Objective  Little is known about factors predicting in-hospital adjustment in children with chronic illnesses or about risk/protective factors for in-hospital behavior compared to out-of-hospital behavior. This study investigated the relationship between illness factors (chronicity and severity) and child adjustment in and out of the hospital.  Methods  Parents and nurses completed questionnaires about in-hospital and home behavior for a sample of 85 hospitalized children.  Results  In the hospital, children with acute illnesses demonstrated more internalizing behavior problems than children with chronic illnesses. Children with life-threatening illnesses had more internalizing and externalizing problems than children with non-life-threatening illnesses. Out of the hospital, children with chronic illnesses demonstrated more internalizing problems and a trend toward more externalizing problems than healthy children who later developed acute illnesses. Out of hospital behavior problems were unrelated to illness severity.  Conclusions  Results suggest that different illness factors may predict in-hospital as compared to out-of-hospital behavioral adjustment.

Key words  behavior problems; children; hospitalization; pediatric consultation–liaison.

Serious illness is a major stressor for children and families and is associated with outcomes ranging from reduced functioning and maladjustment to resilience. Researchers have attempted to identify factors that impact psychological and behavioral adjustment (Thompson & Gustafson, 1996), including characteristics of the illness, such as onset, course, and outcome (Rolland, 1987; Stein & Jessop, 1982). For example, medical conditions involving the central nervous system may put children at higher risk for behavioral and social problems (Breslau, 1985). Other research has found illness characteristics such as functional impairment, severity, and duration to relate to stress or psychological adjustment, although such a relationship is not always found (Thompson & Gustafson, 1996).

Most existing research on the impact of illness factors has emphasized child behavior out of the hospital (e.g., at home). Less is known about the relationship between illness factors and child behavior during hospitalization, despite the fact that illness factors may be much more salient during hospitalization. Furthermore, there is no a priori reason to assume that the relationship between illness factors and child behavior will be the same in hospital as compared to out-of-hospital. One study found no relationship between illness chronicity and in-hospital behavior (Rodriguez & Boggs, 1994), whereas another study found children with high-mortality illnesses (such as cancer) to have more in-hospital behavior problems than children with low-mortality illnesses (such as mild asthma and diabetes; Kronenberger, Carter, & Thomas, 1997).

To promote a better understanding of the impact of illness factors on child behavior, the current study investigated the relationship between two major illness characteristics (chronicity and severity) and child behavioral adjustment in two settings (in and out of the hospital). Illness severity may be more of a factor in the hospital, when severity is likely to relate to intensity of treatment and level of concern for the child’s well-being. Additionally, children with chronic physical conditions (that require frequent hospital visits) may be more familiar with the hospital setting than those with new-onset conditions, and their in-hospital behavior may reflect this familiarity (e.g., by showing less adjustment-related anxiety).
Studies investigating illness factors that predict adjustment difficulties in the home or hospital setting can help to identify high-risk groups, guide the content of prevention and intervention programs, and advance theories of how illness characteristics relate to behavioral adjustment problems.

Method
Participants
Participants consisted of 85 families of children (51 males, 34 females; mean age = 12.6 years, SD = 3.4, range 6–18; \( n = 59 \) Caucasian, 23 African-American, 1 Asian-American, 2 Other) hospitalized at a tertiary care pediatric hospital. Potential study participants were identified from admission lists to match a companion sample of inpatients referred to a consultation–liaison service for another study (Carter et al., 2003). Children referred for psychological consultation were excluded from this study to prevent over sampling of behavior problems within each illness group. Inclusion criteria were age between 6 and 18 years and availability of a parent/guardian. Families were not included in the study if the child was to be immediately discharged from the hospital or if the parent/guardian or child had insufficient time/ability to complete study instruments. Two families refused to participate in the study, stating they were uninterested. Participants had a range of primary physical conditions: cancer (\( n = 17 \)), asthma (11), traumatic injuries (14), diabetes (9), renal disorders (6), neurological disorders/spina bifida (4), gastrointestinal disorders (4), cystic fibrosis (3), infectious diseases (3), cardiac disease (1), other pulmonary disorders (5), head/spinal cord injury (2), pancreatitis (2), sickle cell (1), other blood disorders (1), autoimmune disease (1), and congenital orthopedic defect/scoliosis (1).

