Early Cognitive Stimulation, Emotional Support, and Television Watching as Predictors of Subsequent Bullying Among Grade-School Children

Frederick J. Zimmerman, PhD; Gwen M. Glew, MD; Dimitri A. Christakis, MD, MPH; Wayne Katon, MD

Background: Bullying is a major public health issue, the risk factors for which are poorly understood.

Objective: To determine whether cognitive stimulation, emotional support, and television viewing at age 4 years are independently associated with being a bully at ages 6 through 11 years.

Methods: We used multivariate logistic regression, using data from the National Longitudinal Survey of Youth, to adjust for multiple confounding factors.

Results: Parental cognitive stimulation and emotional support at age 4 years were each independently protective against bullying, with a significant odds ratio of 0.67 for both variables associated with a 1-SD increase (95% confidence interval, 0.54-0.82 for cognitive stimulation and 0.54-0.84 for emotional support). Each hour of television viewed per day at age 4 years was associated with a significant odds ratio of 1.06 (95% confidence interval, 1.02-1.11) for subsequent bullying. These findings persisted when we controlled for bullying behavior at age 4 years in a subsample of children for whom this measure was available.

Conclusion: The early home environment, including cognitive stimulation, emotional support, and exposure to television, has a significant impact on bullying in grade school.


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has received circumstantial empirical support. Parenting style has been associated with contemporaneous bullying in cross-sectional studies, although maltreatment is associated with bullying. Accordingly, the noted cross-sectional association between parenting style and bullying could be biased by reverse causality.

By contrast, a clear consensus in the literature indicates that there is a causal role for television violence in producing aggressive behavior, although only 1 study cates that there is a causal role for television violence in bullying. This could be biased by reverse causality. The sectional association between parenting style and bullying is the method of choice for prevalence estimation of bullying. The same article discusses the construct validity of the preferred measure by assessing the correlation between bullying and an antisocial measure. Solberg and Olweus found that identified bullies have a mean externalizing score that is approximately 1 SD higher than that for nonbullies, and the difference is significant at P < .001. (Externalizing behavior refers to problem behaviors such as antisocial behavior, oppositional behavior, hyperactivity, and so on.) As a check on our own measure of bullying, we performed the same analysis using the short-form Behavior Problems Index, which includes a validated antisocial score for each child. We revised the Antisocial scale by subtracting the values of the answers to the bullying question, which would otherwise contribute to the Antisocial scale.

In our data, the antisocial score is about 1.3 SDs higher among the bullies than nonbullies, and the difference is significant at P < .001. Of the children in our sample, 13% were identified as bullies, which is similar to a recent national estimate of prevalence of 19%. We therefore conclude that the maternal report of bullying is a reasonable and informative assessment of true bullying behavior.

**MAIN PREDICTORS**

Our first 2 main predictors were the cognitive stimulation and emotional support subscales of the Home Observation for Measurement of the Environment–Short Form, measured at age 4 years. These subscales have been shown to have good psychometric properties and have been used extensively in child development research. They include both maternal-report and interviewer-report items. The cognitive stimulation score generally includes items related to outings, reading, playing, and the parental role in teaching a child. For younger children, the emotional support score consists of elements related to eating meals with both parents, parents talking to the child while working, and spanking. To facilitate interpretation, scores were normalized so that a 1-unit change in the variable represents a 1-SD change.

Our third main predictor variable was the weekly average number of hours of television watched per day. As of 1990, mothers were asked the number of hours of television that the child (younger than 10 years) watches on a typical weekday and on a typical weekend day. When a response indicated no television in the home, television viewing hours were set to 0. When a response indicated more than 16 hours of viewing per day, the viewing was capped at 16 hours. The number of hours per week was computed as 5 times the number of hours watched during a typical weekday plus 2 times the number of hours watched on a typical weekend day. To get a daily average, we divided this number by 7. This computation was performed for the survey year occurring closest to the 4-year birthday of each child.

**COVARIATES**

We include as potential confounders any variable that has been shown to be associated with bullying and has also been shown to be associated with any of the 3 main predictors. Bullying behavior has been shown to vary with the child’s race, age, and sex as has the amount and type of television viewing. The association between bullying and socioeconomic status, including parental income and education, has not been explic-
MODELING

After examining the univariate characteristics of the independent variables, we ran 3 multivariate logistic regression models. The first model included all children ages 6 through 11 years. The second included only those children for whom age 4 years bullying data were available. All analyses were performed using Intercooled Stata 8.0 (Stata Corp, College Station, Tex).

RESULTS

A total of 1266 6- through 11-year-old children had complete data for the basic set of variables, and 641 children had complete data for the early bullying control variable. Table 1 presents descriptive statistics for all variables. Approximately 49% were female, and 11% were African American; 9% were Native American, Latino, or Asian; and the remainder were white. Approximately 13% of children were reported as bullies by their mothers.

