Race as a Moderator of Parent and Family Outcomes Following Pediatric Traumatic Brain Injury

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Objective: To use data from a prospective, longitudinal study to determine whether race moderates parent and family outcomes during the first year following pediatric traumatic brain injuries (TBI).

Method: Participants included 73 white and 18 black children with moderate to severe TBI and their families, and 32 white and 23 black children with orthopedic injuries only (OI) and their families. Assessments of parent and family functioning occurred shortly after injury (baseline) and at 6- and 12-month follow-ups.

Results: Race was a significant moderator of group differences in parental psychological distress and perceived family burden, by and large independent of socioeconomic status. The negative consequences of TBI were relatively less pronounced for parents of black children than for parents of white children at baseline, but became more pronounced at the two follow-ups. Black and white parents differed in preferred coping strategies, which may partially account for their different reactions to their children's injuries.

Conclusions: The sociocultural factors associated with race may moderate the effects of pediatric TBI and OI on parents and families.

Key words: traumatic brain injury; children; race.

Traumatic brain injury (TBI) is a major source of mortality and morbidity for children and adolescents. Trauma is the leading cause of death among individuals 14 years of age and younger, and nearly half of those fatalities involve brain injury (Kraus, 1995). Among survivors, severe TBI results in decrements in intellectual functioning, language, nonverbal skills, attention, memory, and executive functions (Yeates, 2000). TBI also can result in a variety of emotional and behavioral problems (Taylor et al., 1999; Yeates et al., 2001), as well as declines in academic achievement, school performance, and adaptive functioning (Taylor et al., 1999).

TBI can have devastating consequences not only for children but also for their families. Recent studies have shown that severe pediatric TBI results in significant distress and burden for parents and families. The negative outcomes have been documented in comparisons to families of uninjured children and to families of children with injuries not involving the brain (Rivara et al., 1996;
The consequences of pediatric TBI for parents and families appear to depend in part on children's outcomes, which in turn are influenced by parent and family functioning (Taylor et al., 1999, 2001; Yeates et al., 1997). Parent and family outcomes after pediatric TBI also are moderated by psychosocial factors. For instance, caregiver coping styles moderate parent and family functioning following TBI. A reliance on avoidant strategies such as denial exacerbates parental distress and perceived family burden, whereas the use of emotion-focused strategies such as acceptance promotes more positive outcomes (Wade et al., 2001).

Race or ethnic minority status is another social factor that could moderate parent and family outcomes following pediatric TBI. Race is a complex social construct that involves the classification of individuals and groups based on externally visible physical characteristics. Racial classification is often a means of assigning social position, including designation as an ethnic minority (Coll et al., 1996). Ethnic minorities are characterized by important sociocultural differences, even when equated for factors such as education and income, and race can serve as a proxy for those differences in research. A study of whether the parent and family outcomes of pediatric TBI are moderated by race could provide the grounds for a more detailed examination of how sociocultural differences among ethnic groups affect responses to traumatic injuries. However, racial differences in outcomes after pediatric TBI have not been studied before. For instance, blacks constitute the largest ethnic minority in the United States, but we could not find any previous studies comparing blacks and whites on different parent and family outcomes following pediatric TBI.

There are several reasons to think that parents and families may respond differently to pediatric TBI as a function of race. Blacks and whites differ in general health perceptions and methods of coping with negative life events, in ways not accounted for by differences in socioeconomic status (SES; Kessler & Neighbors, 1986). Blacks are more likely than whites to assess their health as poor, even when equated for income level (Navarro, 1991; Ren & Amick, 1996). Similarly, black parents rate their children's health more poorly than white parents, even when matched for SES, health needs, and access to care (Weitzman, Byrd, & Auinger, 1999). Blacks also have been found to respond differently than whites to negative life events. Among lower income samples, blacks report more distress than whites in response to undesirable life events (Kessler & Neighbors, 1986; Ulbrich, Warheit, & Zimmerman, 1989) and are more likely to rely on religion when coping with their distress (Neighbors, Jackson, Bowman, & Gurin, 1983). Differences in health perceptions and coping styles may lead black parents to respond differently to TBI than white parents.

