

## FULL-LENGTH ORIGINAL RESEARCH

# Depression and mental health help-seeking behaviors in a predominantly African American population of children and adolescents with epilepsy

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### SUMMARY

**Purpose:** To determine whether previously undetected symptoms of depression and psychiatric help-seeking behaviors are associated with demographic or epilepsy-related variables in a predominantly African American sample of pediatric epilepsy patients.

**Methods:** Ninety-six serially recruited parent-child dyads (55% African American, 39% Caucasian) completed the Short Mood and Feelings Questionnaire (SMFQ). Regression analyses determined whether depressive symptoms measured by the SMFQ were associated with demographic (age, gender, and ethnic background) or epilepsy-related variables (age of seizure onset, duration of epilepsy, seizure type, time since last seizure, and number of antiepileptic drugs). Dyads with positive SMFQ screens (score  $\geq 12$ ) received information about depression and were advised to seek mental health services. Six months later, parents completed follow-up interviews to ascertain mental health service utilization.

**Results:** Thirty-five participants (36.5%) screened positive for probable depression. Greater number

of antiepileptic drugs was the only predictor variable independently associated with greater (worse) depression scores ( $p = 0.005$ ). At 6-month follow-up, 12 patients (36.4%) had received mental health care, whereas 21 guardians (63.6%) denied depressive symptoms in their child and never sought mental health services (two dyads lost to follow-up). Logistic regression analyses found no associations between demographic, epilepsy-related, or depressive variables and psychiatric help-seeking.

**Discussion:** This study indicates the necessity and feasibility of screening for previously undetected symptoms of depression in pediatric epilepsy clinics serving diverse populations, particularly among patients receiving antiepileptic polytherapy. Additional research on the correlates of depressive symptoms and determinants of psychiatric help-seeking is needed to develop evidence-based interventions for youths with epilepsy and symptoms of depression.

**KEY WORDS:** Pediatric epilepsy, Antiepileptic medications, Mental health, Treatment linkage, Evidence-based practice.

Many children and adolescents with epilepsy experience comorbid emotional and behavioral disorders (Austin et al., 2002; Davies et al., 2003; Baker et al., 2005). Among these, depression represents an especially

prominent concern. Epidemiologic studies (Rutter et al., 1970; Hedderick & Buchhalter, 2003; Hesdorffer et al., 2006) and clinic-based surveys (Ettinger et al., 1998; Dunn et al., 1999; Baki et al., 2004; Thome-Souza et al., 2004; Adewuya & Ola, 2005; Jones et al., 2007; Thome-Souza et al., 2007; Turkey et al., 2008) have shown that 16–38% of youths with epilepsy screen positive for depression. These rates of depression are higher than those found among healthy children and adolescents (2–17%) (Garrison et al., 1992; Lewinsohn et al., 1993; Hankin et al., 1998; Costello et al., 2006; The

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NSDUH Report, 2008) and children with other chronic conditions (2–18%) (Dunitz et al., 1991; Goodwin et al., 2005). The combined burden of depression and pediatric epilepsy is associated with difficult family relationships (Dunn et al., 1999; Alwash et al., 2000), social anxiety (Baker et al., 2005), and suicidal ideation or intent (Brent, 1986; Ettinger et al., 1998; Caplan et al., 2005; Hesdorffer et al., 2006). Such negative outcomes highlight the need for evidence-based standards of care that promote the identification and treatment of depression among children and adolescents with epilepsy (Epilepsy Foundation, 2003).

A growing body of research has addressed this issue by investigating potential predictors of depression in pediatric epilepsy. Several demographic variables have been examined, but the role of ethnic background in depressive symptoms among children with epilepsy remains under-researched. With a few notable exceptions (Ott et al., 2001; Caplan et al., 2005; Wagner & Smith, 2007), studies of depression in pediatric epilepsy from the United States and Europe enrolled either largely Caucasian subjects or did not report subject ethnicity (Ettinger et al., 1998; Dunn et al., 1999; Hesdorffer et al., 2006; Jones et al., 2007; Turky et al., 2008). Studies from Jordan, Turkey, Brazil, and Nigeria examined culturally homogenous groups as well (Alwash et al., 2000; Oguz et al., 2002; Thome-Souza et al., 2004; Adewuya & Ola, 2005). To our knowledge, no studies of depression in children with epilepsy have recruited a predominately African American sample.

