A Hopelessness Model of Depressive Symptoms in Youth with Epilepsy

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Objective To test the cognitive diathesis-stress and mediational components of the theory of learned hopelessness in youth with epilepsy. Methods Seventy-seven participants ages 9–17 (35 girls, 42 boys) completed measures of depressive symptoms, hopelessness, self-efficacy for seizure management, and attitude toward epilepsy. Caregivers provided information on seizure activity. Diagnostic and treatment information was obtained via medical record review. Results Regression analyses revealed that hopelessness mediated the attitude towards epilepsy–depressive symptom relationship. While attitude toward epilepsy and self-efficacy were independent predictors of depressive symptoms, the relationship of attitudes toward epilepsy and depressive symptoms was not enhanced with low self-efficacy for seizure management. Conclusions Findings support the mediation component of the learned hopelessness theory in youth with epilepsy, suggesting the importance of interventions that assist youth in identifying epilepsy-related aspects of functioning over which they can realistically exercise control and challenging negative thoughts about situations they cannot control.

Key words depression; epilepsy; learned hopelessness.

Epilepsy affects between 0.2% and 0.6% of children (Cowan, 2002) and is associated with significant behavioral and psychiatric symptoms (Caplan et al., 2004; Rodenburg, Stams, Meiler, Aldenkamp, & Dekovic, 2005). With prevalence rates of 21–60% for psychopathology in children with seizures, symptoms are 4.8 times greater in children with epilepsy than the general population and 2.5 times greater than in children with other chronic illnesses not involving the central nervous system (CNS) (see Austin & Caplan, 2007 for review). More specifically, prevalence rates have been reported to range between 10% and 30% for clinically significant depressive symptoms and DSM diagnoses of depression (Alwash, Hussein, & Matloub, 2000; Caplan et al., 2005; Ettinger et al., 1998; Oguz, Krul, & Dirik, 2002).

The relationship among pediatric epilepsy and psychiatric symptoms appears to be a complex interaction between neurological, biological, and psychosocial factors. There is increasing support for neurological etiologies of psychopathology related to pediatric epilepsy and/or underlying CNS deficits (see Austin & Dunn, 2002 for a review). However, researchers have also demonstrated the significant contribution of seizure-related stressors to children’s psychosocial adjustment (Devinsky et al., 1999; Dunn, 2003). For example, children and adolescents must cope with stigma, loss of independence from their caregivers, side-effects of medications, academic difficulties, and fears of future seizures (MacLeod & Austin, 2003; McNelis, Musick, Austin, Dunn, & Creasy, 1998).

One of the most difficult challenges posed to children with recurrent seizures may be the noncontingency associated with epilepsy. Despite medical regimen adherence, children may continue to experience seizures, which by their nature are associated with a loss of control and uncertainty for when the next seizure will occur. The experience of seizures, associated feelings of fear and loss of control, and increased risk for depressive symptoms can be conceptualized within the framework of Abramson and colleagues’ (Abramson, Metalsky, & Alloy, 1989) learned hopelessness theory (Dunn & Austin, 1999).
Indeed, a large body of literature supports the link between perceived control, hopelessness, and depression in children (Abela, 2001; Joiner, 2000), and the learned hopelessness theory has been applied to the explanation of psychosocial adjustment in adults with epilepsy (Gramstad, Iversen, & Engelsen, 2001; Hermann, Trenerly, & Colligan, 1996). In addition, a handful of studies have shown that children’s perceptions of control and self-efficacy for seizure management as well as attitudes towards epilepsy are related to depressive symptoms (Austin & Huberty, 1993; Austin, MacLeod, Dunn, Shen, & Perkins, 2004; Caplin, Austin, Dunn, Shen, & Perkins, 2002; Dunn, Austin, & Huster, 1999).

In other words, this model provides a window for examining how epilepsy may present an environment of noncontingency in which youth develop negative attitudes towards epilepsy and a poor perceived self-efficacy for daily aspects of their disease symptoms and management, creating a sense of hopelessness and associated depressive symptoms, which would likely affect future attempts at disease management. However, no studies could be found that have provided an in-depth examination of the learned hopelessness theory, including the critical mediational component of this theory (i.e., hopelessness mediates the relationship between negative attributions, or attitude toward epilepsy, and depressive symptoms) in pediatric epilepsy.

