Correspondence of Pediatric Inpatient Behavior Scale (PIBS) Scores with DSM Diagnosis and Problem Severity Ratings in a Referred Pediatric Sample

William G. Kronenberger  
Indiana University School of Medicine

Bryan D. Carter  
University of Louisville School of Medicine

Tina Limbird  
Indiana University School of Medicine

The Pediatric Inpatient Behavior Scale (PIBS) is a 47-item, nurse-completed rating scale designed specifically for use with children hospitalized in pediatric settings. The purpose of this study was to investigate the correspondence of PIBS scores, DSM diagnoses, and problem severity ratings in a sample of hospitalized, physically ill children referred for psychological evaluation and intervention.

Nurses completed PIBS scales for 177 hospitalized, physically ill children referred to pediatric psychology/psychiatry consultation-liaison services. DSM diagnoses were assigned based on the consensus of the consultation-liaison team following a standard evaluation. Nurses and consultation-liaison clinicians also independently rated the degree to which the child’s behavior was a problem on the hospital unit.

As expected, children with Depressive Disorders scored significantly lower on the PIBS Positive-Sociable and Overactivity subscales, compared to children with other diagnoses, while children with Anxiety Disorders scored higher on the Distress and Anxiety subscales. Children with Adjustment Disorders scored higher than children with other diagnoses on most PIBS subscales. Nurse and clinician ratings of severity of behavior problems correlated significantly with most PIBS subscale scores.

The results of this study demonstrate that the PIBS is sensitive to diagnostic differences and severity of behavior problems in a hospitalized, physically ill, psychologically referred sample of children.

One area in which inpatient pediatric psychology consultation-liaison evaluation has fallen well short of outpatient pediatric and clinical child psychology is in the development and use of standardized assessment tools such as behavior checklists. The benefits of well-developed and validated behavior checklists for hospitalized, physically ill children would be similar to the benefits of behavior checklists currently in use in outpatient clinical psychological settings: improved assessment and diagnosis, quantification and standardization of behavior ratings, use in outcome monitoring, use in research applications, and comparison with normative samples. Although a myriad of behavior checklists exist for assessment of psychological symptoms in the outpatient setting, only two broad-band behavior checklists (the parent rating form of the Behavior Upset in Medical Patients - Revised [BUMP-R; Rodriguez & Boggs, 1994; Saylor et al., 1987] and the nurse rating form of the Pediatric Inpatient Behavior Scale [PIBS; Kronenberger, Carter, & Thomas, 1997]) have been published for primary use in the psychological assessment of children during hospitalizations for physical illnesses. However, neither scale has been extensively researched in a large, clinically-refferred (to pediatric psychology consultation-liaison services) pediatric inpatient sample, despite the fact that such samples would frequently be the primary targets of such scales.

Using smaller (N=45-58) samples of referred children hospitalized for chronic physical illnesses, Kronenberger and Carter (1995; Kronenberger et al., 1997) have shown that referred children score higher than nonreferred children on several PIBS subscales and that hospitalized children with Adjustment Disorders score higher on PIBS subscales than children with other DSM-IV disorders. However, further comparisons between other DSM-IV diagnostic groups were not possible because of the small N used in those studies. In nonreferred hospitalized physically ill samples, PIBS scores have been related to nurse ratings of behavior problems and need for intervention, as well as to pre-hospitalization behavior problems and stresses (Carter et al., 1996; Kronenberger et al., 1997). In a sample of children hospitalized on a psychiatry inpatient unit, children with different DSM-IV diagnoses and different primary reasons for hospital admission showed significant differences in PIBS subscale scores, suggesting some
diagnostic differential validity for the PIBS (Kronenberger, Causey, & Carter, 1999). However, the validity of the PIBS has not yet been tested in a large, clinically referred sample of hospitalized children with chronic physical illnesses. The purpose of this study was to investigate the correspondence of PIBS ratings, DSM diagnoses, and symptom severity ratings in a large sample of hospitalized, physically ill children referred for psychological evaluation and intervention. Use of a large sample would allow comparison of more homogeneous diagnostic subgroups, providing additional differential validity for the use of the PIBS by consultation-liaison services.