Other demographic variables have received more attention, but results are mixed among children with both epilepsy and depression. Depression is found in pediatric epilepsy across a wide age range, and many studies have shown no correlation between age and depression (Ettinger et al., 1998; Dunn et al., 1999; Baki et al., 2004; Adewuya & Ola, 2005; Jones et al., 2007; Turky et al., 2008). Thome-Souza et al. (2004) found psychiatric disorders in children with epilepsy between the ages of 4 and 18 years, with depressive disorders more common among adolescents. Similarly, when studying children with epilepsy and depression or anxiety, Caplan et al. (2005) found that those with depression tended to be older than those with anxiety. The role of gender is similarly unclear. Some studies have found no association between gender and depression in pediatric epilepsy (Ettinger et al., 1998; Dunn et al., 1999; Baki et al., 2004; Thome-Souza et al., 2004; Adewuya & Ola, 2005; Jones et al., 2007), whereas others have found that female gender can be predictive of depression (Turky et al., 2008).

Considerable research has focused on the link between epilepsy-related variables and depression in children and adolescents with epilepsy. When comparing children with focal epilepsy to those with generalized epilepsy, Thome-Souza et al. (2004) found focal epilepsy to be a predictor of psychiatric disorder. When comparing affective and

anxiety disorders among children with epilepsy, Caplan et al. (2005) found a higher rate of anxiety disorders among subjects with childhood absence epilepsy, whereas subjects with complex partial seizures had a higher rate of depression or comorbid anxiety and depression. Others found no relationship between psychopathology and seizure type among children with epilepsy (Ettinger et al., 1998; Ott et al., 2001; Baki et al., 2004; Adewuya & Ola, 2005; Hesdorffer et al., 2006; Jones et al., 2007). Some studies have found that depression is more common among children with uncontrolled seizures (Oguz et al., 2002; Adewuya & Ola, 2005), whereas others have not (Ettinger et al., 1998; Dunn et al., 1999; Alwash et al., 2000; Baki et al., 2004; Jones et al., 2007; Turky et al., 2008). The link between numbers of antiepileptic drugs (AEDs) prescribed and symptoms of depression in children with epilepsy has also been studied. Some found that children on AED polytherapy were at greater risk for depression than those who were on monotherapy or not taking medication (Oguz et al., 2002; Adewuya & Ola, 2005), whereas others found no such relationship (Ettinger et al., 1998; Thome-Souza et al., 2004; Jones et al., 2007; Turky et al., 2008). Additional research is needed to clarify the interaction between seizure variables and depression in children with epilepsy.

Although depression is a comorbid condition commonly found in youth with epilepsy, mental health care utilization in this population is low. Less than 35% of children with both epilepsy and mental illness receive mental health care (Ettinger et al., 1998; Ott et al., 2001; Caplan et al., 2005). Thome-Souza et al. (2004) found a 4.35-year lapse between depression symptom onset and diagnosis in children and adolescents with epilepsy. Wagner and Smith (2007) offered on-site psychological services for children with epilepsy referred for emotional or behavioral problems; of those referred, only one-third accessed services. Studies from the general population suggest that mental health care utilization is especially low among children of minority groups (Wu et al., 2001; Zimmerman, 2005; Burgess et al., 2008). Previous authors have suggested that lack of parental knowledge, minimization of symptoms, and inadequate resources widen the gap between mental health care and youth with epilepsy (Ott et al., 2003; Smith et al., 2007; Wagner & Smith, 2007), but these barriers have not yet been thoroughly studied in this population. Additional research is needed to guide interventions designed to promote effective mental health referral and establish treatment linkage for youth with epilepsy and depression.

