The Functional Disability Inventory: Measuring a Neglected Dimension of Child Health Status

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Described the development and validation of the Functional Disability Inventory (FDI) for school-age children and adolescents. Results provide support for construct, concurrent, and predictive validity. FDI scores also demonstrated stability over a 3-month period in patients with a chronic condition, and the instrument was sensitive to changes in patient status subsequent to medical treatment. There was some evidence that gender played a role in disability, particularly in adolescence. The instrument may be used (a) in studying individual differences in pediatric disability, (b) in examining the relation of disability to psychosocial functioning in the child and other family members, or (c) as an outcome measure in assessing the impact of interventions on patient functioning.

KEY WORDS: youth; illness behavior; disability; measurement; gender.

Measures of children's health status are needed for describing the impact of disease, evaluating treatment effectiveness, and testing theories regarding the influence of social and behavioral factors on child health (cf. Ware, Brook, Davies, & Lohr, 1981). Comprehensive assessment of health status depends upon measures of specific disease parameters (e.g., symptomatology, blood pressure, tumor staging, pain ratings) and measurement of the impact of disease or trauma.  

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on a patient's daily functioning. A primary concern in functional assessment is evaluation of the individual's ability to live independently in the community. Although children do not live independently, there are several important potential uses for measures of childhood functional disability, including (a) examining the impact of disease or trauma on the child's everyday functioning, (b) assessing the extent to which childhood illness creates a caretaking burden for the family, (c) describing changes in child functioning subsequent to intervention, and (d) investigating individual differences in functioning within specific patient groups. The first functional assessment instruments, developed in the two decades prior to World War II to document claims for accident or injury compensation, focused on loss of function related to the individual's work performance (Frey, 1984; McDowell & Newell, 1987). The scope of functional assessment has broadened considerably since that time and now taps every domain of the individual's functioning within the environment, including personal care, social interaction, household activities, and recreation, but to date there has been little attention to the functional requirements of daily living for child patients.

In their review of functional assessment measures, Gresham and Labi (1984) identified three basic types of instruments: (a) global instruments that provide an overall functional profile, (b) activities of daily living (ADL) scales that emphasize self-care and mobility and are used in the early stages of medical rehabilitation, and (c) categorical instruments that are designed to assess unique characteristics associated with a particular disease or condition. In selecting a measure of functional disability, it is important to evaluate how well the instrument fits its proposed use (Bombardier & Tugwell, 1987; Feinstein, Josephy, & Wells, 1986; Halpern & Fuhrer, 1984). For treatment planning and evaluation, for example, an instrument that focuses on characteristic limitations of a particular disease and that has highly specific items may be most useful (e.g., several items might be needed to assess changes in the patient's ability to pick up objects of various sizes). For a population survey, in contrast, an instrument that addresses more general aspects of disability, such as the number of work days missed, might be most appropriate.

The present paper describes the development of the Functional Disability Inventory (FDI) for children and adolescents. The FDI was designed as a global measure of functional disability for use in research regarding the impact of illness on children's physical and psychosocial functioning in everyday social roles. Functional disability was defined as difficulty in age-appropriate physical and psychosocial functioning due to physical health status. In order to maximize the utility of the measure, it was designed to be applicable to varying levels of severity of dysfunction associated with a broad range of illnesses.

The field of functional disability assessment has been criticized for the frequent absence of evidence documenting the psychometric properties of instruments (Bombardier & Tugwell, 1987; Frey, 1984; McDowell & Newell, 1987). Functional Disability Inventory

This paper presents results of the current validity was examined by comparing absence, a common objective in the reports of mothers and the additional source of information assessed by examining the association child well-being. It was expected with measures of recent physical states are typically associated with the child's perceptions unlikely to be influenced by the our samples; and that it would otherwise, as disability tends to be a evidence of construct validity was discriminating between patient disability. A longitudinal design indicates and test–retest reliability of the FDI to changes in patient clinical with treated patients.

DEVELOPMENT

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Functional Disability Inventory

This paper presents results of two studies conducted to validate the FDI. Concurrent validity was examined by calculating the correlation of the FDI with school absence, a common objective index of child disability. The correlation between the reports of mothers and those of their children on the FDI provided an additional source of information on concurrent validity. Construct validity was assessed by examining the association between the FDI and other measures of child well-being. It was expected that FDI scores would correlate significantly with measures of recent physical symptoms, anxiety, and depression since these states are typically associated with disability; that it would not correlate significantly with the child's perceived social competence, a relatively stable trait unlikely to be influenced by the short-term disability experienced by children in our samples; and that it would not correlate with a measure of acting-out behavior, as disability tends to be associated with passive behavior. Additional evidence of construct validity was sought by examining the utility of the FDI in discriminating between patient groups that were expected to differ in level of disability. A longitudinal design yielded data on the instrument's predictive validity and test–retest reliability at three intervals. Finally, the sensitivity of the FDI to changes in patient clinical status was evaluated in follow-up interviews with treated patients.

DEVELOPMENT OF THE INSTRUMENT

Although the construct of functional disability has been operationalized in various ways, a common thread is measurement of disruption of normal physical and social activity (Gallin & Given, 1976; Slater, Vukmanovic, Macukanovic, Prvulovic, & Cutler, 1974). In assessing pediatric functional disability one must consider activities and abilities that are relevant to children. Some areas of functioning that might be assessed in adults—for example, the ability to concentrate or independence in personal grooming—would be likely to confound developmental level with disability if applied to children. To avoid this problem, the content and wording of the FDI were designed to be appropriate to children across a broad age range.