Thus, research indeed supports the role of psychological mechanisms in depressive symptoms, and highlights the importance of a combined medical and psychosocial approach to the treatment of pediatric epilepsy. The present study was designed to examine self-efficacy for epilepsy management, attitudes toward epilepsy, and hopelessness in children with pediatric epilepsy, which could provide stronger support for a psychosocial model of depressive symptoms as well as specific prospective points of intervention for future mental health treatment programs. Consistent with the cognitive diathesis stress component of the hopelessness theory of depression, it was anticipated that self-efficacy for seizure management (proximal stressor) would moderate the relationship between attitudes towards illness (negative attributions about epilepsy) and depressive symptoms (Abramson et al., 1989). More specifically, we predicted that negative attitudes toward illness would be associated with greater depressive symptoms, only under conditions of low self-efficacy for seizure management. Further, consistent with the causal mediation component, it was hypothesized that hopelessness would mediate the effect of attitudes towards epilepsy on depressive symptoms (Abramson et al., 1989).

Methods
Participants
Children and adolescents ages 10–17 who were diagnosed with epilepsy for at least 1 year (ICD-9 345 codes) and had average or better intelligence (IQ > 85) were eligible. (IQ estimates were based on medical record review in consultation with the health care provider and were not directly assessed in this study. Because IQ parameter was one of the inclusion criteria, participants in this study are more cognitively intact than general pediatric epilepsy populations.) Participants were approached during a pediatric epilepsy clinic visit or via telephone if they did not have an upcoming visit scheduled. One hundred thirteen families were approached, and 82 agreed to participate. Of the 31 families who refused to participate, the most common reason was “not interested.”

Institutional Review Board approval was granted, and verbal informed consent and assent were obtained from each participant and his/her legal guardian. As part of the consent process, families were informed that youth would receive $10 compensation for their time. A copy of the verbal assent/consent forms were provided to the participants. Eighty-two participants were enrolled in the study; however, only 77 youth completed the study. Emotional, personal, or logistical reasons precluded five participants from completing the study.

Instruments
Youth Report
The Children’s Depression Inventory (CDI; Kovacs, 1992) is a 27-item scale designed for use with children ages 7–17 that measures depressive symptoms over the previous 2 weeks. Raw scores can be converted to T-scores, and a T-score of 66 or greater is considered clinically elevated. Further, a raw cutoff score of 16 maximizes the specificity and sensitivity (Timbremont, Braet, & Dreesen, 2004). The CDI has demonstrated adequate reliability and validity in pediatric epilepsy populations (Dunn, Austin, & Huster, 1999). In the present study, Cronbach’s coefficient α was .87. Six participants scored above the cutoff, placing them in the clinically significant range. The range of raw scores on the CDI was 0–30.

The Seizure Self Efficacy Scale for Children and Adolescents with Epilepsy (SSES-C; Caplin et al., 2002) is a 15-item scale designed to measure self-efficacy in children and adolescents related to the management of their seizures. Children respond on a scale ranging from 1 (“I’m very unsure I can do that”) to 5 (“I’m very sure I can do that”).

This study was part of a larger project and only information pertinent to the current article will be provided.
sure I can do that”), and a total score is created by summing responses. Reliability and validity estimates are adequate (Caplin et al., 2002). Published studies of the SSES-C in children indicate use with ages 9–14 (Caplin et al., 2002); however, it has also been used with children up through the ages of 17 (J. Austin, personal communication, November 17, 2005). Cronbach’s coefficient α for the present study was .85.

The Hopelessness Scale for Children (HSC; Kazdin, French, Unis, Esveldt-Dawson, & Sherick, 1983) is a 17-item self-report inventory that measures hopelessness in a true/false format. The HSC has demonstrated good reliability and validity (Kazdin et al., 1983; Kazdin, Rogers, & Colbus, 1986; Spirito, Williams, Stark, & Hart, 1988) in children and adolescents up to age 17. Cronbach’s coefficient α for the present study was .78.

The Child Attitude Towards Illness Scale (CATIS) (Austin & Huberty, 1993). The CATIS is a 13-item scale that measures positive and negative evaluations associated with having a chronic illness. Reliability and validity estimates have been acceptable (Austin & Huberty, 1993; Caplin et al., 2002; Heimlich et al., 2000). For the present study, following the guidelines of the original authors of the CATIS (Heimlich et al., 2000), the investigators adapted the CATIS to be specific to epilepsy. Additionally, following consultation with the original authors, the authors adapted the CATIS for use with older adolescents (J. Austin, personal communication, September 20, 2005). Thus, child (ages 10–12) and adolescent (ages 13–17) CATIS versions were utilized in the present study. Cronbach’s coefficient α for the present study was .84.

Seizure Severity
Following the International League Against Epilepsy classification (Ozuna et al., 1997), a caregiver report form was developed to assess age at onset of seizures and seizure frequency and severity. ICD-9 diagnostic codes and antiseizure medications were obtained from medical record abstraction.

