Stress and Adaptation in Mothers of Children With Cerebral Palsy

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Objective To assess the importance of disability severity and child functional status as predictors of maternal depressive symptoms and the moderating effects of maternal appraisal, social support, and family income on the relationship between disability factors (severity and functional status) and maternal depressive symptoms.

Method Mothers of 270 children with cerebral palsy completed surveys on their appraisal of the child’s disability, social support, and family demographics. Physicians assessed the severity of the disability and the child’s functional status.

Results Thirty percent of the mothers had depressive symptoms above the cutoff on a depression screening instrument. Disability severity and child’s functional status did not predict maternal depression. Perceived social support moderated the relationship between the child’s functional status and maternal depressive symptoms.

Conclusions Mothers of children with cerebral palsy may be at risk for depression. Interventions that take into account the moderating effects of social support may increase maternal adaptation.

Key words cerebral palsy; mothers; depression; disabilities; coping; adaptation.
pressive symptoms, having a child with a lower functional ability would predict maternal depression. Further, we believed that maternal appraisal of the impact of the disability, social support, and family income would moderate the relationship between disease severity and maternal depression and that these factors would also moderate the relationship between the child’s functional status and maternal depression.

Method
Participants and Procedures
Internal review board approval was obtained before the study began. All children with cerebral palsy and their parents attending a private orthopaedic clinic in the Piedmont region of North Carolina between July 1994 and December 1999 were targeted. All parents (N = 444) approached agreed to participate in the study, and each completed a series of questionnaires during the visit. An orthopaedic surgeon and physical therapist completed the disability severity and child functional status assessments, with discussion to resolve cases where ratings were not clear. Only questionnaires completed by mothers whose children had been diagnosed with cerebral palsy for at least 1 year were included for this analysis (n = 270). There were no demographic differences between the participants and the excluded subjects.

Overall, the children with cerebral palsy ranged in age from 1.1 to 17.8 years of age (M = 7.1, SD = 4.1). Children had been diagnosed with cerebral palsy for a mean of 6.3 years (SD = 4.2), and 54% were male. About half of the parents (n = 134) were making less than $25,000 per year. Most of the mothers were currently married (67.2%) and non-Hispanic white (78%). About a third of the mothers (n = 87) reported working full-time outside of the home.

Measures
Disability severity was assessed with the Global Rating Scale, a measure of cerebral palsy severity created for the parent study of cerebral palsy outcomes. Scores range from 1 to 3. Mild cases (1) included those where there was minimal impairment; more severe cases (3) were those with almost complete body involvement. While validation of this scale is still in process, initial concurrent validity for this scale is indicated by the finding that high global rating scores correlate with worse diagnoses (i.e., quadriplegia) (r = .69, p < .0001) and high parent rating of the child’s severity (r = 0.38, p = .0001).

The child’s functional status was assessed with the Functional Independence Measure for Children (Msall et al., 1994). A total score is derived by summing scores for each of its six domains, and norms are used to determine age-based abilities. Higher scores indicate better functional ability. This measure has been found to have good reliability and construct validity (Ottenbacher et al., 1999).

Maternal social support was measured with a scale developed in conjunction with the Medical Outcomes Study (Sherbourne & Stewart, 1991). This scale consists of 20 items answered on a 5-point Likert scale. Higher scores indicate more perceived social support. This instrument has been validated for use in a variety of populations (Sherbourne & Stewart).

Appraisal of the illness situation was measured with the Impact on the Family scale (Stein & Riessman, 1980), which is a 24-item instrument. Respondents are asked to indicate their level of agreement on a 4-point scale, and higher scores indicate more positive appraisal. The internal reliability for this measure was .88 (Stein & Riessman). This study used a summary score consisting of 19 items (the mastery subscale was excluded) as a total appraisal score. Lustig, Ireys, Sills, and Walsh (1996) discuss the appropriateness of using these 19 items as a measure of illness appraisal.

Maternal depression was assessed with the Center for Epidemiologic Studies-Depression (CES-D) Scale Short Form, an 8-item scale developed for the Medical Outcomes Study as a screen for depressive disorders (Burman, Wells, Leake, & Landsverk, 1988). The short form of the CES-D differs from the original CES-D in that the scoring method of the short form has been altered by weighting items, and two items from the Diagnostic Interview Schedule pertaining to the persistence of depressive symptoms have been added. This scale has had high sensitivity and good positive predictive value for detecting recent depressive disorders (Burman et al.). For this study, the scoring algorithm was transformed to make computerized scoring simpler, with high levels of depression indicated by CES-D short form scores greater than 3.79; this transformation did not affect score interpretation, as discussed by the CES-D authors.