There is considerable variation in the domains of functioning assessed by adult measures (Gresham & Labi, 1984; McDowell & Newell, 1987). In addition to assessing the patient's physical and psychosocial functioning, some adult measures include subscales on emotional functioning. Psychometrically sound measures of child emotional functioning are available (e.g., Achenbach & Edelbrock, 1983; Kovacs, 1980/1981) and may be used in conjunction with a measure of functional disability to obtain an overall "profile" of the patient's health status (cf. Starfield, 1974). Thus, the FDI did not address the child's emotional functioning but focused on the domains of physical and psychosocial
functioning which were assessed in the context of child-relevant settings (i.e., home, school, and community).

Measures of disability may be based on patient self-report or clinician ratings of behavior observed in the clinic. Given our interest in child and adolescent behavior in natural settings outside the clinic, a self-report format was chosen for the instrument. Both child and parent report version were developed, as each provides an important perspective on the child's well-being (cf. Weissman et al., 1987). To allow monitoring of patient progress after the clinic visit, the instrument was designed to facilitate verbal administration in follow-up interviews conducted by telephone.

After reviewing adult measures of functional disability, items appropriate for children and adolescents were generated. These items (see Appendix) in the broad domains of physical and psychosocial functioning represent the narrow categories used in the Sickness Impact Profile (SIP; Bergner, Bobbitt, Carter, & Gilson, 1981), an instrument for adults that has received positive reviews (e.g., Hunt, McEwen, & McKenna, 1986; McDowell & Newell, 1987). Two FDI items (6, 15) refer to the SIP category of sleep and rest, one item (5) refers to eating, one item (4) refers to home management, and two items (8, 10) refer to school, corresponding to the SIP category of work for adults. Items in the category of ambulation (1, 2, 12, 13) were taken from the Duke–UNC Health Profile (Parkerson et al., 1981), as these items were deemed appropriate for children. A single item (7) represents mobility. Finally, four items (3, 9, 11, 14) assess the category of social interaction and recreation in the contexts of home, school, and community. Items representing three additional categories of the SIP (body care and movement, alertness behavior, and communication) were not included because of the likelihood that such items would confound developmental level with disability, and the SIP category “emotional behavior” was not included in the FDI because of the availability of independent measures of child emotional functioning that could be used in conjunction with the FDI when multidimensional health assessments are required.

The item for questionnaire items was adapted from the Physical Function subscale of the Duke–UNC Health Profile (Parkerson et al., 1981). Respondents were asked to answer the question, “In the last few days would you (your child) have had any physical trouble or difficulty . . . ,” followed by each of 15 behaviors. Possible responses for each item included “no trouble,” “a little trouble,” “some trouble,” “a lot of trouble,” and “impossible.” The wording of the items served to operationalize disability in terms of the perceived difficulty of performing activities. McDowell and Newell (1987) argued that this approach overcomes disadvantages associated with measures of functional disability that use definitions based on capacity.
Functional Disability Inventory

definitions based on capacity or actual performance. Indices of capacity, which ask what a person can do, tend to exaggerate the healthiness of the respondent. Indices of actual performance, which ask what a person does do, may underestimate the respondent's health status when lack of performance is due to nonhealth factors. In contrast, a definition based on perceived difficulty allows estimation of actual or anticipated difficulty in activities that one may or may not recently have had the opportunity or desire to perform.

The original version of the instrument was pilot-tested with children and adolescents and their parents in a pediatric outpatient clinic. Several items were eliminated and others were reworded (e.g., an item referring to overall disability was deleted when it was discovered that its meaning was ambiguous, and the abbreviation "P.E." was replaced with "gym class" because the latter was more familiar to most children). Midway through the questionnaire a statement was inserted to remind the respondent that the questions refer to difficulty due to physical health. The final scale comprised 15 items. Responses to each item were scored (0) no trouble to (4) impossible and summed to yield a total score that ranged from 0 to 60. Two studies were conducted to examine the instrument's psychometric properties.

STUDY 1

The FDI was administered to a heterogeneous sample of patients presenting with acute minor illnesses at an adolescent outpatient clinic and their mothers. The aims of this study were (a) to examine the internal consistency of the parent and child versions of the FDI and (b) to assess the validity of the FDI as demonstrated by its correlation with related measures of child health status and by the correlation between child and parent versions of the instrument.

Method

Subjects and Procedure

Subjects were 47 pairs of adolescents and their mothers. The adolescents were patients presenting at the adolescent outpatient clinic of a university medical center. The patients and their mothers were approached in the waiting room by a member of the research team and were invited to participate in the study. Subjects with a chronic illness, handicap, or mental retardation were excluded. The final sample included patients with a variety of minor complaints (e.g., dysmenorrhea, gastrointestinal upset, upper respiratory infections). There were 13 boys and 34 girls. The age range was from 9 to 17 years old (M = 14.0).
Instruments were administered verbally to the adolescents. Mothers completed the instruments by themselves after a brief explanation.

**Measures**

The Functional Disability Inventory was completed by children and by mothers in reference to their children. Several additional instruments, described below, were also administered.

**Pennebaker Inventory of Limbic Languidness (PILL; Pennebaker, 1982).** The PILL is a self-report measure of the frequency of occurrence of 34 common physical symptoms, such as coughing, sneezing, upset stomach, and so on. Frequency of complaints is rated on a 5-point scale ranging from *never or almost never* to *more than once per week*. The instrument has adequate psychometric properties. The PILL was completed by the children and by mothers reporting about their children’s symptoms.