Accordingly, the goals of the present study were twofold. First, we sought to assess the relationships between demographic factors, epilepsy variables, and the severity of depressive symptoms in an ethnically diverse population of children and adolescents with epilepsy, with a substantial proportion of African American participants.

Second, we examined the relationship between these same factors and subsequent help-seeking behaviors among patients with significant depressive symptomatology.

## METHODS

### Subjects

Eligible patients and their parents/guardians were recruited serially from an outpatient neurology clinic at Children's Hospital of Michigan in Detroit. Inclusion criteria were: (1) patient age from 6–17 years, (2) clinical diagnosis of epilepsy based on International League Against Epilepsy (ILAE) criteria (Commission, 1993), (3) presence of patient's parent or legal guardian, and (4) informed consent/assent from both patient and parent. Patients were considered ineligible and excluded from the present study if they had received mental health services

for depression during the previous 5 years, or if the clinician or parent stated the child was unable to answer screening questions. All procedures were approved by the institutional review board at Wayne State University.

Of the 113 patients invited to take part in the study, three families chose not to participate. Eleven dyads were excluded because the child had already received mental health services for depression. Three patients with a presumptive diagnosis of epilepsy were later determined to have nonepileptic spells and were excluded from analysis. Therefore, 96 parent–child dyads satisfied the criteria and participated in the study. The age of child participants ranged from 6–17 years (mean: 11.3 years; SD: 3.5 years); 56% of the child participants were female, 55% were African American, 39% were Caucasian, and the remaining 6% were Latino, Arab American, or Asian American (see Table 1).

**Table 1. Demographic profiles, epilepsy variables, and positive SMFQ-T screens**

|                            | All participants | Participants screening positive for depression (SMFQ-T $\geq$ 12) | Participants screening negative for depression (SMFQ-T < 12) |
|----------------------------|------------------|---|--|
| Total                      | n = 96           | n = 35 (36.5%)  | n = 61 (63.5%)   |
| Age (years)                | 11.3 (SD = 3.5)  | 11.6 (SD = 3.3)   | 11.1 (SD = 3.6)  |
| 6–7                        | 17 (17.7%)       | 4 (11.4%)   | 13 (21.3%)   |
| 8–9                        | 19 (19.8%)       | 7 (20.0%)   | 12 (19.7%)   |
| 10–11                      | 17 (17.7%)       | 8 (22.9%)   | 9 (14.8%)  |
| 12–13                      | 13 (13.5%)       | 5 (14.3%)   | 8 (13.1%)  |
| 14–15                      | 17 (17.7%)       | 7 (20.0%)   | 10 (16.4%)   |
| 16–17                      | 13 (13.5%)       | 4 (11.4%)   | 9 (14.8%)  |
| Gender                     |                  |   |  |
| Female                     | 54 (56.3%)       | 19 (54.3%)  | 35 (57.4%)   |
| Male                       | 42 (43.8%)       | 16 (45.7%)  | 26 (42.6%)   |
| Race                       |                  |   |  |
| African American           | 53 (55.2%)       | 18 (51.4%)  | 35 (57.4%)   |
| Caucasian                  | 37 (38.5%)       | 14 (40.0%)  | 23 (37.7%)   |
| Other                      | 6 (6.3%)         | 3 (8.6%)  | 3 (4.9%)   |
| Age at onset (years)       | 6.9 (SD = 4.3)   | 6.9 (SD = 4.2)  | 6.9 (SD = 4.4)   |
| 0–5                        | 42 (43.8%)       | 15 (42.9%)  | 27 (44.3%)   |
| 6–11                       | 35 (36.5%)       | 14 (40.0%)  | 21 (34.4%)   |
| 12–17                      | 19 (19.8%)       | 6 (17.1%)   | 13 (21.3%)   |
| Epilepsy duration (months) | 51.5 (SD = 41.5) | 55.9 (SD = 41.1)  | 48.9 (SD = 41.8)   |
| $\leq$ 12                  | 20 (20.8%)       | 4 (11.4%)   | 16 (26.2%)   |
| 13–60                      | 48 (50.0%)       | 21 (60.0%)  | 27 (44.3%)   |
| >60                        | 28 (29.2%)       | 10 (28.6%)  | 18 (29.5%)   |
| Number of AEDs             |                  |   |  |
| 0                          | 12 (12.5%)       | 3 (8.6%)  | 9 (14.8%)  |
| 1                          | 63 (65.6%)       | 19 (54.3%)  | 44 (72.1%)   |
| 2                          | 18 (18.8%)       | 10 (28.6%)  | 8 (13.1%)  |
| 3                          | 3 (3.1%)         | 3 (8.6%)  | 0  |
| Last seizure (months)      | 8.5 (SD = 14.2)  | 6.5 (SD = 10.5)   | 9.7 (SD = 15.8)  |
| $\leq$ 1 week              | 26 (27.1%)       | 12 (34.3%)  | 14 (23.0%)   |
| 8 days–4 months            | 29 (30.2%)       | 11 (31.4%)  | 18 (29.5%)   |
| >4 months                  | 41 (42.7%)       | 12 (34.3%)  | 29 (47.5%)   |
| Seizure type               |                  |   |  |
| Generalized                | 31 (32.3%)       | 8 (22.9%)   | 23 (37.7%)   |
| Focal                      | 65 (67.7%)       | 27 (77.1%)  | 38 (62.3%)   |