Method

Sample and Procedure

Pediatric floor nurses completed Pediatric Inpatient Behavior Scales and Problem Severity Ratings for 177 hospitalized children (age 6-17, mean age=12.6 years [SD=3 years]; 92 females, 85 males; 148 White, 29 African-American) referred to pediatric psychology/psychiatry consultation-liaison services for evaluation and intervention, as a part of the children’s routine initial clinical evaluation by the consultation-liaison service. Two tertiary care pediatric hospitals in mid-size midwestern cities participated in the study (with one hospital providing 144 subjects and the other providing 33 subjects). Clinician-rated Problem Severity Rating scores and DSM (psychiatric) diagnosis were assigned by the consultation-liaison treatment team. Study data were abstracted from clinical charts using standard chart review methods. Children were hospitalized for serious and/or chronic diseases such as cancer (N=16), gastrointestinal disorders (N=23), traumatic injury (N=22), burns (N=15), diabetes (N=13), asthma (N=11), neurological disorders (N=11), and medical complications of intentional overdose (N=26)(other disorders had N<10).

Measures

Pediatric Inpatient Behavior Scale (PIBS; Kronenberger et al., 1997). The PIBS is a 47-item, nurse-completed rating scale designed specifically for use with children hospitalized in pediatric settings. PIBS items are rated on a 0 (never) to 2 (often) scale based on the child’s behavior during the hospitalization. The PIBS yields ten factor-analytically derived subscales: Oppositional-Noncompliant, Positive-Sociability, Withdrawal, Conduct Problem, Distress, Anxiety, Elimination Problem, Overactive, Self-Stim, and Self-Harm. Subscale raw scores are calculated by dividing the sum of the item scores by the number of items on the subscale, giving a mean item score.

Problem Severity Ratings. The nurse who completed the PIBS also completed a global rating scale (1 [low] to 10 [high]) of the degree to which the child’s behavior was a problem on the hospital unit (N=165). Similar ratings (“clinician ratings”; N=131) were made independently by the member of the consultation-liaison service primarily responsible for the child’s psychological care (a psychology intern, psychiatry resident, psychologist, or psychiatrist).

DSM Diagnosis (American Psychiatric Association, 1994). The child’s DSM diagnosis was obtained from chart review. DSM-III-R or DSM-IV diagnoses were assigned based on the consensus of the treatment team. For the purposes of statistical analysis, diagnoses were aggregated into clusters based on similarity of symptomatology. The most common diagnoses were Depressive Disorder (N=90, defined as a Major Depressive Disorder, Dysthymic Disorder, Depressive Disorder Not Otherwise Specified, or Adjustment Disorder with Depressed Mood), Anxiety Disorder (N=29, defined as any DSM Anxiety Disorder or Adjustment Disorder with Anxiety), or Adjustment Disorder (N=74, defined as any Adjustment Disorder)(numbers add to more than 177 because of comorbid diagnoses and overlap in the definition of the different aggregate diagnostic groups).

Data Analysis

Diagnostic differential validity of the PIBS was tested using t-test of each major diagnostic subgroup (Depressive Disorders, Anxiety Disorders, and Adjustment Disorders) compared to the remainder of the referred sample. PIBS subscales used for each comparison were selected based on consensus of two pediatric psychologists (BC and WK) of subscales corresponding to the major features of the diagnostic group. For Depressive Disorders, the PIBS Withdrawal, Positive Sociability (negative direction), and Overactive (negative direction) subscales were selected for comparison, reflecting the social withdrawal, anhedonia, negative affect, and low energy characteristic of depression. For Anxiety Disorders, the Distress and Anxiety subscales were selected for comparison. Finally, all PIBS subscales were selected for comparison of the Adjustment Disorder group with the other diagnostic groups, reflecting the disparate symptoms captured by the various Adjustment Disorder diagnoses.

For the second data analysis, correlations were calculated between all PIBS subscales and nurse- and clinician-rated behavior problem severity. With the exception of the Positive-Sociability subscale, all PIBS subscales were expected to be positively related to behavior problem severity. Higher correlations were expected for nurse severity ratings and PIBS scores, because both scales were completed by the same person. Correlations between consultation-liaison clinician severity ratings and
PIBS scores, while expected to be lower, were calculated to provide a validity analysis that would not be affected by the method bias of having the same rater complete both the PIBS and the validity criterion (problem severity).