**Hopkins Symptom Checklist,** Somatization subscale (HSCL; Derogatis, Liment, Rickels, Uhlenhuth, & Covi, 1974). The HSCL is a self-report symptom inventory with underlying symptom dimensions that have been identified in factor analysis. The somatization subscale consists of 12 nonspecific somatic complaints such as weakness, headaches, and so on. Children and mothers reported how often the child had recently been bothered by each symptom. A 5-point response format was used.

**State-Trait Anxiety Inventory for Children,** Trait form (STAIC; Spielberger, 1973). This child self-report instrument assesses children’s general level of anxiety. Each of the 20 items is rated on a 5-point scale ranging from *hardly ever* to *often*. Total scores, which range from 20 to 60, are obtained by summing the child’s responses. Evidence supporting the instrument’s reliability and validity is provided by Spielberger.

**Children’s Depression Inventory (CDI; Kovacs, 1980/1981; Kovacs & Beck, 1977).** The CDI is a child self-report instrument with 27 items scored on a 3-point scale. Total scores range from 0 to 54. Evidence supporting the instrument’s psychometric properties is provided by its authors and others (Saylor, Finch, Spirito, & Bennett, 1984; Strauss, Forehand, Frame, & Smith, 1984).

**Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983).** The CBCL provides a standardized description of children’s problem behaviors during the previous 6 months as reported by a parent. The CBCL consists of 118 behavior problems, each scored on a 3-point scale. There are two subscales: The Internalizing Behavior Problems scale reflects fearful, inhibited, overcontrolled behavior; the Externalizing Behavior Problems scale reflects aggressive, antisocial, undercontrolled behavior. Normalized T scores for the scales are standardized for child age and sex. The CBCL was completed by mothers reporting on their children’s behavior.

Functional Disability Inventory (FDI).

**Socioeconomic Status (Hollingshead, 1975).**

Reliability. Cronbach’s alpha was .80. The child report (alpha = .90) and the items constituting the FDI were .80. The correlation was .38 for the child report.

Validity. The correlation of the FDI scores with several other well-established instruments such as the PILL and the HSCL Somatization subscale scores on both the child and parent report forms was .35 and .28, respectively. There was a significant correlation between externalizing and internalizing behaviors. The correlation between FDI scores and SES was .28, indicating little association between SES and FDI scores.

Table 1: Pearson Correlations and Measures of Health Status

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<tr>
<th>Health status measures</th>
<th>PILL</th>
<th>Child report</th>
<th>Parent report</th>
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<td>Health status measures</td>
<td>HCCL-Somatization</td>
<td>Child report</td>
<td>Parent report</td>
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<td>Health status measures</td>
<td>CBCL Internalizing</td>
<td>Child report</td>
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<td>Health status measures</td>
<td>Demographic variables</td>
<td>Child age</td>
<td>Child gender</td>
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<td>Health status measures</td>
<td>SES</td>
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*p < .10.

*p < .05.

*p < .01.

*p < .001
Socioeconomic Status (SES). The Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975) was used as a measure of family socioeconomic status.

Results

Reliability. Cronbach's alpha reliability coefficients were high for both the child report (alpha = .90) and the mother report (alpha = .94), indicating that items constituting the FDI are internally consistent. The mean interitem correlation was .38 for the child report and .52 for the mother report.

Validity. The correlation between child and mother FDI scores was .30, p < .05. Table I presents the Pearson correlation coefficients for child and mother FDI scores with several other measures. Child-reported somatic complaints on the PILL and the HSCL Somatization subscale were significantly correlated with scores on both the child and mother versions of the FDI. As predicted, there was a significant correlation between the FDI and measures of child anxiety, depression, and internalizing behavior. There was also an unexpected significant correlation between FDI scores and CBCL externalizing behavior. There appeared to be little association between the FDI and child age or family SES. Consistent

<table>
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<tr>
<th>Health status measures</th>
<th>Functional Disability Inventory</th>
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<td>Child report</td>
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<tr>
<td>PILL</td>
<td>.71&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.34&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Child report</td>
<td>.42&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.32&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Parent report</td>
<td>.58&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.17</td>
</tr>
<tr>
<td>HCCL-Somatization</td>
<td>.36&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.49&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Child report</td>
<td>.52&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.15</td>
</tr>
<tr>
<td>Parent report</td>
<td>.62&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.20&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>State-Trait Anxiety Inventory</td>
<td>.44&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.55&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Child Depression Inventory</td>
<td>.02&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.41&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>CBCL Internalizing Behavior</td>
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<td>CBCL Externalizing Behavior</td>
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<td>Demographic variables</td>
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<td>Child age</td>
<td>.13</td>
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<td>Child gender</td>
<td>.30&lt;sup&gt;b&lt;/sup&gt;</td>
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<tr>
<td>SES</td>
<td>.05</td>
<td>.24&lt;sup&gt;a&lt;/sup&gt;</td>
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<sup>a</sup>p < .10.
<sup>b</sup>p < .05.
<sup>c</sup>p < .01.
<sup>d</sup>p < .001.
with the literature on gender differences in health status (cf. Gove, 1984; Nathanson, 1975), there was a low but significant correlation between child-report FDI and child gender, with girls reporting somewhat higher levels of disability.

