</th>
<th>Partial reg. coefficients for major pred. variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mother's ed.</td>
<td>.137</td>
<td>.137</td>
<td>1, 50</td>
<td>7.94**</td>
<td>.225</td>
</tr>
<tr>
<td>2</td>
<td>Defect severity</td>
<td>.153</td>
<td>.016</td>
<td>1, 49</td>
<td>&lt;1</td>
<td>-.012</td>
</tr>
<tr>
<td>3</td>
<td>Daily hassles</td>
<td>.222</td>
<td>.070</td>
<td>1, 48</td>
<td>4.30*</td>
<td>-.222</td>
</tr>
<tr>
<td>4</td>
<td>Palliative coping</td>
<td>.375</td>
<td>.153</td>
<td>1, 47</td>
<td>11.5**</td>
<td>-.415</td>
</tr>
<tr>
<td>5</td>
<td>Family support</td>
<td>.378</td>
<td>.003</td>
<td>1, 46</td>
<td>&lt;1</td>
<td>.066</td>
</tr>
</tbody>
</table>

*p < .05.  
**p < .01.

prising maternal adaptational processes would account for the most significant amount of variance in maternal adjustment scores. To address the contribution of each of the three domains of cognitive processes, methods of coping, and family functioning, we regressed maternal adjustment on the three variables chosen to represent each domain in order to determine whether daily hassles, coping style, and family functioning each accounted for a significant amount of variance in maternal adjustment scores. The results of this analysis are depicted in Table IV.

Finally, we entered the final standardized partial regression coefficients (bs) for each variable after each selected variable into the regression equation (see Table IV). These were examined in an attempt to delineate the most significant variables with respect to predicting variance in maternal adjustment scores. As depicted in the table, a total of five variables was entered into the regression equation. Results of this analysis indicated that, after controlling for maternal education and defect severity, daily hassles and method of coping accounted for a significant amount of variance in maternal adjustment scores. In contrast, family supportiveness accounted for less than 1% of the remaining variance. Together, all five variables accounted for approximately 38% of the variance in maternal adjustment scores.

Discussion

This investigation examined factors predictive of psychological adjustment in mothers of children with congenital heart defects. We used a transactional stress and coping model that previously demonstrated utility in delineating those factors associated with maternal adjustment in other childhood chronic illnesses. Findings of this study support previous research indicating that maternal adjustment is associated with active strategies for coping and daily stressors and is unrelated to type of illness or illness severity (e.g., Thompson et al., 1992; Thompson et al., 1993a; Thompson et al., 1993b, Thompson et al., 1994). The finding that approximately 37% of the mothers met criteria for poor adjustment is consistent with the findings of Thompson and associates (Thompson et al., 1992; Thompson et al., 1994) both for mothers of children with cystic fibrosis and mothers of youth with sickle cell disease. No significant differences were found in mothers' adjustment as a function of their children's gender. In the chronic illness literature, the evidence regarding the contribution of children's gender to caregivers' psychological adjustment has been unclear. This is certainly an area ripe for future investigation across chronic illness groups.

Support was provided for the hypothesized effect of the maternal adaptational processes depicted in the transactional stress and coping model. Specifically, when both maternal education and severity of defect were controlled, both daily stress and an emotion-focused coping style characterized by self-blaming and avoiding emotions were significantly, and negatively, associated with maternal adjustment. Together, the variables in the model accounted for over one third (nearly 40%) of the variance in maternal adaptation scores, with nearly one fourth of this variance accounted for by the two adaptational processes domains (cognitive processes, methods of coping, and family functioning) depicted in the stress and coping model (see Figure 1).

The data from this investigation support the findings of Thompson and associates, who em-
ployed the transactional stress and coping model to predict maternal adjustment in mothers of children with cystic fibrosis and sickle cell disease (e.g., Thompson et al., 1992; Thompson et al., 1993a). Specifically, our findings indicate that stress stemming from daily hassles and increased use of palliative coping techniques were negatively related to maternal adjustment. Further, coping style in this investigation appeared to be more strongly associated with maternal adjustment than the other variables investigated, accounting uniquely for 15% of the variance in maternal adaptation scores. In contrast to previous studies, in ours the contribution of daily hassles approached but did not reach significance. The relatively small sample size may have limited power, however, thereby obscuring significant effects that otherwise may have occurred. Further research is needed with larger sample sizes in order to determine the durability of the relationship of daily hassles to maternal adjustment in mothers of children with congenital heart defects.