AEDs, antiepileptic drugs.

### Measurement of depressive symptoms

Symptoms of depression were measured with the Short Mood and Feelings Questionnaire (SMFQ), a self-report instrument designed to screen for depression in children and adolescents (aged 6–17 years) seen in nonpsychiatric clinic settings (Angold et al., 1995). Using the 13-item SMFQ-C, children rated the extent to which they had experienced depressive symptoms in the previous 2 weeks, whereas parents separately reported the child's recent symptoms in a parallel version (SMFQ-P). Studies have shown that the SMFQ is a unidimensional measure that serves as an adequate screening tool for depression among young children (Sharp et al., 2006) and adolescents (Katon et al., 2008). In the original development study, SMFQ scores were compared to those found with the Children's Depression Inventory (CDI) and the Diagnostic Interview Schedule for Children (DISC) in a group of 173 children and adolescents (ages 6–17) with chronic illness. Both the child and parent components demonstrated high internal reliability, with  $\alpha = 0.85$  for the SMFQ-C and  $\alpha = 0.87$  for the SMFQ-P. Using DISC depression diagnoses as a criterion, an SMFQ-T (combined parent and child scores) cutoff of 12 demonstrated a sensitivity of 70%, specificity of 85%, positive predictive value of 80%, and negative predictive value of 68% for depression, and it performed as well as the CDI in discriminating between children with and children without a DISC diagnosis of depression (Angold et al., 1995). Other studies have supported the validity and utility of the SMFQ in screening for depression among similar populations (Kent et al., 1997; Sharp et al., 2006).

In the current study, as in the original SMFQ validation study, a member of the research team orally administered the questionnaire in a private room to children who requested assistance. Thirty-one children (32%) completed the questionnaire with assistance (verbally). Twenty-three (74%) of these children were between the ages of 6 and 8, and eight (26%) were between the ages of 9 and 13. The remainder of the study subjects answered the questionnaire independently (written form).

All participants were assured that their responses would remain confidential. Parent-child dyads with a combined score below 12 were told that their scores were not indicative of clinical depression. Symptoms of childhood depression were reviewed and parents received a packet of additional information about depression in children and adolescents. With an SMFQ-T score of 12 or above, children were considered to screen positive for depression, and their parents were advised that the child or adolescent was experiencing symptoms commonly found in pediatric depression. After a detailed discussion of depression and treatment, families were urged to seek mental health services for further evaluation. These families received informational handouts from the American Academy of Child Psychiatry, a list of available print and Internet resources,

and an invitation to attend an all-day seminar on depression in children with epilepsy sponsored by the Michigan Epilepsy Foundation. They also received a list of local outpatient psychiatric and psychology resources with contact information.