Procedure
A trained interviewer conducted standardized telephone interviews with youth and transcribed answers onto response forms. Youth completed the CDI (Kovacs, 1992), the SSES-C (Caplin et al., 2002), the CATIS (Austin & Huberty, 1993), and the HSC (Kazdin et al., 1983). The interviewer was able to answer questions and clarify children’s responses if needed. Due to the sensitive nature of some of the questions posed to children (CDI suicidal ideation question), a protocol for handling children’s responses to these questions was utilized. More specifically, if children endorsed suicidal ideation or clinical depressive symptoms, parents were informed, and the child was referred to a mental health provider if he/she was not already receiving services. If the child was already receiving services, parents were encouraged to alert the mental health professional. No children reported active suicidal ideation with a well-developed plan that required emergency intervention.

Analyses
The main independent variable, attitude toward illness, was measured using CATIS. CATIS responses were scored 1 through 5. Coding was reversed for negatively worded items, resulting in all item scores reflecting more positive attitudes. The total items were then summed and divided by the total score, resulting in possible scores from 1 through 5. For one individual who skipped one question, the 12 answered items were averaged, and the rounded-off average was used to replace the missing item. The dependent variable, depression, was measured using CDI. CDI total raw scores were used, with higher scores indicating increasing depression severity.

Seizure self-efficacy was considered a moderator, and hopelessness was considered a mediator in the attitude toward illness–depression relationship. Self-efficacy was measured with SSES-C. All items were unidirectional and summed for a total score with a higher score indicating greater self-efficacy in seizure management. One individual failed to complete two items. Those items were replaced with an average of their other item responses to be able to obtain a total score. Hopelessness was measured with HSC. Positive items had the coding reversed for scoring and the items were summed for a total score. Higher scores indicate greater hopelessness. Other covariates considered included age, race, ethnicity, seizure type, epilepsy duration, frequency of seizures, and number of antiepileptic drugs.

All analyses were conducted using SAS version 9.1 (2003 SAS Institute Inc., Cary, NC USA). Cronbach’s coefficient α was used to test the internal consistency of the instruments used. Descriptive statistics were utilized to examine the frequencies and distributions of the individual demographic, epilepsy-related, and testing variables. The relationship of each of the covariates with the outcome variable was tested using either a Spearman correlation coefficient or the Kruskal–Wallis test, depending on whether the covariate was continuous or categorical. Only those covariates showing a significant relationship (p < .05) with the outcome were included.
in the regression model. Multivariable linear regression was used to model the relationship between the independent and dependent variables, and to test self-efficacy and hopelessness as moderator and mediator, respectively.

Results

The 77 youth who completed the CDI, CATIS, HSC, and SSSES-C were included in analyses. The demographic, epilepsy-related, and psychological variables are shown in Table 1. Age and gender was well-represented within the group, and racial frequency reflected that of South Carolina (U.S. Census Bureau, 2006). The majority of participants had partial seizures and was on one antiepileptic drug. While there were some unknowns, there was a fairly wide range of epilepsy duration, with a majority experiencing less than 12 seizures per year. None of these covariates had a significant relationship with CDI ($p > .05$), so none were included in the final model. Independent variables CATIS, HSC, and SSSES-C were all entered into the multivariable linear regression model simultaneously. A normal probability of the plot of the residuals showed only slight skewing at the ends of the data, allowing for an approximately Gaussian distribution. Plots of the residuals versus the predicted values, and the residuals against each of the other explanatory variables, showed no detectable patterns and thus no evidence of heteroscedasticity. The assumptions of linear regression were considered to be unviolated. Two possible outliers were examined. When they were removed from the analysis, the normal probability plot of the residuals straightened. There was no clinical or procedural reason to remove them, however, so they were retained in the analyses. Variance inflation factors and eigenvalues showed no evidence of multicollinearity between the independent variables. Mallows C(P) statistic showed the model with all three independent variables to be the best model.

The multivariable linear regression model with CATIS, HSC, and SSSES-C was significant ($p < .0001$). The adjusted $R^2$-square showed that 53% of the variation in the data was explained by the model. All three independent variables had statistically significant parameter estimates ($p < .05$). On the average, after adjusting for total scores on HSC and SSSES-C, the estimated average raw total CDI score is decreased by 3.04 points (95% CI $-5.10, -0.97$) for each point increase in the average CATIS score mean value. Holding constant the other covariates, the estimated average raw total CDI score is increased by 0.88 points (95% CI $0.43, 1.33$) for each point increase in the average total HSC score. And the estimated average raw total CDI score is decreased by 0.17 points (95% CI $-0.30, -0.03$) for each point increase in the average total SSSES-C score.