The findings from Study 1 provide preliminary evidence supporting the FDI's validity and internal consistency. It should be noted, however, that the sample was small and consisted primarily of adolescent girls. Furthermore, the study was limited by lack of an objective measure of functional disability and by a cross-sectional design that precluded evaluation of the FDI's predictive validity and sensitivity to changes in patient clinical status. Study 2 addresses these issues.

STUDY 2

Study 2 had several features that facilitated further validation of the FDI. First, the sample was larger (n = 110), included a broader age range (from 8 to 16 years old), and had a more balanced gender distribution (62 boys, 42 girls). Second, records of school absence were obtained as an objective measure of functional disability for comparison with the FDI. Third, a healthy comparison group was included to assess the utility of the FDI in discriminating well from ill children. Fourth, a longitudinal design was employed in order to evaluate the FDI's predictive validity and sensitivity to changes in patient clinical status following treatment. Changes in FDI scores were examined for two groups: (a) patients with abdominal pain of organic etiology and (b) patients with recurrent abdominal pain (RAP) without identifiable organic etiology. Given that patients with organically based abdominal pain received medical treatment corresponding to their diagnoses, and assuming that most of them would recover from their illnesses, we expected test–retest correlations to decline at each follow-up for patients in this group. In contrast, because no standard treatment has been shown to be effective for recurrent abdominal pain, a condition that is often chronic (Apley & Hale, 1973; Christensen & Mortensen, 1975), we expected test–retest correlations to remain in the moderate range for follow-up interviews with the RAP group.

Method

Sample

Subjects were participants in a larger study of pediatric abdominal pain described in detail by Walker and Greene (1989). Patients between the ages of 8 and 16 years old were recruited from pediatric outpatient clinics of a university medical center. The patients' mothers also participated. There were three groups:

Functional Disability Inventory

1. Abdominal pain with group included patients with
2. Recurrent abdominal
3. Well (n = 41). This
clinic for routine examination to achieve the same proportion of RAP group.

Patients in both abdominal pain groups were viewed in the clinic prior to the initial interview. Mothers were given a brief explanation. Follow-up interviews for Organic and RAP subjects occurred at the same initial interview. Subjects in the Well group were interviewed every three months.

The FDI was administered along with emotional/behavioral problems, trait form of the State-Trait Anxiety Inventory, and the Children's Somatization subscale of the Health Survey. The criteria for somatization disorder were used to determine if the children were present or currently bothered by each symptom in the list, such as a whole lot. Total scores are obtained for each subscale.

Self-Perception Profile for Children is an instrument that assesses children's perceptions of themselves and others in various areas (school performance, athletic ability, and behavioral conduct). Items are worded like this: "Some kids find it hard to make
Functional Disability Inventory

1. Abdominal pain with organic etiology (Organic group, $n = 28$). This group included patients with diagnoses such as ulcer, esophagitis, and gastritis.

2. Recurrent abdominal pain (RAP group; $n = 41$). This group consisted of patients without identifiable organic etiology for their pain, which was considered functional in nature.

3. Well ($n = 41$). This group consisted of patients who had attended the clinic for routine examinations. These subjects were selectively recruited in order to achieve the same proportion of male/female and children/adolescents as the RAP group.

**Procedure**

Patients in both abdominal pain groups (Organic and RAP) were interviewed in the clinic prior to medical evaluation. Instruments were administered verbally to the children. Mothers completed the instruments themselves after a brief explanation. Follow-up telephone interviews were conducted with the Organic and RAP subjects at 2 weeks, 6 weeks, and 3 months following the initial interview. Subjects in the Well group had only one follow-up interview at 3 months.

**Measures**

The FDI was administered to children and their mothers. Three measures of emotional/behavioral problems used in Study 1 were also used in Study 2: the trait form of the State-Trait Anxiety Inventory for Children, the Children’s Depression Inventory, and the Child Behavior Checklist. Several additional measures of health status also were obtained:

*Children’s Somatization Inventory* (CSI; Garber, Walker, & Zeman, 1990; Walker, Garber, & Greene, 1989; Walker & Greene, 1989). The CSI is a self-report instrument listing 36 nonspecific physical symptoms derived from the somatization subscale of the Hopkins Symptom Checklist and from the DSM-III criteria for somatization disorder. Children rate the extent to which they are presently bothered by each symptom on a 4-point scale ranging from *not at all* to *a whole lot*. Total scores are obtained by summing the ratings. The instrument was administered to the child at the initial interview and at each follow-up.

*Self-Perception Profile for Children* (Harter, 1985). This child self-report instrument assesses children’s global perceptions of their worth or esteem as a person, as well as judgments of personal competence in five domain-specific areas (school performance, athletics, physical appearance, social acceptance, and behavioral conduct). Items are of a “structured alternative format” (e.g., “Some kids find it hard to make friends, but other kids find it’s pretty easy to...”)
make friends.”). Children first are asked to decide which type of child is most like them, and then whether this is “sort of true” or “really true” of them. Responses to the 36 items are summed to yield a total score.

Child bed days. At each follow-up interview, mothers were asked to recall how many days the child had stayed in bed due to illness since the previous contact. These reports were summed to obtain the number of child bed days for the 3 month period.

Child medication use. At each follow-up interview, mothers were asked to recall how many prescription and over-the-counter medications had been used by the child since the prior contact. The number of different medications reported at each contact were summed to yield a total medication score.

School absence. School officials provided attendance records for several months preceding and following the clinic visit. Two measures were derived from these records: (a) number of days absent in the 3 months preceding the initial interview and (b) number of days absent during the 3 months between the initial and final interviews.

