The Child Vulnerability Scale: An Instrument to Measure Parental Perceptions of Child Vulnerability

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Developed and validated an instrument for identifying children perceived as vulnerable. Mothers of 1,095 children, aged 4–8 years, completed interviews that included the original 12-item Child Vulnerability Scale. Eight items that correlated best with each of two major variables that contribute to vulnerability were retained in the revised scale and a cutoff score was identified for children perceived as vulnerable. The internal consistency of the revised scale was good. Using the revised scale, 10.1% of children were identified as perceived vulnerable. Children categorized as perceived vulnerable had a significant increase in behavior problems and acute medical visits. The revised Child Vulnerability Scale should be useful in providing a better understanding of the causes and effects of an important factor in child development.

KEY WORDS: vulnerable child; behavior, development; instrument.

A parent's belief that a child is vulnerable or in some way abnormally susceptible to illness or death can potentially have an adverse effect on the child's development. In their original description of the "the vulnerable child syndrome," Green

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and Solnit (1964) reported on children with severe behavioral and learning problems who had each experienced a serious illness or accident early in childhood from which they had not been expected to recover. Although these children had recovered fully, their parents continued to view them as especially susceptible to illnesses and death. The overprotective, enmeshed relationships that existed between the parents and their children contributed to the abnormal psychological development of the children.

The cases described by Green and Solnit almost certainly represent only the extreme end of a spectrum in which a number of different experiences, most less severe than a near-death experience, can heighten parents' anxieties and cause them to perceive their children to be at increased risk of illness or death. There are now a number of clinical descriptions of other factors affecting parental perceptions of vulnerability. For example, Bergman (1967) described parents of children with "innocent," functional heart murmurs who related to their children as though they had significant heart disease and were at increased risk of becoming ill or dying. Parental behaviors consistent with increased perceptions of vulnerability have been described following self-limited conditions such as croup (Sigal, Chagoya, Villeneuve, & Mayerovitch, 1973), acute diarrheal illnesses (Sigal & Gagnon, 1975), and premature but otherwise normal birth (Bidder, Crowe, & Gray, 1974; Blake, Stewart, & Turcan, 1975; Boyle, Giffen, & Fitzhardinge, 1977; Jeffcoat, Humphrey, & Lloyd, 1979; Stern & Karraker, 1988). However, beyond reports such as these, there has been very little clinical research investigating the prevalence, etiology, or sequelae of abnormal perceptions of vulnerability.

The contribution of parental perceptions of vulnerability to psychopathology among children has not been adequately investigated. We have little understanding of why in some instances "perceived vulnerability" leads to pathologic interactions between parents and their children resulting in the development of behavior problems, and in other instances there are perceptions of vulnerability without development of the vulnerable child syndrome. We do not know which factors in early childhood contribute most to parental perceptions of vulnerability and, most important, researchers are unable to investigate how abnormal perceptions of vulnerability and their adverse effects on the development of children can be prevented.

To advance research in this field, the Child Vulnerability Scale was designed specifically to measure parental perceptions of vulnerability and identify children perceived as vulnerable. Versions of the scale have been used in research describing perceived vulnerability among children admitted to hospital for acute infectious illnesses (Forsyth, 1987), children born prematurely (Perrin, West, & Culley, 1989), and children who had problems of feeding and crying behavior in early infancy (Forsyth & Canny, 1991). However there has been little
attempt to validate the instrument. Thus, the purpose of this research was to further develop and provide validation of the Child Vulnerability Scale.

The original instrument was a self-administered questionnaire with 12 items selected from both the literature and clinical experience because they were consistent with the vulnerable child syndrome. Although the results of earlier studies provided face validation for the scale, it is not known which of the 12 items contributed significantly to the scale. Furthermore, the demarcation for categorizing a child as being perceived vulnerable has not been satisfactorily defined. In earlier research, those with scores more than 1 standard deviation above the mean (approximately the 85th percentile) were categorized as being perceived vulnerable. Although there is a spectrum of parental perceptions of vulnerability, the concept that there are normal and abnormal perceptions of vulnerability is important.