Racial differences in family distress and burden following TBI also could occur because of structural barriers that prevent blacks from obtaining quality health care. Blacks often experience decreased access to health care, as well as inequality in medical treatment, as compared to whites (Dressler, 1993). Black children receive less continuity of care than white children, even when equated for SES; they make fewer physician visits and are more likely to rely on hospital emergency departments for medical care (Weitzman et al., 1999). Severe TBI typically necessitates ongoing medical care. In the face of limitations in access to quality health care, black families may be more likely than white families to experience negative outcomes after pediatric TBI.

The specific aims of this study, therefore, were to determine whether race moderates parent and family outcomes following pediatric TBI independently of SES. We used data from a prospective, longitudinal study of the effects of pediatric TBI on children and their families (Taylor et al., 1995). We anticipated that black parents would report relatively more psychological distress and greater perceived family burden than white parents following moderate to severe TBI, even when equated for SES. Finally, we predicted that black parents would report different strategies for coping with traumatic injuries than white parents. We examined coping strategies shown in our previous research to predict parent and family outcomes (Wade et al., 2001).

**Method**

**Sample**

We recruited a total of 109 children with moderate to severe TBI and their families and 80 with orthopedic injuries only (OI) and their families for a longitudinal, prospective study of child and family outcomes following TBI. Participants were recruited from consecutive admissions to four hospitals in central and northeastern Ohio. All children were
between 6 and 12 years of age at the time of injury and used English as their primary language at home. Children with a history of child abuse, previous neurological disorder, or mental retardation were excluded from the study. For this work, participants were also restricted to those whose primary caregivers designated them as white or black; eight children who were either of a different race or multiracial were excluded. Children were not excluded for premorbid learning disabilities, attention problems, or behavior disorders.

Of the 181 remaining families, 36 did not complete all three assessments scheduled during the first year postinjury and were not included in this study. The rate of participation in all three assessments was significantly higher in the TBI group (87%) than in the OI group (71%; χ²[1, n = 181] = 6.75, p < .01). Participation varied by race in the TBI group (whites = 91%, blacks = 72%) but not in the OI group (whites = 74%, blacks = 68%). Families who participated in all three assessments demonstrated lower SES than those who did not. Among the TBI group, children completing all three assessments had less severe injuries (i.e., higher Glasgow Coma Scale [GCS] scores) than those who did not.

Children in the TBI group sustained a blunt head trauma resulting in a moderate to severe TBI. They were eligible if their lowest postresuscitation GCS (Teasdale & Jennett, 1974) score was 12 or less, or if the GCS score was between 13 and 15 but was associated with an intracranial lesion on neuroimaging, skull fracture, neurological deficit, or documented loss of consciousness for more than 15 minutes. Children in the OI group sustained a noncranial fracture that required at least an overnight hospitalization but did not demonstrate any loss of consciousness or other indication of TBI. The OI group was selected to equate participants for the experience of a traumatic injury and subsequent medical treatment and also to help control for premorbid characteristics that increase a child’s risk of traumatic injury, as well as for practice effects due to repeated testing.

The sample for this study consisted of 145 of the original participants: 72 white and 18 black children with moderate to severe TBI and their families, and 32 white and 23 black children with OI and their families. Table I presents descriptive information about the participants. The OI group had a higher proportion of black children than the TBI group, (χ²[1, n = 145] = 8.24, p < .01). The racial imbalance was likely a reflection of emergency transport patterns at the hospitals rather than any bias in recruitment. The TBI and OI groups did not differ on any other demographic measures, including SES, as reflected in the Socioeconomic Composite Index (SCI; Yeates & Taylor, 1997). The SCI was formed by averaging sample z scores for the Duncan occupational status index (Stevens & Featherman, 1981), annual family income as coded on the Life Stressors and Social Resources Inventory (Moos, Fenn, & Billings, 1988), and a 7-point maternal education scale. As anticipated, the groups differed in injury severity. In Table I, the injury severity score (ISS; Mayer, Matlack, Johnson, & Walker, 1980) reflects all injuries sustained, whereas the partial ISS is calculated based only on injuries that do not involve the brain. The TBI group had more severe injuries overall but did not differ from the OI group in the severity of injuries not involving the brain.