Results

Reliability

Cronbach’s coefficient alpha was high for both child and parent versions of the FDI, indicating that the instrument is internally consistent. For the child version, coefficient alpha was .92 at the initial interview and .85 at the 3-month follow-up. Coefficient alpha was .95 at both the initial and final interviews for the mother-report FDI.

Validity

Evidence of the FDI’s concurrent validity was provided by the high correlation between child and parent forms of the FDI (r = .71, p < .001), and by the significant correlation of the FDI with an objective index of disability—number of days of school absence in the 3 months prior to the clinic visit (r = .52, p < .001 for child FDI report, r = .55, p < .001 for mother FDI report).

Support for the instrument’s construct validity was found in the Pearson correlation of FDI scores with other measures of physical and emotional health (see Table II). As expected, FDI scores were significantly correlated with severity of somatic complaints as assessed by the CSI. Consistent with the frequently observed association between physical symptoms and states of emotional distress, significant correlations were obtained between the FDI and measures of child anxiety, depression, and internalizing behavior, but not with a more stable trait (perceived personal competence, measured by the Self-Perception Profile).

Table II. Pearson Correlations of FDI Scores and Other Measures of Disability

<table>
<thead>
<tr>
<th>Health status measure</th>
<th>Child absence</th>
<th>Child’s Somatization</th>
<th>State-Trait Anxiety</th>
<th>Children’s Depression</th>
<th>CBCL Internalizing</th>
<th>CBCL Externalizing</th>
<th>Self-Perception Profile</th>
<th>Demographic variables</th>
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<tbody>
<tr>
<td>Child age</td>
<td>r = .43</td>
<td>r = .51</td>
<td>r = .42</td>
<td>r = .57</td>
<td>r = .54</td>
<td>r = .54</td>
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<tr>
<td>Child gender</td>
<td>r = .45</td>
<td>r = .50</td>
<td>r = .44</td>
<td>r = .56</td>
<td>r = .53</td>
<td>r = .53</td>
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<tr>
<td>SES</td>
<td>r = .46</td>
<td>r = .49</td>
<td>r = .43</td>
<td>r = .56</td>
<td>r = .52</td>
<td>r = .52</td>
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*p < .10.
*p < .05.
*p < .01.
*p < .001.

Although FDI scores were correlated with the externalizing scale, there was a significant difference between mother-report and the CES-D and the PSI scales.

It is possible that changes in FDI scores may be related to changes in the child’s behavior. The significant relation between the FDI and the mother-child FDI scores suggest that this possibility is not ruled out. Together, these scores accounted for 28% of the variance in the child-report FDI and found that child-report FDI was significantly 31% of the variance in the parent-report FDI.

Demographic variables were entered first in the equation of the FDI with child report. The child report approached significance, with a correlation of .22 (n = 100). A significant correlation between age and the FDI was found, with children who were younger having higher FDI scores.

Evidence of the FDI’s concurrent validity was provided by the significant correlation between the FDI and measures of subsequent disability (i.e., parent-report FDI) over the 3 months following the initial interview. Positive correlations with measures of physical health were found for the FDI and the CSI scores. Positive correlations with measures of emotional health were found for the FDI and the CBCL scores. The correlations were generally stronger for the parent-report FDI than for the child-report FDI.
of child is most true of them.

were asked to recall the previous child bed days for years were asked to had been used by actions reported at
words for several es were derived as preceding the nths between the

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(001), and by the sibility—number sit (r = .52, p <. report).

in the Pearson emotional health related with sever-
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and measures of a more stable Profile).

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<th>Table II, Pearson Correlations Between the Functional Disability Inventory and Other Measures for Total Sample at Time 1, Study 2</th>
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<tr>
<td><strong>Functional Disability Inventory</strong></td>
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<td><strong>Child report</strong></td>
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<tr>
<td>Health status measures</td>
</tr>
<tr>
<td>School absence</td>
</tr>
<tr>
<td>Children's Somatization Inventory</td>
</tr>
<tr>
<td>State-Trait Anxiety Inventory</td>
</tr>
<tr>
<td>Children's Depression Inventory</td>
</tr>
<tr>
<td>CBCL Internalizing Behavior</td>
</tr>
<tr>
<td>CBCL Externalizing Behavior</td>
</tr>
<tr>
<td>Self-Perception Profile</td>
</tr>
<tr>
<td>Demographic variables</td>
</tr>
<tr>
<td>Child age</td>
</tr>
<tr>
<td>Child gender</td>
</tr>
<tr>
<td>SES</td>
</tr>
</tbody>
</table>

*<sup>p < .10</sup>  
*<sup>p < .05</sup>  
*<sup>p < .01</sup>  
*<sup>p < .001</sup>

Although FDI scores were not expected to correlate significantly with the CBCL externalizing scale, there was a low, significant correlation between the FDI mother-report and the CBCL externalizing scale.

It is possible that child emotional distress is a third variable accounting for the significant relation between mother and child-report FDI. In other words, mother and child FDI scores may reflect the child's psychological distress. To address this possibility, we controlled on child anxiety and depression (which together accounted for 25% of the variance in child-report FDI scores) in a multiple regression analysis examining the relation of mother-report FDI to child-report FDI and found that mother-report FDI scores explained an additional significant 31% of the variance in child-report FDI scores.

Demographic variables were weakly associated with the FDI. The correlation of the FDI with child age was not significant. The correlation with gender approached significance, with girls reporting greater disability. There was a low, significant correlation between the FDI and SES; lower SES was associated with higher FDI scores.