Developing and validating a scale is difficult when there is little that the results of the scale can be compared to—the condition being measured is a perception rather than a true entity and is different than other psychological factors such as parental anxiety. Recognizing this difficulty, we focus on the theoretical concepts of perceived vulnerability and the two variables that are felt to contribute most: First is the instance in which a child is truly medically vulnerable because of illness; and second, as discussed by Green and Solnit (1964), the instance in which a parent in the past has feared that the child might die. As each of these variables is etiologically important in the development of perceptions of vulnerability, one would expect a significant proportion of children with each of these variables to be perceived as vulnerable and identified as such by the instrument. Conversely, if a parent has never feared that a child might die and the child has no medical condition, one would expect that such a child would rarely be perceived as vulnerable. Items from the scale have been selected and a cutoff score determined that rarely identifies a child as perceived vulnerable when that child has neither of the two major variables, but identifies as perceived vulnerable children who do have at least one of the two major variables that contribute to perceptions of vulnerability. It should be noted that this scale was developed to measure perceptions of vulnerability and not to identify those with the vulnerable child syndrome, a concept that also includes an overprotective parent-child relationship and resulting behavior problems.

To further develop the scale, data were collected on a large community-based cohort of children and were analyzed in the following manner: (a) The two major variables that contribute to perceptions of vulnerability were used to identify those children in the cohort who were most likely to be perceived as vulnerable and those least likely to be perceived as vulnerable; (b) the scores of items included in the original Child Vulnerability Scale were examined, and the items that had poor association with the two major variables were eliminated from the
revised scale; (c) the internal consistency of the revised scale was examined; (d) the cutoff score that best discriminated between individuals with and without each of the two major variables was identified; and (e) to provide some validation of the instrument, we assessed the relationship between perceived vulnerability and two other variables that would be expected to be increased for children perceived as vulnerable: behavior problems and the number of visits to physicians.

METHOD

Subjects

The subjects for this study were children 4–8 years old attending pediatricians' offices. Of 2,006 children seen during the enrollment periods, 1,886 children and their families (94%) participated in a screening process. Of the 1,382 children and their families who satisfied criteria for participation in further data collection (see below), 1,148 (83%) agreed to do so. For the analyses reported here, the 53 respondents who were not biologic mothers were excluded, providing a final sample of 1,095 mothers and their children.

The sociodemographic characteristics of the subjects are summarized in Table I. The majority of mothers were Caucasian, had received at least a high school education, and were married. The median maternal age was 33 years and the median family income was $30,000. There was a similar number of male and female children and a similar number who were ages 4 or 5 years and those between 6 and 8 years. Thirty-one percent were firstborn children.

Procedures

This study was part of a larger study, the primary objective of which was to understand the contribution of pediatricians in identifying and managing psychosocial problems of children (Horwitz, Leaf, Leventhal, Forsyth, & Speechley, 1992). During two separate 3-week periods all parents of children ages 4 to 8 years attending their pediatricians' offices were invited to participate. The study was explained in detail in the pediatrician's office and informed consent was obtained. Following entry into the study, children were screened using the parent-completed version of the Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1986) and after the medical visit, the child's pediatrician completed a form identifying psychosocial problems (Horwitz et al., 1992). In addition, pediatricians were asked to list all past and current illnesses affecting the child and to categorize them as acute or chronic and rate them as mild, moderate, or
severe. Following this screening, all children who scored in the clinical range for behavior problems on the CBCL or those who were identified by physicians as having psychosocial problems were invited into the interview portion of the study, as were a random one half of the children who were neither in the clinical range on the CBCL nor were identified by physicians as having psychosocial problems. Of the 1,886 children initially screened, 919 (48.7%) scored in the clinical range on the CBCL or were identified on the physician form as having a psychosocial problem. Of these, 764 (83%) participated in further data collection. Of those who were negative on the screening evaluations and were selected for further participation, 384 (83%) completed the in-depth interview. The interviews included sociodemographic data, information on the child's early life, and measures of psychological variables including the original Child Vulnerability Scale. Parents were also asked to identify any medical conditions affecting their child in the past or present.

One year after study enrollment, physicians' medical records for all subjects were reviewed and data on each medical visit were abstracted. The type of visit
was categorized as either an acute medical visit, a routine preventive health care visit, or a follow-up visit.

**Measures**

As noted above, initial screening of subjects was performed using the CBCL which is a widely used instrument developed to measure parental reports of children’s behavior problems (Achenbach & Edelbrock, 1986). Respondents rate on a 3-point scale 118 behavioral items. Children with a standardized total problem score of 64 or greater are considered to be in the clinical range for behavior problems. Because the methods for scoring the CBCL were revised before the study was completed, pre-1991 methods for scoring were used to determine subject enrollment (Achenbach & Edelbrock, 1986). However, data analyses are based on the 1991 scoring methods (Achenbach, 1991). These revisions are considered to have little effect on the number of subjects enrolled in the study.