This investigation did not provide support for the role of family functioning in predicting maternal adjustment. In fact, these data are consistent with those of Thompson et al. (1993a, 1993b) in a study of mothers of children with sickle cell disease who were comparable in educational attainment to the mothers participating in this study. Thompson et al. found that family functioning accounted for only 3% of the variance in maternal adjustment, while coping style and daily stress significantly predicted mothers' adaptation to their children's disease. In the present investigation, high levels of family supportiveness did not predict maternal adjustment. In fact, family support accounted for less than 1% of the variance in maternal adjustment scores. One possible explanation for these data may be due to the cultural diversity of the present sample (nearly one third of the sample of mothers was African-American). Thus, family functioning and, more specifically, family support, may have been conceptualized differently in this sample than for middle-class Caucasian families. Moreover, the mothers in this investigation may have had a different notion of "family" than would be expected in a sample composed primarily of middle-class Caucasian respondents. For example, some recent research has suggested that African-American families seek support beyond their nuclear families to include cousins, grandparents, and significant others (Wilson & Tolson, 1990). Thus, the measure employed in this investigation to assess family support may not have captured the true notion of "family" as perceived by these mothers. Additional research will need to be conducted employing family measures that are culturally sensitive in order to accurately assess the environment of ethnically diverse families.

The findings of this study are consistent with the pediatric chronic illness literature insofar that disease severity did not predict maternal adjustment. In past studies examining the maternal adjustment in mothers of children with sickle cell disease and cystic fibrosis, illness parameters were not related to maternal adaptation/adjustment (e.g., Thompson et al., 1992; Thompson et al., 1993a). The findings of this study parallel these data, demonstrating that the severity of a child's cardiac defect accounted for less than 2% of the variance in maternal adjustment. Taken together with other studies, this investigation supports the general notion that psychological adjustment is associated with adaptational processes rather than with disease severity.

In our investigation, neither perceived efficacy nor expectations of health locus of control were associated with maternal adjustment. Thompson et al. (1993a) have demonstrated a significant association between efficacy and adjustment in adults with sickle cell disease. Consistent with our data, however, Thompson et al. (1992) did not find support for an association between health locus of control and adjustment for mothers of pediatric patients with cystic fibrosis. It has been suggested that investigators examine the constructs related to maternal expectations including maternal attributions and learned helplessness that may be more specific to chronic illnesses (Frank, Blount, & Brown, 1997; Thompson et al., 1992).

The contribution of the present findings must be considered within the limitations of this study. First, there is not a consensus regarding an objective and comprehensive measure of disease severity for children with congenital heart defects. In addition, comorbidity factors also may contribute to severity of illness. In this investigation, disease alone was employed as an illness severity index to provide objective assessment of each child's severity of defect and general prognosis. While our data are in accord with those from other previously cited studies of chronic illnesses in suggesting a lack of support for the effect of illness severity in child or family adjust-
ment, future studies should attempt to further quantify additional parameters of disease severity for children's congenital heart defects. Second, the relatively small sample size may have obscured significant effects or relationships that otherwise may have occurred in a larger sample. Because this is a low-incidence population, it is difficult to obtain participants in only one medical center. Thus, future research should consider multi-institutional studies designed to increase participant availability and to thereby increase number of subjects. Third, this study examined the psychological adjustment only of mothers, because fathers were frequently absent from the hospital or clinic setting. While this problem is pervasive in much of the pediatric literature, future efforts need to consider adaptational processes of fathers in order to examine both commonalities and potential differences in the adaptational processes demonstrated by mothers and fathers of children with congenital heart defects. Fourth, adjustment was assessed solely by means of maternal report. Thus, it is possible that mothers who demonstrate poor coping abilities also may view themselves as having greater adjustment difficulties. However, different types of constructs were employed in this study (e.g., psychopathology-versus coping-based measures), which assisted in mitigating the issue of subjectivity. Fifth, demonstrated relationships among maternal adaptational processes and maternal adjustment cannot necessarily be considered causal. Future research will need to employ longitudinal and experimental designs to definitively demonstrate the role of palliative coping in mothers' psychological adjustment to a chronic illness. Finally, as with much of the pediatric psychology literature, the adjustment measure employed in this investigation was primarily psychopathology-based. Nonetheless, we chose this particular measure because it is widely employed in the pediatric psychology literature and has published norms available for nonclinical samples. Future research will need to develop additional measures to assess the adjustment of mothers and fathers in nonclinical pediatric settings.

In summary, this study underscores the utility of using theoretical models to examine psychological functioning of families and patients across chronic illness groups (Wallander, 1992). The findings suggest that the overall psychological adjustment of mothers of children with congenital heart defects, as well as for mothers of other chronically ill children, may be enhanced by fostering healthy adaptive coping strategies and decreasing daily stress. Further research is needed to determine the efficacy of various interventions designed to target coping behavior and daily stress for mothers of children with congenital heart defects. Tests of interventions are needed for mothers at risk that increase adaptive coping strategies and decrease daily hassles. Assessments of maternal adjustment must follow to validate the utility of the factors of the stress and coping model that appear to be most strongly associated with maternal adaptation. Finally, the association between parental stress and coping and the quality of child-mother relationships will be an important next direction for future research. We hope that future use of theoretical models will demonstrate predictors of healthy adaptation for families of children with chronic illnesses.

Acknowledgments

We thank the staff of the Children's Heart Center, including Angie Hawthorne, RN, Kathy Murphy, MSN, and Kathy Sloan, MN. This study was submitted in partial fulfillment for the MA degree in the Department of Psychology.

Received July 17, 1997; accepted October 14, 1997

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