Evidence of the FDI's predictive validity is presented in Table III. There were significant positive correlations between initial FDI scores and two indices of subsequent disability (i.e., school absences and bed days due to illness during the 3 months following the clinic visit). Initial FDI scores also had significant positive correlations with other aspects of illness behavior: number of medications used by the child in the 3 months following the clinic visit and level of somatic complaints at the 3-month follow-up.
Table III. Pearson Correlations Between Time 1 Functional Disability and Health Status During the Subsequent Three Months for Total Sample, Study 2

<table>
<thead>
<tr>
<th>Health Status</th>
<th>Functional Disability Inventory</th>
<th>Child report</th>
<th>Mother report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatic complaints (CSI)</td>
<td>*p &lt; .05.</td>
<td>*p &lt; .01.</td>
<td>*p &lt; .001.</td>
</tr>
</tbody>
</table>

Discriminant validity of the FDI was evaluated by examining its utility in differentiating the three diagnostic groups. In addition to diagnostic group (Well, RAP, Organic), we included age group (children, adolescents) and child gender as factors in the analysis of variance. Results indicated that the FDI differentiated among the diagnostic groups: for child report, $F(2, 97) = 26.40, p < .001$; for mother report, $F(2, 96) = 21.03, p < .001$. Post hoc analyses using Duncan’s multiple range test showed significantly higher FDI scores for the RAP group ($M_s = 17.12$ and 17.41 for child and mother reports, respectively) and for the Organic group ($M_s = 15.00$ and 17.04 for child and mother reports) in comparison to the Well group ($M_s = 3.50$ and 2.26 for child and mother reports). At the 3-month follow-up the FDI also discriminated among the groups: for child report, $F(2, 86) = 6.75, p < .01$; for mother report, $F(2, 85) = 6.16, p < .01$. At this follow-up, however, RAP patients had significantly higher FDI scores ($M_s = 6.86$ and 7.42 for child and mother reports) than either the Organic group ($M_s = 2.65$ and 3.16 for child and mother reports) or the Well group ($M_s = 2.64$ and 1.03 for child and mother reports). There was also a significant Age × Gender interaction for the mother follow-up data: $F(1, 85) = 4.26, p < .05$; mothers of adolescents reported significantly higher disability in daughters ($M = 8.29$) than in sons ($M = 2.58$).

The sensitivity of the FDI to changes in patient status was assessed by examining changes in FDI scores reported at each follow-up by RAP and Organic patients and their mothers. A multivariate analysis of variance with repeated measures yielded a significant Group × Time effect, $F = 2.92, p < .05$. Post hoc analyses indicated that for the Organic group both children and mothers reported significant decreases in child functional disability between the initial and 2-week interviews and between the 2-week and 6-week interviews. For the RAP group, in contrast, the only significant decline in child functional disability occurred between the initial and 2-week interviews. Reporter (mother vs. child) did not have a significant effect on FDI scores.

Another way of looking at the sensitivity of the FDI to changes in patient status is to examine test–retest correlations between initial FDI scores and three-month follow-up scores. Correlations were low for the Well group and moderate for the RAP group, but correlations were significant for the Organic group. The fact that correlations were significant for the Organic group and not for the other groups suggests that the FDI is sensitive to changes in functional disability in patients with Organic symptoms, but not in Well or RAP patients.

The significant correlations between the FDI and specific psychological distress measures (e.g., anxiety, depression) suggest that the FDI may be a useful tool for assessing emotional functioning in patients with RAP. The FDI may be a useful tool for assessing emotional functioning in patients with RAP.

Table IV. Pearson Correlations Between Time 1 FDI Scores and Health Status at Each Follow-up for Total Sample, Study 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Child report</th>
<th>RAP</th>
<th>Organic</th>
<th>Mother report</th>
<th>RAP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*p &lt; .05.</td>
<td>*p &lt; .01.</td>
<td>*p &lt; .001.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Functional Disability Inventory

status is to examine test–retest reliability. Table IV shows the Pearson correlation coefficients between initial FDI scores and FDI scores at each follow-up for children and mothers in the RAP and Organic groups. These correlations were expected to decline for the Organic group because they received medical treatment that should have led to the recovery of most patients in this group. In fact, correlations were low for the Organic group and by the time of the final follow-up were not significant. For the RAP group, in contrast, test–retest correlations were significant at each follow-up for both mother and child. This finding is not unexpected in that RAP patients may be considered an untreated group, given that there is no standard medical treatment protocol with demonstrated effectiveness for these patients.

The significant correlations between FDI scores and measures of child emotional functioning raise the possibility that the FDI may simply reflect non-specific psychological distress (cf. Dohrenwend, Shrout, Egli, & Mendelsohn, 1980). If this is so, the FDI may be no more useful than measures of subjective distress in predicting child functional disability. In order to explore this possibility, we controlled for child anxiety and depression in multiple regression analyses that used the FDI to predict two indices of disability subsequent to the clinic visit: school absences and bed days. Separate analyses were conducted with child-report and mother-report FDI scores as predictor variables. Examination of regression coefficients showed that, controlling on anxiety and depression, both the child-report and mother-report FDI were significant predictors of bed days ($T = 3.87$ and $3.67$, $p < .001$) and each explained at least 20% unique variance in bed days subsequent to the clinic visit (for child-report FDI, unique $R^2 = .22$; for mother-report FDI, unique $R^2 = .21$). With respect to school absence, the child-report FDI was a significant predictor ($T = 3.22$, $p < .01$) and explained 18% of the variance in school absence after controlling for anxiety and depression, but the mother-report FDI only approached significance as a predictor of school absence ($T = 1.81$, $p < .08$). (Neither anxiety nor