The cognitive stimulation and emotional support scores at age 4 years were each approximately 0.5 SDs higher among those who were subsequently reported in grade school to be nonbullies than among those who were subsequently reported to be bullies. Children at age 4 years had watched an average of 3.5 hours of television per day, with a mean of 5.0 among subsequent grade-school bullies and 3.2 among subsequent nonbullies. All of these differences were significant at P<.01.

Table 2 presents the results of the logistic regression model for all children, without controlling for early bullying. The odds ratios associated with cognitive support and emotional stimulation at age 4 years were each 0.67 (95% confidence interval [CI], 0.54-0.82, and 95% CI, 0.54-0.84, respectively). The odds ratio associated with each hour of television per day was 1.06 (95% CI, 1.02-1.11). We also controlled for parental income and education and the child's age, sex, and race or ethnicity. Of these, only being African American was significant, showing an association with decreased bullying (odds ratio, 0.50 [95% CI, 0.29-0.87]) (not reported in the table).

In the regression on the subset of children with data available on early bullying (Table 3), early television viewing was significantly predictive of subsequent bullying, with an odds ratio of 1.09 per hour watched per day (95% CI, 1.02-1.17). Emotional support was protective, with an odds ratio of 0.75 per 1-SD change in the subscale (95% CI, 0.56-0.99). Cognitive stimulation was not significant, with an odds ratio of 0.81 (95% CI, 0.62-1.05).

Table 1. Descriptive Statistics of Variables by Bullying Status in Grade School*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Full Sample (n = 1266)</th>
<th>Bullies (n = 172)</th>
<th>Nonbullies (n = 1094)</th>
<th>P Value of Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child reported to be a bully</td>
<td>0.13 ± 0.34</td>
<td>0.13 ± 0.34</td>
<td>0.13 ± 0.34</td>
<td>.266</td>
</tr>
<tr>
<td>Cognitive stimulation score</td>
<td>6.17 ± 1.00</td>
<td>7.22 ± 1.00</td>
<td>6.04 ± 1.00</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Emotional support score</td>
<td>6.28 ± 1.00</td>
<td>7.22 ± 1.00</td>
<td>6.34 ± 1.00</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Television viewing at age 4 years</td>
<td>3.47 ± 3.92</td>
<td>3.23 ± 3.92</td>
<td>3.23 ± 3.92</td>
<td>.004</td>
</tr>
<tr>
<td>Log of parental income</td>
<td>10.75 ± 0.99</td>
<td>10.78 ± 0.99</td>
<td>10.75 ± 0.99</td>
<td>.02</td>
</tr>
<tr>
<td>Parental education</td>
<td>13.96 ± 2.38</td>
<td>14.03 ± 2.38</td>
<td>14.03 ± 2.38</td>
<td>.02</td>
</tr>
<tr>
<td>Age, y</td>
<td>9.19 ± 1.86</td>
<td>9.17 ± 1.86</td>
<td>9.17 ± 1.86</td>
<td>.18</td>
</tr>
<tr>
<td>Female, %</td>
<td>48.7</td>
<td>49.6</td>
<td>49.6</td>
<td>.09</td>
</tr>
<tr>
<td>African American, %</td>
<td>11.2</td>
<td>10.9</td>
<td>10.9</td>
<td>.28</td>
</tr>
<tr>
<td>Native American, %</td>
<td>3.9</td>
<td>3.9</td>
<td>3.9</td>
<td>.83</td>
</tr>
<tr>
<td>Latino, %</td>
<td>5.0</td>
<td>5.1</td>
<td>5.1</td>
<td>.61</td>
</tr>
<tr>
<td>Asian, %</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>.71</td>
</tr>
<tr>
<td>Child reported to be a bully at age 4 years, %</td>
<td>22.6</td>
<td>25.5</td>
<td>16.7</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Values are mean ± SD unless otherwise indicated.

Table 2. Regression of Bullying in Grade School on Early Predictors—Full Sample (n = 1266)*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television viewing at age 4 years</td>
<td>1.06 (1.02-1.11)</td>
</tr>
<tr>
<td>Cognitive stimulation score</td>
<td>0.67 (0.54-0.82)</td>
</tr>
<tr>
<td>Emotional support score</td>
<td>0.67 (0.54-0.84)</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; OR, odds ratio.
*Model adjusted for child's age, sex, and race or ethnicity and parents' income and education.
We found that early (age 4 years) cognitive stimulation, emotional support, and exposure to television were each independently associated with subsequent maternal report that the child was considered a bully at grade-school age. This finding was present even while controlling for a number of potential confounding factors, including socioeconomic status and the child’s age, race or ethnicity, and sex. The magnitudes of the emotional support and cognitive stimulation scores were meaningful, with a 1-SD increase in each of these scores at age 4 years associated with a 33% decrease in the odds of being a bully in grade school. The magnitude of the risk associated with television, expressed in our analysis in terms of hours per day of television viewed, is clinically significant, particularly when one considers that the SD of hours per day of television viewing was 3.9. Accordingly, a 1-SD increase in the number of hours of television watched at age 4 years is associated with an approximate 25% increase in the probability of being described as a bully by the child’s mother at ages 6 through 11 years.

