How Do Mothers and Fathers Influence Pediatric Injury Risk in Middle Childhood?

David C. Schwebel, PhD, and Carl M. Brezausek, MS
1Department of Psychology, and 2Center for Educational Accountability, University of Alabama at Birmingham

Objectives Parental influences are among the strongest behavioral correlates to unintentional injury outcome in early childhood, but are less well understood as children develop. We implemented a prospective research design to study how parenting style, parent–child relationships, and parental mental health influence injury during middle childhood. We also considered the roles of parent and child gender. Methods Parental influences were assessed from a sample of 584 first graders, plus their mothers and fathers. Injuries requiring medical treatment were assessed regularly over the subsequent 5 years. Logistic regression models examined how maternal and paternal parenting factors predicted injury among all children, just boys, and just girls. Results Fathers who reported more positive relationships with their children had children protected from injury. This was particularly true of father–son relationships. No maternal traits predicted injury. Conclusions A positive father–child, and especially a positive father–son relationship, may protect children from injury during middle childhood.

Key words fathers; injury; parents; parenting; safety.

Injuries are the leading cause of pediatric mortality in the US (NCIPC, 2009). One set of behavioral factors that plays a prominent role in child injury risk is the influence of parents. Among young children, a constellation of traits encompassing parental supervision and monitoring, parental mental health, and parental engagement in the child’s life appears to be among the strongest behavioral correlates to pediatric injury outcomes (Morrongiello, 2005; Petras, Blitvich, & Finch, 2009). During early child development, parents have the responsibility to supervise young children in potentially injurious situations because children do not yet have the cognitive, perceptual, motor, or impulse control capacities to engage safely in dangerous situations. Parents also serve as role models for young children and spend considerable time training children about safety-related rules and how to make safe decisions in potentially dangerous environments.

As children develop, parents and other adults play a diminishing role in protecting children from injury (Morrongiello & Schwebel, 2008). By school age, children make decisions about how to behave independently, and therefore accept increasing responsibility to protect their own safety. However, parents continue to play some role in pediatric injury prevention after children enter school. This influence likely occurs through a complex set of conceptual pathways (Morrongiello, 2005; Peterson, Farmer, & Mori, 1987). Some influence is direct, both through supervision of children during potentially dangerous activities (Schwebel & Bounds, 2003) and via parental modeling of safe behaviors (Morrongiello, Corbett, & Bellissimo, 2008). Other pathways are indirect, but are the result of sub-par management of children and their environment due to parental mental distress in the form of maternal anxiety (Bradbury, Janicke, Riley & Finney, 1999), depression (Karazsia & van Dulman, 2009; Rhodes & Iwashyna, 2007), or substance use (Damashek, Williams, Sher, & Peterson, 2009).

Another aspect of how parenting might influence child injury risk is the role of gender—both parent gender and child gender. Boys have an injury rate surpassing girls at all developmental stages (NCIPC, 2009). Although a number of biological, sociocultural, and environmental factors may contribute to gender disparities in injury (Matheny, 1991; Rosen & Peterson, 1990), one contributing factor for this
disparity may be gender-related socialization by parents. Mothers tend to intervene more quickly and more frequently, and with more disappointment and less anger when they see their daughters taking risks than when they see their sons taking the same risks (Morrongiello & Dawber, 2000; Morrongiello & Hogg, 2004). Further, parents of young boys encourage their sons to take risks without assistance, whereas parents of young girls will offer physical assistance to help their girls complete the same risky task (Morrongiello & Dawber, 1999).

Also relevant is the role of parent gender on pediatric injury risk. Most research on parenting and child injury risk focuses on maternal influences. Work examining paternal influences has yielded mixed results. Morrongiello and Dawber (1999) reported that mother and fathers tended to socialize their boys and girls similarly. Others suggest employment-related paternal traits—but not maternal traits—play a role in toddler’s injury risk (Schwebel & Brezausek, 2004) and that the addition of a father or father-figure into the household decreases subsequent injury risk in early childhood (Schwebel & Brezausek, 2007). Very little published research considers the role of fathers versus mothers on injury risk in middle childhood.

This study used a prospective design to study how mother and father parenting factors, as measured when children were in first grade, predict pediatric injury risk over the subsequent 5 years, from second through sixth grade. We considered parenting style (firm, harsh, and lax control); time with children; relationship with children; and parental depression as predictors of subsequent pediatric injury. We hypothesized both maternal and paternal parenting factors would predict subsequent pediatric injury in both boys and girls. Specifically, we expected more firm control, less lax control, more time with children, a stronger relationship with children, and lower depression levels would be associated with decreased injury risk.