| Table IV. Pearson Correlations Between FDI Scores at Clinic Visit and FDI Scores at Each Follow-up for RAP and Organic Groups, Study 2 | Follow-up |
|---|---|---|---|
| Time 1 | 2 weeks | 6 months |
| RAP | .80<sup>c</sup> | .70<sup>c</sup> | .63<sup>c</sup> |
| Organic | .40<sup>a</sup> | .34<sup>a</sup> | .17 |
| RAP | .47<sup>b</sup> | .60<sup>b</sup> | .69<sup>b</sup> |
| Organic | 16 | .11 | .25 |

<sup>a</sup>p < .05.
<sup>b</sup>p < .01.
<sup>c</sup>p < .001
depression was itself a significant predictor of school absence or bed days.) The somewhat greater utility of the FDI in predicting bed days than school absence may be due to the fact that the FDI assesses disability across several settings, whereas school absence reflects disability in a single context and may occur for reasons other than illness.

**DISCUSSION**

Results of the two studies reported here indicate that the Functional Disability Inventory has sound psychometric properties. Evidence of the FDI's concurrent validity was found in its significant correlation with an objective measure—days absent from school—that has been used elsewhere as an index of child functional disability (Starfield, 1974). Moreover, the correlation between mother and child versions of the instrument was higher than that typically reported for measures of child health (cf. Kashani, Orvaschel, Burk, & Reid, 1985; Kazdin, French, Unis, & Esveldt-Dawson, 1983; Weissman, Orvaschel, & Padian, 1980). This suggests that in responding to the FDI, mothers and children were reporting about similar aspects of child behavior.

Construct validity was supported by the utility of the instrument in discriminating well patients from abdominal pain patients and by the fact that the FDI demonstrated the anticipated association with other measures of child health. Thus, FDI scores had a significant positive correlation with measures of the child's state including physical symptoms and aspects of psychological distress (anxiety, depression) that have been found in association with functional disability in other populations (e.g., Spiegel et al., 1988). In contrast and as expected, FDI scores were not significantly correlated with a measure of a more stable trait (i.e., the child's perceived social competence). It should be noted, however, that among children with more chronic or severe conditions than in the present samples, greater disability might be associated with the perception of less social competence. The nature of the causal relation underlying the frequently observed association of functional disability to anxiety and depression requires further exploration. Functional disability may result in emotional distress, but it is also likely that low morale limits the individual's perceptions of his or her capacity and inhibits actual performance.

Assuming that most children respond to disability with behavior that is more passive than active, we also predicted that FDI scores would not correlate significantly with CBCL externalizing scale scores. However, a significant positive correlation was found between mothers' reports on the FDI and children's externalizing behaviors. This correlation was higher in Study 1, which used an adolescent sample, and may indicate that adolescents are more likely than children to react to disability with acting-out behavior. This may reflect adolescents' rejection of the dependency that is typically associated with disability.

**Functional Disability Inventory**

There was some evidence that in adolescence. This finding is consistent with the hypothesis that girls have more somatic complaints, whereas men (Nathanson, 1977) cited in Whitehead, Busch, Helldin, have been offered for gender differences in the development of functional roles conflict less with those preferences than men (Mechanic & Polen, 1981). Men report responsibility for family health and care coordination, whereas women (Gove, 1984) and (and) ill men and women report more for men (Mechanic role socialization result in gender differences and extend into adulthood).

Support for predictive validity comes from correlations between initial FDI scores and somatic complaints, medication use, and health status. These correlations were rather low, suggesting that a variety of individual behaviors (cf. Campbell, 1978). Perceptions of functional disability, whether the FDI is as useful as an objective measure of functional disability to anxiety and depression, the child's anxiety in school absence and behavioral correlation with child emotional and social behavior are not predictors of child function.

With respect to the FDI's reliability, consistent, suggesting that the instrument test-retest reliability on chronic condition. Furthermore, improvements in patient status based on self-report and abdomen pain.

Starfield (1974) has argued that dimensions that should be assessed in clinical settings to be useful for disability. It is recommended that this information be collected for heterogeneous and who are concerned with partial disability may need to assess.

In addition, the FDI must...
There was some evidence that gender played a role in disability, particularly in adolescence. This finding is consistent with literature reporting that women have more somatic complaints, health care visits, and illness-related work absences than men (Nathanson, 1975; National Center for Health Statistics, 1982, cited in Whitehead, Busch, Heller, & Costa, 1986). Several explanations have been offered for gender differences in adult illness behavior: (a) women's traditional roles conflict less with the assumption of the sick role than do men's roles (Marcus & Seeman, 1981; Marcus, Seeman, & Telesky, 1983), (b) women's responsibility for family health contributes to greater interest and concern with their own health (Hibbard & Pope, 1983), (c) stress associated with women's nurturant role results in real differences between men and women in physical health (Gove, 1984), and (d) illness behavior is culturally more acceptable for women than for men (Mechanic, 1976). It is possible that these aspects of sex-role socialization result in gender differences in illness behavior that begin in adolescence and extend into adulthood.