The physician form was completed at the time of the medical visit at which the child was enrolled in the study. This form includes a checklist of psychosocial and developmental problems that was based on a World Health Organization-sponsored primary care, child-oriented classification system developed by Burns, Burke, and Regier (1982). Unlike the CBCL, which identifies children with problem behaviors, this checklist includes clinically relevant psychosocial problems such as divorce, parental substance abuse, and inadequate housing that may affect a child’s functioning. Based on their clinical work with families, physicians noted when such psychosocial problems were present and used their clinical judgment to categorize problems into one of two levels of severity; either mild or moderate/severe.

The original Child Vulnerability Scale consisted of 12 statements with a 5-point response scale ranging from strongly agree to strongly disagree for each statement. To refine the scale, we first identified subjects with each of the two variables that are major contributors to perceptions of vulnerability. The methods for defining each of these variables are as follow: (a) A parent’s prior fear that a child might die was ascertained by the response to a single question in the interview “Has your child ever been so ill that you were concerned for his/her life?” (b) To identify children with medical conditions that might make them truly vulnerable, data were used from both the parent interview and the physician-completed form. The list of all reported medical conditions were reviewed independently by a panel of three pediatricians (B. W. F., J. M. L., and J. B.) who determined whether or not a child with such a condition was potentially medically vulnerable. In instances where there were differences of opinion a final categorization was determined by discussion and consensus agreement. In
arriving at these decisions the chronicity and severity of the disorder were taken into account. For example, a child with moderate asthma was categorized as potentially medically vulnerable, whereas a child with a past history of meningitis without sequelae was categorized as not medically vulnerable. All medical conditions noted by parents that categorized children as potentially medically vulnerable were confirmed by reviews of the children's medical records.

A total of 168 medical conditions were identified. Of these, 23 were categorized by the panel of pediatricians as conditions that might result in a child being medically vulnerable. The remaining conditions were either self-limited conditions or of mild severity and were considered unlikely to result in a child being truly medically vulnerable. There was very little disagreement between panel members, largely because the vast majority of these conditions were mild, self-limited conditions, so consensus agreement was easily reached.

RESULTS

Major Variables That Contribute to Mothers' Perceptions of Vulnerability

In examining the two major variables that contribute to perceptions of vulnerability, 226 (21%) of the mothers reported that they had had prior fears that their child might die and 46 (4%) reported a medical condition that was categorized by the panel as moderate or severe and potentially made the child medically vulnerable. Of the remaining children, 758 were reported to have medical conditions categorized as not medically vulnerable and 288 children were reported to have no medical condition. Of note, the mothers of 21 of the 46 children (46%) who had medical conditions making them potentially medically vulnerable also reported that they had had prior fears that their children might die.

Development of the Child Vulnerability Scale

Item Scoring. Before conducting further analyses, we first examined the frequency of responses on the 5-point scale for each item. The middle score for each item (i.e., the score for the response uncertain or neither true nor false) was used by less than 1.2% of the respondents. Because it appeared that respondents were using the scale as a 4-point scale rather than a 5-point scale, this middle score was discarded, and the items were rescored with scores from 0 to 3. In the few instances where the middle score had been used, the average score for the rest of the items on the instrument was substituted for that score.

Correlation of Items in the Child Vulnerability Scale with the Major Variables That Contribute to Vulnerability. To determine whether there were items in
the original scale that were unlikely to be contributing to the scale’s ability to discriminate between those most likely to be perceived as vulnerable and those least likely to be perceived as vulnerable, correlations were performed between the item scores and the two major factors that contribute to perceptions of vulnerability. Because item scores were considered an ordinal scale and the two factors are dichotomous variables, Kendall’s tau-b statistic was used to assess the strength of association (Goodman & Kruskal, 1972). The results of the correlations are shown in Table II. It is notable that items that correlated the best with one variable tended to correlate well with the other variable, and those items that correlated poorly with one variable also correlated poorly with the second variable. Three of the items did not correlate significantly with at least one of the two major variables and were therefore eliminated from the revised scale. A fourth item (Item 9, Table II) correlated weakly with one of the major variables, so the remaining analyses were conducted both with and without this item included in the revised scale. Because the instrument performed no better in future analyses when the ninth item was included, for simplicity only the results obtained with