Statistical Analysis
Statistical Analysis System for Windows (SAS Institute, Inc., 1985) was used for all analyses. To examine potential moderating relationships, we estimated six separate generalized linear model regressions. Variables in each of these regressions were centered (means subtracted) to reduce problems with multicollinearity due to multiplicative factors in the model. For each regression, predictor (disability severity or functional status) and moderator main effects were entered first, followed by the interaction between the predictor and moderator. Significant interac-
tion terms indicated a moderating relationship, and interactions with $p$ values of less than .10 were considered significant because linear modeling (including regression and ANOVA) tends to underestimate the effect size of interaction terms (Holmbeck, 1997).

**Results**

Table I shows the characteristics of the measures. The Functional Independence Measure for Children (functional status) measure showed a strong bimodal distribution, with most of the children scoring either very high or very low; for this reason the measure was dichotomized, with low functioning children scoring at or below the mean and high functioning children scoring above the mean.

The mean depression score for this group of mothers was 2.76 ($SD = 2.44$). However, 30% of the mothers ($n = 80$) scored greater than 3.79 (the cutoff above which further evaluation for depression is advised), indicating that depression was a common problem for these mothers.

Results of the first regression showed that neither the child’s disability severity, partial $F = 2.07$, $p = .15$, nor functional status, partial $F = .01$, $p = .91$, predicted maternal depression. Therefore, the first hypothesis was not supported. In addition, only perceived social support was a significant moderator of the relationship between the child’s functional status and maternal depression, partial $F = 3.67$, $p = .06$. None of the other factors examined (appraisal or family income) buffered the relationship between disability parameters and maternal depression.

A plot of the moderating effect of social support can be seen in Figure 1. This plot indicates that the relationship between child functional status and maternal depression differs based on levels of maternal perceived social support. Post-hoc analyses (see Holmbeck, 2002) determined that, for mothers reporting high levels of social support, maternal depressive symptoms tended to be higher for low-functioning children ($\beta = .73$), $t(256) = 1.31$, $p = .057$ although the opposite was true for mothers reporting low levels of social support ($\beta = .70$), $t(256) = 1.28$, $p = .06$.

**Discussion**

Almost a third of the mothers in this study scored above the cutoff on a screening instrument for depression, which supports results of previous studies showing that mothers

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Table I. Characteristics of Measures Administered to Mothers of Children With Cerebral Palsy ($N = 270$)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Sample range</th>
<th>$M$ ($SD$)</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global inventory (severity)</td>
<td>0–3</td>
<td>1.90 (.73)</td>
<td>na</td>
</tr>
<tr>
<td>Functional Independence Measure for Children (functional status)</td>
<td>18–126</td>
<td>71.48 (40.87)</td>
<td>na</td>
</tr>
<tr>
<td>Medical Outcomes Study social support</td>
<td>7–100</td>
<td>73.01 (20.62)</td>
<td>.97</td>
</tr>
<tr>
<td>Family income</td>
<td>1–11</td>
<td>5.82 (3.48)</td>
<td>na</td>
</tr>
<tr>
<td>Impact on family (appraisal)</td>
<td>23–76</td>
<td>49.47 (9.66)</td>
<td>.91</td>
</tr>
<tr>
<td>CES-D short form (depression)</td>
<td>−.81–9.65</td>
<td>2.76 (2.44)</td>
<td>na</td>
</tr>
</tbody>
</table>

na = not available.
of children with chronic illness/disability are at psychosocial risk (e.g., Thompson & Gustafson, 1996). Also, the finding that the child's disability severity did not predict mothers' depression is consistent with results of previous studies (e.g., Canning et al., 1996; Thompson et al., 1992). However, the finding of no direct relationship between child functional status and maternal depression was unexpected. A lack of midrange levels of functional ability may have limited the significant results for this sample. In addition, the buffering effect of other factors may have decreased the predictive ability of functional status.

Social support moderated the relationship between child functioning and maternal depression. Several researchers (e.g., Barakat & Linney, 1992) have reported the protective effect of this factor, although few studies have examined its moderation effects. In this study, mothers of high functioning children experienced more distress than mothers of low functioning children when they perceived low levels of social support. Although unintentional, this finding is consistent with prior research in epilepsy, which reported that children with less severe illness/disability had poorer family communication, self-image, and expectations for the future (Hodgman et al., 1979). These results were attributed to the fact that higher functioning children had less visible problems, which might "excuse" lower functioning children from certain expectations. Hodgman et al. cautioned that parents of higher functioning children may also share a heavier psychological burden than might be expected. This caution may hold for mothers of high functioning children with cerebral palsy who perceive inadequate social support, although the interaction effect was small.

This study is limited by the lack of variability in child functional abilities and because most mothers were white and of lower income, perhaps resulting in lack of moderation findings for income appraisal. The homogeneity of the sample also limits the generalizability of these findings, as does the lack of a comparison group. Future studies should examine mothers of children with middle-range abilities. Also, child behavior measures may be helpful in explaining variability in maternal outcomes. Further, the use of parent and child reports of disability severity and functional status along with clinical reports may be useful.

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