Support for predictive validity of the FDI was found in the significant correlations between initial FDI scores and subsequent illness behavior including somatic complaints, medication use, bed days, and school absence. The fact that these correlations were rather low (ranging from .21 to .46) is consistent with the view that a variety of individual and family variables contribute to child illness behavior (cf. Campbell, 1978). Given that patient mental health appears to affect perceptions of functional disability (Spiegel et al., 1988), it is important to know whether the FDI is as useful as measures of child emotional distress in predicting objective measures of functional disability. In regression analyses controlling for anxiety and depression, the child-report FDI predicted 18% of the variance in school absence and bed days, respectively. Thus, despite the FDI's correlation with child emotional distress, it appears to be a significant independent predictor of child functional disability.

With respect to the FDI's reliability, in both studies the scale was internally consistent, suggesting that the items tap a similar domain. The FDI also demonstrated test-retest reliability over a 3-month period in a sample of patients with a chronic condition. Furthermore, the instrument demonstrated sensitivity to improvements in patient status subsequent to medical treatment for organically based abdominal pain.

Starfield (1974) has argued that functional disability is one of several dimensions that should be assessed in evaluating health status. The FDI has been demonstrated to be useful for assessing children's and adolescents' functional disability. It is recommended for inclusion in test batteries when the population of interest is heterogeneous and a brief, global measure is needed. Researchers who are concerned with particular conditions, age groups, or aspects of functional disability may need to develop more specific measures that target these interests.

In addition, the FDI must be understood as a subjective measure. The fact
that initial FDI scores of abdominal pain patients with and without organic findings were equally high whereas that functional disability does not bear a one-to-one correspondence with objective measures of physical health (cf. Fordyce, 1988; Spiegel et al., 1988). The relative value of subjective versus objective measures of health status depends on the purpose of the research (Ware et al., 1981). For example, patients' perceptions of their health, regardless of the accuracy of those perceptions, may be more useful than objective measures in predicting patient-initiated behaviors such as treatment compliance, health service utilization, or resumption of normal activities following illness. An objective measure of disability, such as a rating by a clinician, might be preferable to the FDI in instances where training is required to make fine discriminations in disability, such as in the evaluation of changes in patient ambulation during the course of rehabilitation.

The FDI appears to overlap substantively with other measures of child health but to be sufficiently independent to warrant utilization in situations requiring comprehensive assessment or when functional disability is of particular interest. FDI scores have been shown to share 2 to 50% of variance in describing child health status; correlations were lowest between mother-report FDI scores and children's reports of emotional symptoms and they were highest between child-report FDI scores and children's reports of their own physical symptoms. Thus, the FDI may have utility as one of several measures of health status when examining individual differences in the course of pediatric illnesses.

In future research the FDI might be applied to a variety of patient groups other than those studied here. It would be particularly useful to know how psychosocial factors influence judgments of disability made by pediatric patients and their parents and how these judgments influence the pace and extent of patient recovery. For example, the present finding that patient gender may play a role in perceptions of functional disability merits further study. If the FDI could be complemented with an objective measure of disability for a particular illness or condition, it also would be possible to identify factors that account for discrepancies between judgments of disability made by patient families versus those of professionals and to assess the relative utility of these judgments in predicting various patient outcomes.

**APPENDIX**

**Functional Disability Inventory—Child Form**

When people are sick or not feeling well it is sometimes difficult for them to do their regular activities. In the last few days, would you have had any physical trouble or difficulty doing these activities?

<table>
<thead>
<tr>
<th>Number</th>
<th>Activity</th>
<th>No Trouble</th>
<th>Trouble</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Walking to the bathroom</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Walking up stairs</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Doing something with a friend</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(for example, playing a game)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Doing chores at home</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Eating regular meals</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Being up all day without a nap or rest</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Riding the school bus or traveling in the car</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Being at school all day</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Doing the activities in gym class (or playing sports)</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Reading or doing homework</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Watching TV</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Walking the length of a football field</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Functional Disability Inventory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking to the bathroom. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Walking up stairs. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Doing something with a friend. (for example, playing a game). No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Doing chores at home. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Eating regular meals. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Being up all day without a nap or rest. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Riding the school bus or traveling in the car. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remember, you are being asked about difficulty due to physical health.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Being at school all day. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
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<td>9. Doing the activities in gym class (or playing sports). No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
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<td>10. Reading or doing homework. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
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<td></td>
</tr>
<tr>
<td>11. Watching TV. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Walking the length of a football field. No  A Little Trouble Some Trouble A Lot of Trouble Impossible</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(continued)
Appendix (continued)

13. Running the length of a football field. No A Little Some A Lot of Impossible
   Trouble Trouble Trouble Trouble

14. Going shopping No A Little Some A Lot of Impossible
   Trouble Trouble Trouble Trouble

15. Getting to sleep at night and staying asleep No A Little Some A Lot of Impossible
   Trouble Trouble Trouble Trouble

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Factor Structures of the School Situations Questionnaire and Related Questionnaire

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Examined the factor structures of the School Situations Questionnaire (SSQ) and a related questionnaire (HSQ) for boys (490 boys) and girls (490 girls) ages 4 through 12. Results of factor analysis with Varimax rotation indicated that four factors emerged from the SSQ, four factors emerged from the HSQ, four factors emerged from the SSQ, and three factors emerged from the HSQ. These factors were briefly discussed. Factor scores are provided for clinical practice.

KEY WORDS: child asset

Behavior checklists and questionnaires are used in clinical practice to assess difficulties that children present. Behavior checklists and questionnaires are used to assess the behaviors observed by informants. Such scales have advantages and disadvantages. For extensive reviews, see Barlow et al. (1980).

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