Methods

Data Source and Sample

Data came from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care. Participants were recruited at birth from 31 hospitals located in 10 US locations. During selected 24-hr sampling periods, 8,986 women giving birth were visited in the hospital. Of these, 5,416 met the study’s eligibility criteria (NICHD Early Child Care Research Network, 2000). A subset was selected in accordance with a conditional-random sampling plan designed to ensure recruited families reflected the diversity of the catchment area at each site. When the infants were 1-month old, 1,364 families (58% of those contacted) enrolled in the study (see NICHD Early Child Care Research Network, 1994, for details of study design, recruitment, and informed consent procedures). Both original data collection and secondary analyses were approved by appropriate IRBs.

This study used data collected when children in the longitudinal study were in first through sixth grades. A sample of 584 children, plus those children’s mothers and fathers, was available. Along with natural attrition that occurs in a 10-year longitudinal study, the sample size was reduced because 152 fathers were not present in families or chose not to participate. The included sample was comprised of 291 boys (50%) and 293 girls (50%), and was 91% Caucasian, 5% African American, and 4% of other ethnicities. Average length of education for mothers in the sample was 14.89 years (SD = 2.33) when children were 1-month old.

Measures

This study considered demographic traits, plus parental factors in three domains, as outlined below. With the exceptions of child sex and ethnicity, parent education (all of which were reported soon after the child’s birth), and the injury assessments (reported regularly, as described below), all data were collected when the child was in first grade. Paternal reports were made in the fall of the child’s first grade year, and maternal reports in the spring.

Demographic Data

Parents reported child sex and ethnicity, family income, and parent education. A socioeconomic status (SES) composite was derived by standardizing and then averaging two times family income, maternal education level, and paternal education level. Family income was assessed by a ratio of income to needs, with income defined as the entire income of all members of the family living in the same household and needs estimated by the poverty threshold during the year of measurement, the number of people in the household, and the number of children in the household (NICHD Study of Early Child Care, 2000).

Parenting Style

Parenting style was assessed via self-report using an adapted version of the Raising Children Questionnaire (Shumow, Vandell, & Posner, 1998). Factor analyses conducted by the NICHD Study of Early Child Care
derived a three-factor solution, with the factors tapping firm parental control (6 items), harsh parental control (6 items), and lax parental control (4 items). Higher scores reflect the style of interest. Internal consistencies (Cronbach’s $\alpha$) at first grade were as follows: for mothers, .57, .69, and .49, respectively; and for fathers, .69, .66, and .56.

Parent–Child Relationship
Parent–child relationship quality was assessed by two measures. First, the total time the parent played with the child was assessed through a single self-report item, “Time playing with child”, answered on a 5-point Likert scale: “my partner’s job” (1), “mostly my partner’s job” (2), “shared equally” (3), “mostly my job” (4), and “my job” (5). Second, parents completed the Parent–Child Relationship Scale, a 15-item self-report questionnaire (5-point Likert scale) assessing parents’ impression of their relationship with their child. The scale was adapted from existing teacher–child relationship scales (Pianta, 1994). Higher scores reflect more positive relationships. Internal consistency is good (Cronbach’s $\alpha = .81$ for mothers and .80 for fathers; NICHD Study of Early Child Care, 2001b).

Parental Depression
Parental depression was assessed using the Center for Epidemiological Studies Depression Scale (Radloff, 1977), a self-report scale designed to assess depression in nonclinical populations. Respondents rate the frequency of 20 depressive symptoms over the past week using a 4-point scale; higher scores represent higher depression levels. Psychometrics are strong (Cronbach’s $\alpha = .91$ for mothers and .87 for fathers; NICHD Study of Early Child Care, 2001a).

Injuries
Mothers reported their children’s history of injuries requiring professional medical attention at least once a year from grade 2 through grade 6. In all cases, parents were asked about injuries requiring professional medical attention in the past 6 months. Two inquiries were made in grade 2, offering data on the full second-grade school year. Just one inquiry was made in grades 3 through 6, offering data on injuries occurring only at half-year intervals during those 4 years. Available reports were summed to yield a single score of injuries requiring professional medical attention, which was then dichotomized into a binary-indicator variable of presence (1 or more) or absence (0) of injury requiring professional medical attention.

Data Analysis Plan
Data analyses were conducted in three steps. First, basic descriptive data and bivariate correlations were computed. The correlations assessed linear relations between the dependent and predictor variables, and also evaluated potential problems of shared variance among the predictor variables. Second, we examined how mothers’ and fathers’ parenting, as measured in first grade, influenced children’s injury risk over the subsequent 5 years using logistic regression. Two models were constructed. Both included basic demographic characteristics. One also included paternal parenting characteristics and the other maternal parenting characteristics. Third, we examined how parenting characteristics measured in first grade predicted children’s injuries over the next 5 years among just boys and then among just girls. Following the results from the second step, this analysis was conducted only with paternal parenting characteristics as predictors. All analyses were conducted in SAS Version 9.2 (Cary, NC, USA).