### Measurement of epilepsy variables

Subsequent to participant enrollment, epilepsy variables were obtained via chart review by the research nurse specialist. Information recorded included the participant's age at seizure onset, length of time since seizure diagnosis (duration), seizure type (as documented by a certified pediatric neurologist), time since most recent seizure, and current antiepileptic medications.

### Measurement of help-seeking behaviors

As part of the initial consent process, all participants were informed that dyads screening positive for symptoms of depression would receive a 6-month follow-up phone call to discuss mental health service utilization. At the beginning of the follow-up interview, parents were asked "Did you obtain any mental health services for your child?" Those who replied "yes" were asked to "describe the type of services your child received." They were also asked if their child had been given a mental health diagnosis, the type of diagnosis, and who made the diagnosis. Those who replied "no" were asked to "give the main reason your child did not receive mental health services." In accordance with the exploratory nature of this study, follow-up questions were open-ended in order to allow participants to freely describe their experiences.

### Statistical analysis

#### *Prediction of the severity of depressive symptoms*

Univariate and multiple linear regression models were used to determine whether the severity of depressive symptoms was associated with patient demographic profiles and epilepsy variables. In these regression models, the SMFQ-T score was considered the outcome measure and was treated as a continuous variable. Predictors included: age in years at time of interview, gender, race (African American, Caucasian, or other), age in years at seizure onset, duration in months of epilepsy, time in months since last seizure, diagnosis of generalized or focal seizures according to seizure semiology and EEG findings, and number of current antiepileptic medications (range: 0–3).

#### *Prediction of subsequent help-seeking behaviors*

Using a univariate logistic regression analysis, we explored whether SMFQ scores (total, parent, child), demographic profiles, and epilepsy variables were associated with subsequent utilization of mental health services among the participants with positive SMFQ screens.

**Table 2. Demographic profiles, epilepsy variables, SMFQ scores, and subsequent help-seeking behaviors**

|                            | All participants with positive screens | Participants with positive screens who sought mental health services | Participants with positive screens who did not seek mental health services |
|----------------------------|--|--|--|
| Total                      | n = 35 <sup>a</sup>                    | n = 12 (36.4%)   | n = 21 (63.6%)   |
| Age (years)                | 11.6 (SD = 3.3)                        | 11.6 (SD = 3.9)  | 11.6 (SD = 3.1)  |
| Gender                     |  |  |  |
| Female                     | 19 (54.3%)                             | 6 (50.0%)  | 12 (57.1%)   |
| Male                       | 16 (45.7%)                             | 6 (50.0%)  | 9 (42.9%)  |
| Race                       |  |  |  |
| African American           | 18 (51.4%)                             | 7 (58.3%)  | 10 (46.6%)   |
| Caucasian                  | 14 (40.0%)                             | 4 (33.3%)  | 10 (46.6%)   |
| Other                      | 3 (8.6%)                               | 1 (8.3%)   | 1 (4.8%)   |
| Age at onset (years)       | 6.9 (SD = 4.2)                         | 5.8 (SD = 4.9)   | 7.4 (SD = 3.9)   |
| Epilepsy duration (months) | 55.9 (SD = 41.1)                       | 69.7 (SD = 48.1)   | 50.1 (SD = 37.3)   |
| Number of AEDs             |  |  |  |
| 0                          | 3 (8.6%)                               | 2 (16.7%)  | 1 (4.8%)   |
| 1                          | 19 (54.3%)                             | 6 (50.0%)  | 12 (57.1%)   |
| 2                          | 10 (28.6%)                             | 2 (16.7%)  | 7 (33.3%)  |
| 3                          | 3 (8.6%)                               | 2 (16.7%)  | 1 (4.8%)   |
| Last seizure (months)      | 6.5 (SD = 10.5)                        | 8.2 (SD = 14.6)  | 6.1 (SD = 8.0)   |
| ≤1 week                    | 12 (34.3%)                             | 5 (41.7%)  | 5 (23.8%)  |
| >1 week–4 months           | 11 (31.4%)                             | 3 (25.0%)  | 8 (38.1%)  |
| >4 months                  | 12 (34.3%)                             | 4 (33.3%)  | 8 (38.1%)  |
| Seizure type               |  |  |  |
| Generalized                | 8 (22.9%)                              | 4 (33.3%)  | 3 (14.3%)  |
| Focal                      | 27 (77.1%)                             | 8 (66.7%)  | 18 (85.7%)   |
| SMFQ-C                     | 10.4 (SD = 5.3)                        | 11.7 (SD = 5.6)  | 9.6 (SD = 5.3)   |
| SMFQ-P                     | 8.8 (SD = 5.5)                         | 10.4 (SD = 6.5)  | 8.2 (SD = 4.9)   |
| SMFQ-T                     | 19.2 (SD = 7.8)                        | 22.1 (SD = 6.4)  | 17.8 (SD = 8.4)  |