Results

Internal Consistency Reliability

Preliminary analyses demonstrated strong internal consistency for PIBS Oppositional-Noncompliant (alpha=0.88), Positive-Sociability (alpha=0.83), Withdrawal (alpha=0.80), Distress (0.84), Anxiety (0.73), and Overactivity (0.72) subscales in the clinical sample. The Conduct Problem subscale demonstrated weaker internal consistency (alpha=0.46) than in previous studies, probably as a result of restricted range on several items. The Elimination Problem subscale also showed weak internal consistency (alpha=0.55) as a result of the inclusion of an item ("Shakes") that shares little content similarity or statistical covariance with the other two items ("Wets bed"; "Soils") on the subscale. Deletion of the "Shakes" item would increase the internal consistency of the Elimination Problem subscale to 0.81 in the present sample. The Self-Stim subscale also showed poor internal consistency (alpha=0.02), and the Self-Harm subscale consists of a single item. As a result of questionable internal consistency for the Elimination Problem and Self-Stim subscales, these subscales were dropped from further analysis; Self-Harm was also dropped because it contains only one item.

Diagnostic Subgroup Comparisons

In most cases, each diagnostic group demonstrated more deviant scores on PIBS subscales corresponding to the major characteristics of the diagnosis (Figures 1 and 2): Children with Depressive Disorders, for example, scored significantly lower on the Positive-Sociability and Overactivity subscale, compared to children with other diagnoses. Children with Anxiety Disorders scored higher on the Distress and Anxiety subscales, while children with Adjustment Disorders scored higher on the Oppositional-Noncompliant, Withdrawal, Distress, and Anxiety subscales compared to children with other DSM diagnoses.

One puzzling nonsignificant finding is the failure of the Withdrawal subscale to differentiate between children with and without Depressive Disorders. The item content of

Problem Severity Ratings and PIBS Scores

Both nurse and clinician ratings of severity of behavior problems correlated significantly with most PIBS subscale scores (Figure 3). As expected, the Positive-Sociability subscale was uncorrelated with either rating of problem severity. Surprisingly, however, scores on the Conduct Problem and Overactivity subscale were also unrelated to problem severity ratings. In the case of the Conduct Problem subscale, this appears to have been the result of restricted range.

Discussion

The results of this study demonstrate that the PIBS is sensitive to diagnostic differences and severity of behavior problems in a hospitalized, physically ill, psychologically referred sample of children. As with an earlier, smaller sample, children with Adjustment Disorders were found to score higher on most PIBS subscales, even when compared to other children referred for psychological consultation-liaison services. It is likely that this consistent finding is a result of the fact that children diagnosed with Adjustment Disorders typically receive the diagnosis based on their disease-stress-related behaviors, which frequently are more apparent (and lead to consultation requests) during pediatric hospitalization. This study extends earlier findings by demonstrating that PIBS subscales also differentiate between children with Depressive Disorder diagnoses, children with Anxiety Disorder diagnoses, and children with other DSM diagnoses. Such findings offer strong differential validity support for PIBS use by consultation-liaison services.

A notable diagnostic omission from this study are the Disruptive Behavior Disorder diagnoses (Conduct Disorder and Oppositional-Defiant Disorder). These occurred very infrequently in the present sample (less than 1% of subjects), because most disease-related or in-hospital noncompliance and acting-out was coded under Adjustment Disorder diagnoses. Hence, the differential validity of the PIBS for Disruptive Behavior Disorders could not be adequately tested in this sample. In a different study, strong evidence for the differential validity of the PIBS for Disruptive Behavior Disorders was found in an inpatient psychiatry sample, which had a high occurrence of acting-out behavior problems (Kronenberger et al., 1999). The Withdrawal subscale clearly overlaps with depressive symptomatology (looks sad, withdraws, poor eye contact, ignores people, refuses to speak, immature/regressed).
However, this content also characterizes hospitalized children with adjustment problems and noncompliance. It is possible, therefore, that the Withdrawal subscale is less effective for differentiating between depressed children and children with other adjustment and behavioral problems, although it is effective in differentiating children with depressive, adjustment, or noncompliant behavior problems from those with no behavior problems.