<table>
<thead>
<tr>
<th>Item</th>
<th>Medical condition</th>
<th>Prior fears that child might die</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>tau-b</td>
<td>p</td>
</tr>
<tr>
<td>1. In general my child seems less healthy than other children.</td>
<td>.43 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>2. I often think about calling the doctor about my child.</td>
<td>.37 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>3. I often have to keep my child indoors because of health reasons.</td>
<td>.37 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>4. My child gets more colds than other children I know.</td>
<td>.31 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>5. When there is something going around my child usually catches it.</td>
<td>.21 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>6. I get concerned about circles under my child’s eyes.</td>
<td>.21 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>7. Sometimes I get concerned that my child doesn’t look as healthy as s/he should.</td>
<td>.20 &lt;.001</td>
<td></td>
</tr>
<tr>
<td>8. I often check on my child at night to make sure that s/he is okay.</td>
<td>.17 &lt;.005</td>
<td></td>
</tr>
<tr>
<td>9. My child seems to have more accidents and injuries than other children.</td>
<td>.15 &lt;.05</td>
<td></td>
</tr>
<tr>
<td>10. My child often gets stomach pains or other types of pains.</td>
<td>.11 ns</td>
<td></td>
</tr>
<tr>
<td>11. My child seems to have as much energy as other children.</td>
<td>.11 ns</td>
<td></td>
</tr>
<tr>
<td>12. My child usually has a healthy appetite.</td>
<td>-.04 ns</td>
<td></td>
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Table III. Internal Consistency of the Revised Scale

<table>
<thead>
<tr>
<th>Item</th>
<th>Item-total correlations (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My child gets more colds than other children I know.</td>
<td>.68</td>
</tr>
<tr>
<td>2. I often think about calling the doctor about my child.</td>
<td>.66</td>
</tr>
<tr>
<td>3. When there is something going around my child usually catches it.</td>
<td>.64</td>
</tr>
<tr>
<td>4. In general my child seems less healthy than other children.</td>
<td>.64</td>
</tr>
<tr>
<td>5. I often have to keep my child indoors because of health reasons.</td>
<td>.61</td>
</tr>
<tr>
<td>6. Sometimes I get concerned that my child doesn't look as healthy as s/he should.</td>
<td>.61</td>
</tr>
<tr>
<td>7. I get concerned about circles under my child's eyes.</td>
<td>.56</td>
</tr>
<tr>
<td>8. I often check on my child at night to make sure s/he is okay.</td>
<td>.51</td>
</tr>
</tbody>
</table>

the eight-item scale are presented. Thus, the revised scale has eight items, each scored from 0 to 3 resulting in a total scale score ranging from 0 to 24.

**Internal Consistency of the Revised Scale.** To assess the internal consistency of the revised scale, the Cronbach coefficient alpha was calculated and item-total correlations were performed. The Cronbach alpha for the scale was .74 and the item-total Pearson correlation coefficients ranged from .51 to .68 with \( p < .0001 \) for all items (Table III).

**Determination of the Cutoff Point to Identify Children Perceived as Vulnerable.** Clinically, it is helpful to be able to dichotomize the scoring of the scale so as to identify children perceived as vulnerable. To determine the most appropriate cutoff point, the total score that best discriminates those children with and without the two major variables contributing to vulnerability were identified. The total vulnerability scores for those with and without medical conditions are shown in Figure 1. Subjects with other medical conditions that were not classified by the panel of pediatricians as potentially vulnerable are excluded from this comparison. From the figure, it is apparent that there is a natural dividing line: Of the 288 subjects with no medical condition, 97% have scores distributed below 10, and only 3% have a score of 10 or above, whereas for those subjects with potentially vulnerable medical conditions, 41% had scores of at least 10. In Figure 2 a similar pattern is seen: The majority (93%) of those with no prior fears that the child might die have scores below 10, whereas 23% of those for whom there were prior fears have scores of 10 or greater. Thus, we chose a score of 10 or above as the demarcation at which to categorize subjects as perceived vulnerable. Using this demarcation, 52.4% of the 21 subjects who had both the major variables that contribute to vulnerability were categorized as perceived vulnerable, whereas of the 259 subjects for whom there were no medical conditions reported, nor prior fears of death, only 1.5% were categorized as perceived vulnerable.
For the total sample of 1,095 children in this community-based study, 10.2% were categorized as perceived vulnerable using the revised scale, whereas using the original scale 16.8% were categorized as perceived vulnerable. Because the methods used to select subjects provided a sample enriched with children with psychosocial problems, a weighting factor was used to estimate the prevalence of perceived vulnerability in the whole population of children screened for the study. In effect, this weighting factor applies the prevalence rate for perceived vulnerability found among the 384 subjects who were enrolled but did not have behavior or developmental problems (subjects who screened negative on the CBCL and the physician form) to the equal number of potential subjects who did not participate in the full study. Use of this weighting factor produced virtually no change—10.1% of children in the total population were estimated to be perceived as vulnerable.