Illness types were coded along two parameters, based on consensus agreement of the consultation–liaison team (Carter et al., 2003): chronic versus acute (chronicity factor) and non-life-threatening versus life-threatening (severity factor). Illnesses were coded as acute if they had recent/sudden onset (accident, acute infection) or chronic if they involved recurrent/persistent symptoms or a lifelong condition (asthma, cancer, diabetes). Illnesses were coded as life-threatening if they were severe at the time of the hospitalization (severe burns) or if they involved a significant risk of mortality during or prior to early adulthood. Carter et al. (2003) provide extensive examples of illness types that fall into each category. In order to evaluate interrater reliability of the illness parameters, two coders independently rated the illness parameters of a random subsample of 28 patients as chronic-life-threatening, acute-life-threatening, chronic-non-life-threatening, or acute-non-life-threatening. Agreement between the two coders, as well as between each coder and the consultation–liaison team, on these four categories was 93% (\( \kappa = .89 \)) for all comparisons. In the entire sample, the conditions of 36 participants were categorized as chronic-life-threatening, 9 as acute-life-threatening, 20 as chronic-non-life-threatening, and 20 as acute-non-life-threatening.

Procedures
Permission was obtained from physicians to approach their hospitalized patients and caretakers regarding study participation. Families were approached during hospitalization and invited to participate in a study of children’s illness and behavior. Questionnaires about illness beliefs, adjustment, and child behavior were given to families consenting to participate. One of the primary nurses completed a rating scale about the child’s behavior during the hospitalization. Upon completion of all instruments, participants received $20.

Measures
The Child Behavior Checklist (CBCL; Achenbach, 1991) is a parent-report checklist of child behavior during the past 6 months, which has strong psychometric properties including excellent internal consistency (Achenbach, 1991). This 118-item measure yields two higher order composites: Externalizing (Aggressive Behavior and Delinquent Behavior subscales) and Internalizing (Withdrawn, Somatic Complaints, and Anxious/Depressed subscales). The Somatic Complaints subscale was not included in the Internalizing composite due to the possible confound between somatic complaints and physical illness. For the present study, CBCL Externalizing and Internalizing scores (calculated as the mean \( T \)-scores of constituent subscales) were used as measures of parent-reported child behavior during the prior 6 months (“out-of-hospital behavior”). Based on Achenbach (1991), participants receiving a \( T \)-score greater than 65 on either CBCL subscale within the higher order composite score were identified as having a clinically significant CBCL elevation.

The Pediatric Inpatient Behavior Scale (PIBS; Kronenberger et al., 1997) is a 47-item nurse-completed measure of child behaviors during hospitalization. Items are scored 0 = never, 1 = sometimes, 2 = often. Kronenberger et al. (1997) originally derived 10 PIBS subscales, of which seven were later found to have adequate internal consistency (Kronenberger, Carter, & Limbird, 1999). Four of those seven subscales (Oppositional-Noncompliant, Withdrawal, Distress, and Anxiety) capture key components of in-hospital behavior problems and have consistently
demonstrated excellent reliability (Cronbach α’s between .73 and .88) and validity in pediatric and psychiatric hospital settings (Kronenberger et al., 1997, 1999). Those subscales were selected for this study to measure in-hospital behavior problems (see Kronenberger et al., 1997, for specific PIBS items on each subscale).