When we included a control for bullying behavior at age 4 years (ie, maternal report of whether the child is a bully), the results are similar. This result provides added confidence that the associations identified in this analysis are not confounded by 1 obvious possibility, that of early bullying driving parenting choices. Instead, these results are consistent with a causal role for early emotional support (as a protector) and early television viewing (as a risk factor) in the subsequent development of bullying. Although the effect of early cognitive stimulation did not achieve statistical significance in the model that controls for early bullying, that finding might be partly caused by the reduced sample size.

To our knowledge, this is the first study to test the hypothesis that early emotional support, cognitive stimulation, and television viewing are associated with subsequent bullying. The fact that the data are from a representative longitudinal data set and that the analysis controls for multiple possible confounding variables makes these findings even more compelling.

The fact that early cognitive stimulation is protective against bullying in our data corroborates theoretical work in this area. The benefits of early cognitive stimulation might function through an increase in a child’s comfort level and confidence around academic matters or through the child’s perception that the parents endorse the academic project of schooling. As a result, the child might be less inclined to disrupt the schooling process by bullying others. Clearly, this conjecture needs further research to clarify, but this result is consistent with other research that has found considerable benefits to early childhood education programs such as Head Start. It is also possible that a high score on the cognitive stimulation subscale is a proxy for a broad range of nurturing parental behaviors that are eventually associated with prosocial behavior, such as positive interactions with peers and teachers.

The role of early television viewing is particularly provocative because of the emphasis in the existing literature on television viewing among older children, such as 9-year-olds or adolescents. Most of the literature concluding that television is associated with increased aggression deals only with violent media, not media or television in general. However, approximately 60% of television programs contain violence, so the number of television hours watched likely correlates with the overall number of violent television hours viewed. Perhaps some programming that is not explicitly violent also leads to bullying behavior. For example, some programs contain examples of people behaving disrespectfully toward one another, which could serve as a model for children to engage in the kind of verbal abuse that qualifies as bullying in most definitions. Because watching television can be habit-forming, parents should be encouraged to limit the television viewing of their young children in accord with American Academy of Pediatrics guidelines, which recommend no television for children younger than 2 years old and limited television thereafter.

There are several limitations to this study. First, previous research has relied on student self-reporting bullying status, whereas this study used maternal reports. Moreover, in previous work, the definition of the term bully has been provided to those asked to assess whether someone is a bully. Here, by contrast, we did not provide the definition of bully to the mothers filling out the surveys. Not everyone has the same definition of the word. It is possible that mothers would report their children as bullies if they fought a lot, which, although an example of antisocial behavior, might not fit the usual definition of bullying, which must involve some kind of physical, social, or psychological power imbalance. If mothers of children who fight a lot—but in the absence of power imbalances—report their children as bullies, it would accordingly account for at least some of the correlation reported earlier between the antisocial and bullying measures. In this sense, there might be “false positives,” or type II errors, in the bullying measures used.

At the same time, mothers might differ in their willingness to admit that others consider their children to be bullies, especially if they disagree with that label. Hence, we were probably unable to identify all true bullying children in the sample, which would introduce false negatives, or type I errors. The measure of bullying used in this study might accordingly be subject to measurement error. In general, measurement error tends to decrease the ability to detect an effect that is in fact present and therefore introduces a conservative bias.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>OR (95% CI)</th>
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</thead>
<tbody>
<tr>
<td>Television viewing at age 4 years, h/d</td>
<td>1.09 (1.01-1.17)</td>
</tr>
<tr>
<td>Cognitive stimulation score at age 4 years</td>
<td>0.81 (0.62-1.05)</td>
</tr>
<tr>
<td>Emotional support score at age 4 years</td>
<td>0.75 (0.56-0.99)</td>
</tr>
<tr>
<td>Bullies at age 4 years</td>
<td>5.94 (3.47-10.15)</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; OR, odds ratio.
*Model adjusted for child’s age, sex, and race or ethnicity and parents’ income and education.
Second, it is possible that there are unmeasured characteristics associated with parents who provide low levels of cognitive stimulation or emotional support and who allow their children to watch excessive television and that these unmeasured characteristics account for the relationships between these early variables and subsequent bullying. To mitigate the effects of such a possibility, we included in a second regression a measure of whether the child was a bully at baseline. However, it is possible that this measure undercontrols for the child’s true baseline risk of subsequent bullying behavior.

Finally, we have no data on the content of the television watched by these children.

CONCLUSIONS

Our results have some important implications. First, we have provided some empirical support to theories that suggest that bullying might arise out of cognitive deficits as well as emotional ones. Second, we have added bullying to the list of potential negative consequences of excessive television viewing along with obesity, inattention, and other types of aggression. Third, our findings suggest some steps that can be taken with children to potentially help prevent bullying. Maximizing cognitive stimulation and limiting television watching in the early years of development might reduce children’s subsequent risk of becoming bullies. The early childhood period is an important formative time for the subsequent behavior of children. Future research will be valuable in reproducing and refining these findings and in identifying the precise causal mechanisms involved. In particular, research on how particular television content might affect bullying is essential.

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REFERENCES