**Procedure**

The study was approved by the institutional review boards at all participating institutions. All age-appropriate hospital admissions were monitored for potential eligibility. When children meeting entry criteria were medically stable, their parents or legal guardians were invited to participate in the study. After providing informed consent, the children’s primary caregivers provided demographic information. They also provided retrospective ratings of pre-injury family functioning and children’s premorbid behavioral adjustment. In almost all cases (90%), the biological mother was the primary caregiver and respondent throughout the study. Ar-
rangements were made during the hospitalization for an initial, or baseline, postinjury assessment. During baseline assessments, caregivers provided information regarding parent adjustment and family stress and burden associated with the children’s injuries. Baseline assessment procedures were repeated approximately 6 and 12 months later.

**Parent and Family Outcome Measures.** Parent and family outcome measures included the Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982), the Family Burden of Injury Interview (FBII; Burgess et al., 1999), the Impact on Family Scale, Version G (IOF-G; Stein & Jessop, 1985), and the self-report version of the Family Assessment Device (FAD; Byles, Byrne, Boyle, & Offord, 1988; Miller, Bishop, Epstein, & Keitner, 1985). The measures have demonstrated satisfactory reliability and validity in previous research (Wade et al., 1998). The BSI is a self-report checklist of psychological symptoms. Overall parent distress on this measure was summarized using the General Severity Index. The FBII is a structured interview in which parents are asked questions pertaining to injury-related family burden (Wade et al., 1998). The average stress level across items was used to summarize family burden. The IOF-G assesses the global impact of child disability on the family. The Total Negative Impact score served as a summary measure of family burden. The FAD was employed to assess overall family dysfunction, using the 12-item General Functioning scale (FAD-GF). Parents were asked to rate pre-injury family functioning on the FAD-GF at the baseline assessment, but the baseline BSI, FBII, and IOF-G reflected concurrent, postinjury status, as did all four measures at the 6- and 12-month follow-ups.

Limited information is available regarding ethnic and racial differences in previous studies of the measures. The BSI normative sample included about 87% whites and 12% blacks, but information about SES was not presented for either racial group and no comparisons based on race were reported (Derogatis & Spencer, 1982). The FBII was developed expressly for this project, and we have not previously presented data on racial differences on it. A comparison of Hispanic and non-Hispanic families with chronically ill children on the IOF found significant differences in parent-reported burden, but not after controlling for SES (Stein & Jessop, 1989). Family adjustment as measured by the FAD did not vary by race in a study of the impact of traumatic injuries (Ketchum, 2000).

**Parent Coping Measure.** Parent coping strategies were assessed using the COPE (Carver, Schierer, & Weintraub, 1989). The COPE is a self-report inventory that measures a variety of coping strategies within the broader dimensions of problem-focused, emotion-focused, and avoidant coping. We used the situational version of the COPE and asked parents specifically to rate how they dealt with the stress created by their children’s injuries. The COPE generates scores on four problem-focused scales (active coping, seeking of social support for instrumental reasons, planning, suppression of competing activities), six emotion-focused scales (positive reinterpretation and growth, seeking of social support for emotional reasons, religion, acceptance, focus on and ventilating emotions, humor), and five avoidant scales (mental disengagement, behavior disengagement, denial, alcohol/drug use, restraint).

Previous studies of the COPE in different racial groups have found inconsistent results. In a study of adolescents and adults with end-stage renal disease who were candidates for kidney transplantation, blacks were more likely than whites to use maladaptive coping strategies and less likely to use adaptive coping (Greco, Brickman, & Routh, 1996). In contrast, in a study of women with breast cancer, the only racial differences on the COPE were in religious coping, which was more common among blacks than whites (Culver, Arena, Antoni, & Carver, 2001).

**Data Analysis**

Each measure was subjected to a group (TBI vs. OI) by race (black vs. white) by time (three assessment occasions) repeated measures multivariate analysis of covariance (MANCOVA). To control for SES, we included the SCI as a covariate in all analyses. Analyses initially included interaction terms involving the SCI, not only to test the assumptions underlying analysis of covariance but also to determine if race and SES interacted as moderators of outcomes. If the interactions involving group, race, and the SCI or group, race, the SCI, and time were not significant, all interaction terms involving the SCI were trimmed from the model and the analysis was repeated. Each analysis included only families who had outcome data available at all relevant occasions. The baseline assessment of the FAD provided a measure of pre-injury status. Analyses of this measure included only the 6- and 12-month follow-up.
distress and burden than whites at baseline and less at the 6- and 12-month follow-ups. Table II shows that several other effects were significant for the parent and family measures. Higher SES as measured by the SCI was consistently associated with better parent and family functioning on the BSI, IOF-G, and FBII. The TBI group reported significantly more family stress and burden on the FBII than the OI group, and the difference in burden between the groups increased over time. On the IOF, the OI group reported more negative impact than the TBI group at the baseline assessment, whereas the reverse was true at the 6- and 12-month follow-ups, with more burden reported by the TBI group.