Support for this hypothesis comes from several areas. First, in this study, children with Adjustment Disorders scored higher on the Withdrawal subscale than referred children with other DSM diagnoses (Figure 2); Kronenberger and Carter (1995) report similar results. Second, children rated by nurses as being “high need for psychological intervention” scored higher on the Withdrawal subscale than children rated “low need for psychological intervention” (Kronenberger et al., 1997). Third, Withdrawal subscale scores were correlated with both nurse and clinician ratings of behavior problem severity in the present study. Finally, Withdrawal subscale scores have been found to be related to prehospitalization ratings of parental stress and lack of family support (Carter et al., 1996a). Hence, within clinical samples, the Withdrawal subscale may be a better measure of heterogeneous adjustment problems, as opposed to depressive symptoms. It also appears to be effective in differentiating between clinical and nonclinical samples.

In addition to differentiating between diagnostic groups, most PIBS subscale scores were related to both nurse and clinician ratings of behavior problem severity. While method bias (from the same rater completing both measures) could be a factor in the nurse severity ratings, the clinician ratings were made independently and therefore were less susceptible to such method bias effects. On the other hand, clinician ratings consistently showed lower correlations with PIBS subscales, as compared to nurse ratings. This finding mirrors research from other behavior checklists, which consistently show stronger within-rater than between-rater correspondence of checklist and criterion scores. Consistent with findings from other studies, the PIBS Positive-Sociability subscale did not correlate with problem severity ratings and appears to be seen as somewhat orthogonal to behavior problems on the unit.

Although this study extends previous findings and offers strong support for the differential and criterion validity of the PIBS, one methodological issue to be considered is the method of obtaining DSM diagnosis. Because diagnoses were not obtained through standardized diagnostic interview methods, they may be less reliable and valid. However, use of a team approach in a teaching hospital increased the probability that diagnostic criteria were carefully considered, and all diagnoses were approved by an experienced psychologist or psychiatrist. In addition, use of a less reliable/valid method of assigning diagnoses (provided that there is no systematic bias effect) raises the risk of Type II error (finding nonsignificant results when a real difference exists) but would not affect Type I error (finding significant results when no real difference exists). Therefore, use of unstructured diagnostic techniques in this study would not cause statistically significant results, although larger differences may have been found with more systematic diagnostic techniques.

Future research should be directed at further refinement and testing of the validity of the three PIBS subscales excluded from this study. The content validity and internal consistency of the Elimination Problems subscale appear to be strengthened significantly by exclusion of the item that fails to correlate significantly with the other two items on the subscale. This has also been found in unpublished analyses with other samples, and it suggests that the Elimination Problems subscale should probably be revised to include only the two items that show a strong intercorrelation. The Self-Stim and Self-Harm subscales, on the other hand, appear to have little psychometric support, although their items capture important content and may be best used as a critical item set for clinical purposes. A second area for additional investigation is the stability of PIBS subscale scores during hospitalization and the potential of PIBS subscale scores to reflect relevant clinical change. Finally, the impact of characteristics of the nurse-rater on PIBS scores have not been extensively investigated. Variables such as degree of familiarity with the child’s behavior, personality variables, and unit stress should be investigated to better understand rater influences on PIBS scores.

References


(1997). Assessment of behavior problems in pediatric


Figure 1: Depression and Anxiety Disorder Diagnoses and PIBS Scores

Note: Values are mean PIBS Subscale raw scores. N for Depressive D/O=87; for Anxiety Disorder=29. Residual group is the remainder of the total sample of 177, with target diagnostic group excluded. p-values are based on t-tests.
Figure 2: Adjustment Disorder Diagnoses and PIBS Scores

Note: Values are mean PIBS Subscale raw scores. N for Adjustment D/O=74; Residual group is the remainder of the total sample of 177, with target diagnostic group excluded. p-values are based on t-tests.
Figure 3: Behavior Problem Severity Ratings and PIBS Subscale Scores

Note: Values are Pearson correlations between Problem Severity Ratings (1-10 scale) and PIBS subscale score. Values greater than 0.20 are significant at p<0.01; values greater than 0.15 are significant at p<0.05.