External Validity of the Scale

To provide validation for the instrument, we examined the association between perceived vulnerability and two other measures that would be expected to be increased among children perceived as vulnerable: The association with problem behaviors identified by the CBCL was examined using chi-square analysis and the number of visits to physicians for acute medical problems was examined using Student’s t test. Using 1991 revised criteria for scoring the CBCL, 200
children (10.6% of the sample screened) had total scores that were considered in the clinical range (Achenbach, 1991). Of these, 20% were perceived as vulnerable compared to only 8% of those with a CBCL score in the normal range, $\chi^2(1, N = 1090) = 25.8, p < .001$.

For children perceived as vulnerable the mean total number of visits to physicians during the year following enrollment was 5.86 ($SD = 5.65$) which is significantly greater, $t(125) = 3.55, p < .001$, than the number of visits for those not perceived as vulnerable ($M = 3.90, SD = 4.33$). Notably, children perceived as vulnerable had a significantly greater number of visits for acute medical problems ($M = 3.41, SD = 2.89$) compared to those children who were not perceived as vulnerable ($M = 2.48, SD = 2.83$), $t(135) = 3.22, p < .002$, but there was not a significant difference in number of visits for preventive health care ($M = 0.66, SD = 0.96$ vs. $M = 0.51, SD = 0.63$). These results were similar when the analyses were repeated excluding the 46 subjects who had medical conditions that potentially made them medically vulnerable and therefore might be expected to have an increased number of medical visits.

**DISCUSSION**

Parental perceptions of children's vulnerability likely play an important part in the development of psychopathology of some children, but the research necessary to advance our understanding of this concept and its effect on children requires a standardized instrument to measure parental perceptions of vulnerability. In this study, we used two variables to refine the Child Vulnerability Scale.
Scale, a scale previously developed but for which there was no standardization. This strategy assumes that these variables are important contributing factors for parents to perceive their children as vulnerable. The first variable—that parents have had prior fears that their child might die—introduces the concept that perceived vulnerability is a long-lasting or continuous process, thus parents have both prior fears of death and the continuing view that the child is in some way susceptible to illness or death. Such an underlying view of the child as being different or abnormal is very different, for example, than the anxieties a parent might have when a child has an acute illness but is not ordinarily perceived as vulnerable. The first presumes some inherent abnormality of the child that engenders an ongoing abnormal response from the parent while the anxieties of the latter are resolved once the child recovers from the illness. With the second variable, certain illnesses, such as asthma, may make a child truly vulnerable and the parents of these children would correctly perceive them to be vulnerable. It is also true that not all children with such illnesses should be perceived as vulnerable—the parent recognizes that the child has the condition and may in the future be ill with the condition, but does not otherwise view the child as abnormally susceptible to illness or death. It is an important validation of the instrument that when both variables are present over half of the subjects are categorized by the revised instrument as perceived vulnerable, whereas when a child has no medical illness and a parent has never feared that a child might die, it is rare (only 1.5%) for a child to be categorized as perceived vulnerable.

Using the revised Child Vulnerability Scale, it is estimated that 10.1% of a community-based sample of children are perceived as vulnerable. It is a limitation of this study, however, that only subjects attending health care were included and also the sample was enriched with children with psychosocial problems. The proportion perceived vulnerable in a general population might be different.

To provide further validation of the measure, we demonstrated that the scale was able to predict more frequent future use of health care for acute medical problems, although there was not a significant increase in preventive health care. Such an increase in visits to the doctor for acute problems is certainly an important effect of a parent perceiving a child to be vulnerable. In addition, we demonstrated that children categorized as perceived vulnerable were more likely to have behavior problems which is the underlying tenet of the vulnerable child syndrome. However, not all children who are perceived vulnerable have abnormal behavior. Future research is needed to try and elucidate the additional factors that contribute to the development of the vulnerable child syndrome and the complexities of the interrelationship between perceived vulnerability and behavior problems. Within the confines of this epidemiologic study, we were not able to validate the scale more fully and future clinical research is needed to assess the extent to which the scale correctly identifies children perceived as vulnerable.

In this study, we have further developed the Child Vulnerability Scale by
using theoretical concepts that contribute to perceptions of vulnerability. Thus, despite the limitations of the study, we expect the refined scale to perform better than the original scale. The scale should be useful in providing a greater understanding of an important factor in child development that has largely been ignored in clinical research. Use of the scale will not only be helpful in identifying important risk factors and parental attributes that contribute to perceptions of vulnerability but also will allow researchers to assess approaches aimed at preventing the development of the vulnerable child syndrome.

REFERENCES