Parent Coping

Table III summarizes the results of the analyses of parent coping. None of the interactions involving group, race, and the SCI was significant. When interaction terms were trimmed, the main effect of race was significant for several coping strategies. Blacks reported more use of religion, denial, and mental disengagement than whites and less use of acceptance (see Table IV for estimated marginal means and standard errors on these scales). The SCI also accounted for significant variance in several coping strategies. Higher SES was associated with more use of active coping, planning, seeking social support for instrumental reasons, and humor and less use of behavioral disengagement and denial. Except for denial, the coping strategies for which the SCI was a significant predictor were different from those for which race was a significant pre-

Table II. Results of Analyses of Parent and Family Outcomes (MANCOVAs)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>SCI</th>
<th>Group</th>
<th>Group × Time</th>
<th>Race</th>
<th>Group × Race</th>
<th>Group × Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>F</td>
<td>p</td>
<td>F</td>
<td>p</td>
<td>F</td>
</tr>
<tr>
<td>BSI</td>
<td>140</td>
<td>20.48</td>
<td>.00</td>
<td>3.24</td>
<td>.07</td>
<td>0.68</td>
</tr>
<tr>
<td>IOF-G</td>
<td>144</td>
<td>6.05</td>
<td>.02</td>
<td>1.19</td>
<td>.28</td>
<td>5.42</td>
</tr>
<tr>
<td>FBII</td>
<td>144</td>
<td>7.97</td>
<td>.01</td>
<td>8.88</td>
<td>.00</td>
<td>7.23</td>
</tr>
<tr>
<td>FAD-GF</td>
<td>140</td>
<td>2.54</td>
<td>.11</td>
<td>1.35</td>
<td>.25</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Significance levels < .05 are italicized. The main effect for Time and interactions for Race × Time and SCI × Time are not listed in the table because they were not of primary interest, but they were included in the model tested. SCI = Socioeconomic Composite Index; BSI = Brief Symptom Inventory; IOF-G = Impact on Family Scale, Version G; FBII = Family Burden of Injury Interview; FAD-GF = Family Assessment Device General Functioning scale.

The Group × Race × SCI interaction was significant for the IOF-G. The results listed for the IOF-G were obtained with interaction terms involving the SCI included in the overall model. The interaction terms were trimmed from the models for all other variables, because they were not significant.
Figure 1. Brief Symptom Inventory General Severity Index scores at three occasions for TBI and OI groups for (a) white and (b) black parents.
Figure 2. Family Burden of Injury Interview average stress scores at three occasions for TBI and OI groups for (a) white and (b) black parents.
dictor. The injury group main effect was significant for active coping, with the TBI group reporting more use of this strategy than the OI group.

### Discussion

The findings indicate that race was a significant moderator of parent and family outcomes. Differences between the OI and TBI groups in ratings of parent distress and family burden were of lesser magnitude for parents of black children than for parents of white children at baseline, but of greater magnitude at 6 and 12 months postinjury. This finding is consistent with our previous research showing that noninjury factors moderate the outcomes of pediatric TBI (Taylor et al., 1999; Yeates et al., 1997).

Differences between black and white families in their reactions to TBI by and large occurred independent of SES, which was controlled in statistical analyses. The only exception occurred on the IOF-G, on which group differences varied as a function of race only for families of higher social class. The reasons for this finding are unclear, and it may be spurious. In contrast, on both the BSI and FBII, SES accounted for significant amounts of variance, but race consistently moderated outcomes independent of SES. The independent effects of race and SES identified in this study are consistent with previous research showing that socioeconomic status alone cannot account for racial differences in health perceptions (Dressler, 1993; Navarro, 1991; Ulbrich et al., 1989).