To simplify analyses and allow for comparability with CBCL Internalizing and Externalizing composites, the four PIBS subscales were subjected to principal factor analysis with oblimin rotation. Eigenvalues for the four initially extracted factors were 2.16, 0.81, 0.60, and 0.43. Two factors were extracted in order to obtain dimensions consistent with the CBCL composites. This solution produced large loadings for Oppositional-Noncompliant (.48) and Withdrawal (.81) on an Externalizing factor and loadings for Distress (.67) and Anxiety (.49) on an Internalizing factor (cross-loadings on the opposite factor were all <.40). The loading of Withdrawal on the Externalizing factor is consistent with analyses by Kronenberger et al. (1999), demonstrating that PIBS Withdrawal reflects a sullen, irritable form of behavior in the hospital. PIBS Externalizing and Internalizing scores (calculated as mean raw score of the constituent subscales) were used as measures of nurse-reported child behavior problems during hospitalization (“in-hospital behavior”). Because problems in any single adjustment area are typically considered sufficient to merit intervention, participants scoring above the mean of Kronenberger et al.’s (1997) “High Intervention Need” group for one of the four PIBS subscales used in this study were defined as meeting criteria for clinically significant behavior problems.

Results

PIBS subscale scores were highly intercorrelated (r’s = .42–.49, p < .001), with the exception of more modest correlations between Distress and the PIBS Externalizing subscales (r’s = .24–.27, p < .05). Intercorrelations of the CBCL subscales were .61–.84 for subscales within each higher order composite and .38–.56 for subscales across the higher order composites (all p < .001). All correlations of PIBS subscales with CBCL subscales were <.15 (p > .10), with the exception of correlations between PIBS Withdrawal and CBCL Withdrawn (r = .30, p < .05), Aggressive (r = .21, p < .06), and Delinquency (r = .20, p < .07) subscales.

In-Hospital Behavior

To investigate relationships between illness characteristics and behavior problems, separate 2 (chronicity) × 2 (severity) ANOVAs were conducted for each of the four
dependent variables (PIBS Internalizing, PIBS Externalizing, CBCL Internalizing, and CBCL Externalizing scores). Age and sex were initially tested as covariates in these analyses but did not affect results; therefore, age and sex were dropped from further analysis. For PIBS Internalizing, the interaction effect between chronicity and severity was significant [F(1, 81) = 5.09, p < .03, partial η² = .06]. Main effects were demonstrated for chronicity [F(1, 81) = 14.12, p < .001, partial η² = .15] and severity [F(1, 81) = 11.13, p < .001, partial η² = .12]. Children with acute illnesses were rated higher on in-hospital internalizing problems than children with chronic illnesses, and children with acute illnesses scored in the clinically elevated range on Internalizing subscales at more than twice the rate of children with chronic illnesses (20.7% vs. 8.9%; Table I). Children with life-threatening illnesses were rated higher on in-hospital internalizing problems than children with non-life-threatening illnesses; 15.6% of children with life-threatening illnesses scored in the clinically elevated range, compared to 10% of children with non-life-threatening illnesses (Table I).

For PIBS Externalizing, the interaction effect between chronicity and severity was not significant [F(1, 81) = 0.17, p < .68, partial η² = .00]. A main effect was demonstrated for severity [F(1, 81) = 4.57, p < .04, partial η² = .05], but not chronicity [F(1, 81) = 0.00, p < .96, partial η² = .00]. Children with life-threatening illnesses averaged more in-hospital externalizing problems than children with non-life-threatening illnesses, although clinically elevated externalizing problem scores were rare across all illness types (Table I).
**Out-of-Hospital Behavior**

For CBCL Internalizing and Externalizing, interaction effects between chronicity and severity were not significant \( F(1, 81) = 1.78, p < .19, \) partial \( \eta^2 = .02 \) and \( F(1, 81) = 1.51, p < .23, \) partial \( \eta^2 = .02, \) respectively. For out-of-hospital internalizing behavior, a main effect was found for illness chronicity \( F(1, 81) = 4.62, p < .04, \) partial \( \eta^2 = .05, \) but not severity \( F(1, 81) = 0.49, p < .49, \) partial \( \eta^2 = .01. \) Chronically ill children had more internalizing problems than children who were subsequently hospitalized for an acute illness. Nearly 20% of children with chronic illnesses scored in clinical ranges on at least one of the CBCL Internalizing subscales, compared to 6.9% of healthy children who later became acutely ill (Table I). Results suggested a trend toward increased out-of-hospital externalizing behavior for children with chronic illnesses as compared to healthy children \( F(1, 81) = 3.76, p < .06, \) partial \( \eta^2 = .04, \) but no main effect for illness severity on externalizing behavior \( F(1, 81) = 0.15, p < .70, \) partial \( \eta^2 = .00. \)