To test whether self-efficacy acts as a moderator of the relationship between attitude toward illness and depression, an interaction term for SSES-C and CATIS was added to the multivariable linear regression model. In order to avoid introducing multicollinearity, both the SSSES-C and the CATIS variables were first centered around the mean. The model had very similar results to the original model, and the interaction term was not statistically significant. Thus, self-efficacy did not act as a moderator in this relationship.

In order to investigate whether hopelessness mediates the effect of attitude toward illness on depression, two additional multivariable linear regression models were used. One model looked at attitude toward illness as a predictor of depression, without hopelessness in the model. After adjusting for SSSES-C, the estimated raw total

<table>
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<tr>
<th>Characteristic</th>
<th>Number (%)*</th>
<th>Mean</th>
<th>SD</th>
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<tbody>
<tr>
<td>Age group (years)</td>
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<td></td>
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</tr>
<tr>
<td>9–11</td>
<td>13 (17)</td>
<td>14.43</td>
<td>2.21</td>
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<tr>
<td>12–13</td>
<td>16 (21)</td>
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<tr>
<td>14–15</td>
<td>26 (34)</td>
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<td>16–17</td>
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<tr>
<td>Sex</td>
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<td></td>
</tr>
<tr>
<td>Male</td>
<td>35 (45)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>42 (55)</td>
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<tr>
<td>General</td>
<td>20 (26)</td>
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<tr>
<td>Partial</td>
<td>57 (74)</td>
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<tr>
<td>Duration of epilepsy</td>
<td></td>
<td>6.87</td>
<td>4.44</td>
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<tr>
<td>&lt;5 years</td>
<td>28 (36)</td>
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<tr>
<td>5–10 years</td>
<td>26 (34)</td>
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<td>11–15 years</td>
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<td>Unknown</td>
<td>8 (10)</td>
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<td>Seizure frequency</td>
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<td>&lt;12 in past year</td>
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<td>≥12 in past year</td>
<td>17 (22)</td>
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<tr>
<td>Unknown</td>
<td>15 (19)</td>
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<tr>
<td>Antiepileptic drugs</td>
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<td></td>
</tr>
<tr>
<td>One</td>
<td>58 (75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two or more</td>
<td>19 (25)</td>
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<tr>
<td>CDI (Total raw)</td>
<td>8.42</td>
<td>7.11</td>
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<tr>
<td>CATIS (Average)</td>
<td>3.14</td>
<td>0.73</td>
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<tr>
<td>SSSES-C (Total)</td>
<td>61.71</td>
<td>10.51</td>
<td></td>
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<tr>
<td>HSC (Total)</td>
<td>3.27</td>
<td>2.89</td>
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*Per cents may not equal 100 due to rounding.
CDI score was decreased by 4.61 points (95% CI −6.69, −2.53) for each point increase in the CATIS score mean value. The second model looked at attitude toward illness as a predictor of hopelessness, without depression in the model. After adjusting for SSES-C, the estimated total HSC score was decreased 1.79 points (95% CI −2.77, −0.80) for each point increase in the CATIS score mean value. The impact of attitude toward illness on depression (β = −4.6) was decreased after controlling for hopelessness (β = −3.0). Thus, hopelessness mediates the effect of attitude toward illness on depressive symptoms after adjusting for self-efficacy. Calculation of a Sobel test statistic showed this to be a significant mediation effect (p = .03).

Discussion
The present findings support an emerging body of pediatric depression literature (Abela & Sarin, 2002; Abela, 2001), which places emphasis on the role of hopelessness in predicting depressive symptoms. Specifically, multiple regression analyses revealed that hopelessness mediated the attitude towards epilepsy—depressive symptom relationship providing support for the mediational component of the learned hopelessness theory of depressive symptoms (Abramson et al., 1989) in youth with epilepsy. Negative attitude toward epilepsy was associated with increased depressive symptoms through the pathway of hopelessness; therefore, hopelessness partially accounts for the association between attitude toward epilepsy and depressive symptoms. In other words, hopelessness may be a mechanism by which attitude toward epilepsy affects depressive symptoms.