Results
Basic descriptive data (Table I) and bivariate correlations (Table II) were considered first. Included in these analyses were the dependent (injury) and independent (parenting) variables, as well as basic demographic traits previous work suggests might confound results (child sex and ethnicity; family SES). Several of the parenting qualities intercorrelated mildly, but no intercorrelations were strong enough to invalidate subsequent regression models due to multicollinearity (Table II).

Next, two logistic regression models were constructed to examine how parent characteristics assessed when the child was in first grade predicted injuries over the subsequent 5 years. One model included only father characteristics and the second only mother ones (Table III). Both overall models fit the data (Hosmer and Lemeshow Test $x^2 = 15.19$ and 8.56, ns, for fathers and mothers, respectively). The father’s total positive relationship was related to decreased injury risk. No maternal parenting characteristics were significantly related to subsequent injuries. Child female gender predicted decreased risk in both models.

Last, two logistic regression models were constructed to consider how parental influences might influence boys and girls differently (Table IV). Because maternal characteristics did not predict child injury risk, we focused on paternal influences. Both overall models fit the data (Hosmer and Lemeshow Test $x^2 = 10.60$ and 8.12, ns, for boys and girls, respectively). Fathers’ total positive relationship significantly reduced risk of injury among boys,
but not among girls. No other predictor emerged as statistically significant in either model.1

Table I. Descriptive Data, N = 584

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Injuries, Grades 2–6 (count)</td>
<td>0.37 (0.48)</td>
<td>0</td>
<td>0, 5</td>
</tr>
<tr>
<td>Child Gender</td>
<td>50% male</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Child Ethnicity</td>
<td>91% white</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>SES Composite (average of z-scores)</td>
<td>0.19 (0.79)</td>
<td>0.08</td>
<td>−1.74, 3.33</td>
</tr>
<tr>
<td>Father Firm Control (6 items × 5-point scale)</td>
<td>20.98 (1.99)</td>
<td>21</td>
<td>12, 24</td>
</tr>
<tr>
<td>Father Harsh Control (6 items × 5-point scale)</td>
<td>21.63 (3.13)</td>
<td>22</td>
<td>13, 31</td>
</tr>
<tr>
<td>Father Lax Control (4 items × 5-point scale)</td>
<td>8.52 (1.70)</td>
<td>9</td>
<td>4, 14</td>
</tr>
<tr>
<td>Father Time Playing with Child (3-point scale)</td>
<td>3.06 (0.50)</td>
<td>3</td>
<td>1, 6</td>
</tr>
<tr>
<td>Father Total Positive Relationship (15 items × 5-point scale)</td>
<td>64.44 (6.61)</td>
<td>65</td>
<td>33, 75</td>
</tr>
<tr>
<td>Father Depression (20 items × 4-point scale)</td>
<td>7.47 (6.98)</td>
<td>6</td>
<td>0, 42</td>
</tr>
<tr>
<td>Mother Firm Control (6 items × 5-point scale)</td>
<td>21.53 (1.62)</td>
<td>22</td>
<td>16, 24</td>
</tr>
<tr>
<td>Mother Harsh Control (6 items × 5-point scale)</td>
<td>21.04 (3.09)</td>
<td>21</td>
<td>9, 31</td>
</tr>
<tr>
<td>Mother Lax Control (4 items × 5-point scale)</td>
<td>8.52 (1.56)</td>
<td>8</td>
<td>4, 14</td>
</tr>
<tr>
<td>Mother Time Playing with Child (5-point scale)</td>
<td>3.18 (0.56)</td>
<td>3</td>
<td>1, 6</td>
</tr>
<tr>
<td>Mother Total Positive Relationship (15 items × 5-point scale)</td>
<td>65.09 (6.94)</td>
<td>66</td>
<td>41, 75</td>
</tr>
<tr>
<td>Mother Depression (20 items × 4-point scale)</td>
<td>7.61 (8.07)</td>
<td>5</td>
<td>0, 50</td>
</tr>
</tbody>
</table>