**Discussion**

The results of this study demonstrate that the relationship between child behavior and illness characteristics is dependent on the setting in which the behavior occurs. Out-of-hospital (CBCL) Internalizing behavior was related only to illness chronicity. In-hospital (PIBS) Internalizing behavior was related in the opposite direction to illness chronicity and was also related to severity. The effect sizes for most significant comparisons were in the small-to-medium range and reflected 15–20% of children with the “at-risk” illness characteristic (e.g., acute illness for in-hospital Internalizing behavior) falling in clinically elevated ranges, compared to 6–10% of children with the nonrisk illness characteristic (Table I).

Children with more acute or life-threatening illnesses had more in-hospital behavior problems. Those with more recent diagnoses are less likely to be familiar with the hospital environment and are more likely to be exposed to unfamiliar, acutely intensive treatments. Furthermore, those with life-threatening illnesses may be more prone to concerns during hospitalization about the potential lethal nature of their illnesses. Although children with chronic (as compared to acute) illnesses had lower ratings of in-hospital behavior problems, they had higher ratings of behavior problems out of the hospital (as compared to children prior to acute illness onset). One likely explanation for this finding is that children with acute illnesses were ill for only a very brief period of time prior to hospitalization, and their prehospitalization behavior therefore reflected the absence of the illness. Hence, the comparison of acute versus chronic illness for out-of-hospital behavior was more accurately a comparison of chronic illnesses with no illness. Some prior research has also shown greater internalizing behavior out of the hospital in samples of children with brain-involved conditions, but other findings suggest no relationship between chronic illness and out-of-hospital behavior (Thompson & Gustafson, 1996).

The results of this study must be understood in the context of several methodological characteristics and limitations. First, because different respondents were used to evaluate prehospital and in-hospital behavior, it is possible that the results reflect some differences in the respondents’ perceptions of child behavior. For example, retrospective maternal ratings of child behavior at home may be affected by the current stress of the child’s hospitalization. Additionally, some children with chronic illnesses may have developed relationships with nurses during past hospitalizations, which may bias nurse-reporting of their in-hospital behavior. Second, the four illness categories used are somewhat heterogeneous. While this is an important consideration, the significant relationships found between categories and behavior ratings suggest that these illness categories reflect systematic and relevant information. However, chronicity and severity are only two of many potential illness parameters, and indices of illness severity might be much more specific if only one illness condition were studied. Thus, these results do not necessarily apply to illness characteristics (such as severity) within the same illness condition. Additionally, only nine children in the present sample had acute, life-threatening illnesses, which may have limited the power and generalizability of results from that cell. Finally, accounting for the exact amount of time since onset of symptoms may provide additional insight into how very specific illness characteristics impact child behavior and adjustment.

Nevertheless, these study results illuminate important differences in child behavior and adjustment in and out of the hospital. Factors associated with adjustment at home may not be associated with child adjustment in the hospital, and therefore research based on outpatient and home settings should be cautiously applied to acute illness and in-hospital situations. There is very little research about child behavior during pediatric hospitalization, particularly related to consultation–liaison services. Clinically, the findings of this study may have significant implications because they suggest factors that could potentially reduce behavior problems (particularly internalizing).
in the hospital setting. For example, increased familiarity (through the use of exposure, play, and education) with hospital staff and procedures may help children with acute illnesses to develop some of the same adaptation as may be present in children with more chronic exposure to the hospital environment. Additionally, addressing appraisals of threat from illness or treatment (e.g., through the use of coping skills training and cognitive–behavioral therapy) may improve adjustment in the hospital. Results of the present study highlight the need for increased attention to in-hospital behavior and inpatient consultation–liaison settings (Carter et al., 2003) to better understand factors predicting child adjustment during hospitalization, with the ultimate goal of identifying risk factors, protective factors, and targets for intervention.

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References