Conversely, the cognitive-diathesis stress component of this theory was not supported. While attitude toward epilepsy and self-efficacy for seizure management were independent predictors of depressive symptoms, the relationship of attitudes toward epilepsy and depressive symptoms was not enhanced under conditions of low self-efficacy for seizure management as hypothesized. This finding was surprising given strong support in the literature for the enhanced impact of negative attributions (e.g., attitudes) under conditions of low perceived control or self-efficacy over illness symptoms and management (Mullins, Chaney, Pace, and Hartman, 1997; Wagner, Chaney, Hommel, & Felts, 2007). In the current study, specific attitudes regarding epilepsy and not general attitudes were measured as in previous studies (Wagner et al., 2007) with the assumption that disease-specific attitudes would be more relevant as epilepsy provides pervasive daily challenges for youth. However, due to the modest sample size, power may have been inadequate to detect a significant effect.

Even though a majority of youth with epilepsy, including those in the present sample, do not exhibit clinical depression (Rodenburg et al., 2005), the variable course of seizure activity and its impact on the child and family may increase a child’s vulnerability to a hopelessness response. Epilepsy is a chronic disorder with acute exacerbations of seizures, often in spite of treatment adherence. Functional outcomes of this vulnerability could include poor regimen adherence, mood symptoms, withdrawal, etc., due to the perceived noncontingency of behaviors and outcomes (Caplin et al., 2002; Dunn et al., 1999). Indeed, mild symptoms of depression and associated negative cognitive appraisals can interfere with functioning in children with epilepsy (Caplin et al., 2002). Aicardi (1999) posits that epilepsy can be likened to an iceberg, of which the seizures form only the visible part. The more expansive, “hidden” part is comprised of a complex picture, including subtle behavior, mood, and social factors, which are of central significance in the overall conceptualization of epilepsy.

The findings of this study are qualified by several limitations, including a relatively modest sample size with use of multiple variables in the primary analyses, which may have contributed to moderate power estimates, and thus additional relationships between the predictor and outcome variables may have been missed. The exclusive use of self-report inventories may have resulted in significant correlations due to shared method variance and not to the predicted associations between the variables under study. Interpretation and generalization of these results remain limited because of the inclusion of a modest, self-selected sample of individuals.

Unfortunately, the procedure for data collection did not allow for examination of potential differences between those children with epilepsy who participated in the study and those who did not. Because a measure of epilepsy-specific hopelessness was not available, a well-established general measure was used; however, given that all other cognitive appraisal variables were examined within an epilepsy-specific context, a measure of hopelessness in the specific context of epilepsy would have been more consistent. Finally, it should be noted that children’s ratings of perceived self-efficacy may have been subject to recall bias due to their depressive symptoms, and the cross-sectional nature of this study did not allow for determining the causal direction of relationships between variables.
In spite of the limitations of this study, the finding that hopelessness mediates the impact of attitudes toward epilepsy on depressive symptoms has implications for clinical practice. More specifically, results suggest that hopeless thoughts and behaviors are an important point of psychological intervention. Similarly, targeting self-efficacy for seizure management would address negative attitudes in children with epilepsy (Austin, Dunn, Perkins, & Shen, 2006). Cognitive vulnerabilities, such as hopelessness, negative attitudes, and self-efficacy in children may arise much earlier (age 8) than we thought (Abela & Taylor, 2003; Hankin, 2006). These cognitive vulnerabilities interact with negative events to predict increases in depressive symptoms, and implementing cognitive behavioral therapy (CBT) and prevention programs to reduce depression before these negative thinking patterns become stable in later adolescence would be beneficial (Hankin, 2006). There is one known study in which Martinovic, Simonovic, and Djokic (2006) examined the effectiveness of a group CBT intervention to prevent depression in adolescents with epilepsy. They found significant improvements for youth randomized to CBT compared to those receiving treatment as usual.

Clinical interventions should focus on helping children identify illness-related aspects of functioning over which they can realistically exercise control and challenge negative thoughts about situations they cannot control (e.g., having epilepsy; Weisz, Southam-Gerow, Gordin, & Connor-Smith, 2003). Parents should also be educated on ways to help their children develop realistic expectations about their illness and on how to promote age-appropriate levels of autonomy. Unfortunately, to date preliminary studies have shown that at best, only about one-third of children with epilepsy and comorbid psychopathology receive mental health care (Caplan et al., 2004; Ott et al., 2003). Thus, there is a critical need for pediatric psychologists to become integrally involved in the care of children with epilepsy (Wagner & Smith, 2007).

In closing, the American Epilepsy Society, the Centers for Disease Control and Prevention, and the Epilepsy Foundation (EF) have included in their priority recommendations the development of evidence-based standards of mental health care for children with epilepsy, and pediatric psychologists should be involved in the development, dissemination, and application of such standards (Austin, Carr, & Hermann, 2006).

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