1An anonymous reviewer appropriately raised concern that early injury might influence parenting strategies, and therefore alter the results of all regression models. To test this possibility, we conducted analyses that included injuries requiring medical attention from birth to grade 1 in the models. Results for all models with this variable included were highly similar to those reported.
## Table II. Correlation Matrix, \( N = 584 \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
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</thead>
<tbody>
<tr>
<td>1. Child Injuries</td>
<td>-10*</td>
<td>.02</td>
<td>.03</td>
<td>.01</td>
<td>.00</td>
<td>.02</td>
<td>.01</td>
<td>-10*</td>
<td>.03</td>
<td>-01</td>
<td>-02</td>
<td>-01</td>
<td>.06</td>
<td>-08</td>
<td>.02</td>
</tr>
<tr>
<td>2. Child Gender (1 = male, 2 = female)</td>
<td>.01</td>
<td>.03</td>
<td>.02</td>
<td>-03</td>
<td>.01</td>
<td>-19**</td>
<td>.03</td>
<td>-02</td>
<td>-02</td>
<td>-01</td>
<td>-07</td>
<td>12**</td>
<td>-01</td>
<td>.00</td>
<td></td>
</tr>
<tr>
<td>3. Child Ethnicity (0 = non-white, 1 = white)</td>
<td>.19**</td>
<td>-07</td>
<td>-20**</td>
<td>.02</td>
<td>.02</td>
<td>-01</td>
<td>-02</td>
<td>.05</td>
<td>-26**</td>
<td>-02</td>
<td>-05</td>
<td>.01</td>
<td>-11**</td>
<td></td>
<td></td>
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<tr>
<td>4. SES Composite (z-score)</td>
<td>.06</td>
<td>-33**</td>
<td>.02</td>
<td>.01</td>
<td>13**</td>
<td>-18**</td>
<td>.07</td>
<td>-32**</td>
<td>-09*</td>
<td>-09*</td>
<td>.04</td>
<td>-24**</td>
<td></td>
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<tr>
<td>5. Father Firm Control</td>
<td>-09*</td>
<td>.00</td>
<td>11**</td>
<td>34**</td>
<td>-11**</td>
<td>14**</td>
<td>-04</td>
<td>-03</td>
<td>-01</td>
<td>.06</td>
<td>-04</td>
<td></td>
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<tr>
<td>6. Father Harsh Control</td>
<td>-19**</td>
<td>.01</td>
<td>-06</td>
<td>.10</td>
<td>-08*</td>
<td>.52**</td>
<td>-05</td>
<td>.07</td>
<td>.02</td>
<td>.06</td>
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<tr>
<td>7. Father Lax Control</td>
<td>.04</td>
<td>-06</td>
<td>.06</td>
<td>.11</td>
<td>-11**</td>
<td>22**</td>
<td>.03</td>
<td>.02</td>
<td>.05</td>
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<tr>
<td>8. Father Time Playing with Child</td>
<td>.08</td>
<td>.04</td>
<td>-03</td>
<td>.00</td>
<td>-01</td>
<td>-16**</td>
<td>.03</td>
<td>.02</td>
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<tr>
<td>9. Father Total Positive Relation</td>
<td>-.37**</td>
<td>.09*</td>
<td>-.04</td>
<td>-.02</td>
<td>-.06</td>
<td>.31**</td>
<td>-.11**</td>
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<tr>
<td>10. Father Depression</td>
<td>-.04</td>
<td>.08</td>
<td>.00</td>
<td>.04</td>
<td>-.11**</td>
<td>.21**</td>
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<tr>
<td>11. Mother Firm Control</td>
<td>-.11**</td>
<td>-.03</td>
<td>-.09*</td>
<td>.30**</td>
<td>-.10*</td>
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<tr>
<td>12. Mother Harsh Control</td>
<td>-.10*</td>
<td>.04</td>
<td>-.04</td>
<td>.06</td>
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<tr>
<td>13. Mother Lax Control</td>
<td>.05</td>
<td>-.03</td>
<td>.07</td>
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<tr>
<td>14. Mother Time Playing with Child</td>
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<td>.09*</td>
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<tr>
<td>15. Mother Total Positive Relation</td>
<td>-.33**</td>
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</table>

Note: Pearson correlations were computed between continuous measures. Phi coefficients were computed between dichotomous measures. Point biserial correlations were computed between one dichotomous and one continuous variable.

\*\( p < .05 \); \**\( p < .01 \).
partly due to low item counts. Future work might consider
longer and more internally reliable measures. Injury out-
comes are hard to assess for a variety of reasons, including
the fact that some families may have greater inclination to
seek medical attention following an injury than others.
Finally, the sample was somewhat nonrepresentative;
larger numbers of non-white and low-income participants
might be recruited for future work.

The implications of the findings are many. From the
perspective of individualized interventions, parenting train-
ing—particularly training targeted toward fathers building
a stronger interpersonal relationship with their sons—
might be one avenue to reduce injury risk among children
in middle childhood. As an example, such training might
be implemented in the context of psychotherapy for at-risk
children (e.g., those with ADHD or oppositional behavior
problems). From the perspective of community-level pre-
vention, the results of this study suggest programs
designed to improve father–son relationships might be
healthy not only for boys’ cognitive and social
development (Isley, O’Neil, & Parke, 1996; Tremblay,
Larivée, & Grégoire, 1985), but also for their personal
safety. Existing community programs geared toward men
or fathers might be one avenue to disseminate information.
From a policy perspective, this research re-affirms the role
fathers might play on children’s health and development,
and the importance of workplace, family, and other legis-
lation that builds and encourages healthy father–child
relationships.

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