A central issue left unresolved by this research is the mechanism by which race moderates parent and family outcomes after pediatric TBI. Differences between black and white parents in their reactions...
to traumatic injuries do not occur because of skin color per se. Instead, they presumably occur because of social and cultural differences for which race serves as a surrogate marker. Our findings suggest that differences in coping strategies may be one of the operative cultural factors. Black parents relied more on religion, mental disengagement, and denial in coping with traumatic injuries. Conversely, white families relied more on acceptance. Our previous research (Wade et al., 2001) suggested that avoidant strategies such as denial and disengagement consistently predict poorer parent and family outcomes after pediatric TBI, whereas acceptance, an emotion-focused strategy, predicts better outcomes.

Black and white parents reported different coping strategies independent of SES. Moreover, SES generally was related to coping strategies different from those related to race, accounting for differences in problem-focused strategies such as active coping, seeking instrumental support, and planning. These results are consistent with previous research showing that racial differences in coping with distress exist independent of SES (Neighbors et al., 1983). Our findings suggest that socioeconomic factors are related to whether parents of children with traumatic injuries will utilize coping strategies that emphasize active problem solving, whereas cultural differences associated with race are likely to be associated with whether parents rely on avoidant, as opposed to emotion-focused, coping strategies after their children are injured. Notably, the preference for active coping shown by parents of higher SES may not always be adaptive; we previously found that active coping predicted more parent distress after TBI but not OI (Wade et al., 2001).

A variety of other social and cultural factors warrant future investigation as possible reasons for racial differences in responses to traumatic injuries. These include ethnic differences in health perceptions, knowledge of injury sequelae, or expectations with regard to the impact of traumatic injuries. Ethnic differences in access to health care, in the quality of health care services, and in the willingness to seek those services also may help to explain how race moderates parent and family outcomes (Dressler, 1993; Wethington & Kessler, 1986). Additional factors that may influence parent responses to traumatic injury and that are likely to vary across ethnic groups include family structure, community environment (e.g., urban vs. rural), employment status, and the availability of health insurance.

Our study has several shortcomings. The number of black participants was small, especially in the TBI group. The TBI and OI groups differed significantly in the proportion of black participants, and attrition rates in the TBI group varied by race. These differences between groups, as well as the selective loss of families of lower SES across groups, suggest that the generalizability of the findings to the population of children with traumatic injuries may be limited because participants of lower SES were probably underrepresented (Kraus, 1995). The differential attrition of more severely injured children from the TBI group also is problematic, because it may have limited the number of significant group differences in child and family outcomes and hence reduced the likelihood of obtaining significant interactions with race.

Thus, the findings warrant replication with larger and more diverse ethnic groups. In future studies, the mechanisms by which ethnic minority status moderates outcomes after TBI should be examined directly (Coll et al., 1996). In the meantime, the findings add to a growing literature regarding the characteristics that place families at highest risk for negative outcomes following pediatric TBI (Hu, Wesson, Kenney, Chipman, & Spence, 1993). Future research is needed to determine whether psychosocial interventions can reduce distress and burden in at-risk families after pediatric TBI. One focus of intervention may be parental coping strategies. Helping parents to accept the injury and to pursue realistic goals for their children may reduce the distress and burden they feel, but only if the assistance is provided in a culturally sensitive fashion that reflects the complex influences of race, class, and poverty on families (Boyd-Franklin, 1993). In this regard, a better understanding of how social and cultural differences among ethnic groups moderate parent and family outcomes may lead to improvements in clinical management for all families following TBI.

Acknowledgments

This research was supported by grant MCJ 390611 from the Maternal and Child Health Research Bureau (Title V, Social Security Act), Health Resources and Services Administration, Department of Health and Human Services, and by grant 5 RO1 NS36335 from the National Institute of Neurological Disorders and Stroke. We acknowledge the contributions
of Matt Diamond, Marla Kenmerer, Nori Mercuri Minich, Madeline Polonia, Barbara Shapero, Elizabeth Shaver, and Nichole Wood. Special thanks also are due to the Rainbow Pediatric Trauma Center at Rainbow Babies and Children’s Hospital, the Trauma Program at Children’s Hospital of Columbus, and the Trauma Center at MetroHealth Medical Center. We also acknowledge the participation of the Children’s Hospital Medical Center of Akron and the collaboration of Duane Bishop, Timothy Mapstone, Scott Maxwell, George Thompson, G. Dean Timmons, and Dennis Weiner.

Received February 1, 2001; revisions received May 15, 2001; accepted November 17, 2001

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