AEDs, antiepileptic drugs; SMFQ, Short Mood and Feelings Questionnaire; C, Child; P, Parent; T, Total score.  
<sup>a</sup>This column includes data from the two dyads with positive screens that were lost to follow-up.

A multivariate logistic regression analysis was not tenable due to the limited sample size. Utilization of mental health services was considered the outcome measure, and predictors included demographic variables, epilepsy variables, SMFQ-T score, SMFQ-C subscore, and SMFQ-P subscore (Table 2). At this point, combined parent and child SMFQ scores (SMFQ-T) were considered, as well as separate parent scores (SMFQ-P) and child scores (SMFQ-C), in order to examine whether parent rating of the child's depressive symptoms was related to subsequent help-seeking behaviors.

All statistical analyses were performed using the computer software SPSS 11.5 (SPSS Inc., Chicago, IL, U.S.A.).

## RESULTS

### Description of epilepsy variables

The mean age of seizure onset was 6.9 years [standard deviation (SD): 4.3 years; range: infancy to 17 years]. The mean duration of epilepsy was 51.5 months (SD: 41.5 months; range: 1 month to 17 years). Seizure control

varied, with a mean of 8.5 months since last seizure (SD: 14.2 months; range: 1 day to 7 years). Thirty-two percent of the subjects were diagnosed with generalized epilepsy, 68% had focal epilepsy, 22% were on antiepileptic polytherapy, 65% were on monotherapy, and 13% were not taking antiepileptic medications (see Table 1).

### Proportion of youth with epilepsy and positive SMFQ screens

Thirty-five (36%) of participating parent-child dyads had a score of 12 or greater on the SMFQ-T and were considered to screen positive for symptoms of depression in the child. In reference to SMFQ-T scores, there was no statistically significant difference between those who answered the questionnaire orally and those who used the written form.

### Relationship between demographic profiles, epilepsy variables, and severity of depressive symptoms

Univariate linear regression analyses revealed that greater number of antiepileptic medications, longer duration of epilepsy, and diagnosis of focal seizures were

associated with greater SMFQ-T scores (i.e., more severe depressive symptoms) ( $p < 0.05$ ; see Table S1 on the website). Neither the patient's age, gender, race, age at seizure onset, nor length of time since last seizure was significantly associated with SMFQ-T scores.

The multiple linear regression model revealed that the number of antiepileptic drugs was the only predictor variable independently associated with a greater SMFQ-T score ( $p = 0.005$ ; regression slope = 3.91; see Table S2 on the website). A regression slope of 3.91 indicated that each addition of an AED was associated with a 3.91 point greater SMFQ-T score.

Of those taking a single AED, 45% were on oxcarbazepine, 26% valproic acid, 11% levetiracetam, 6% ethosuximide, and 5% phenytoin. The remaining 7% were taking carbamazepine, zonisamide, or lamotrigine. Of those taking two medications, combinations of oxcarbazepine (50%), valproic acid (43%), lamotrigine (33%), levetiracetam (22%), zonisamide (17%), and topiramate (17%) were prescribed. Carbamazepine, ethosuximide, Clobazam, vigabatrin, and clorazepate were also being taken, each by a single patient in combination with another medication. Of those taking three medications, combinations of oxcarbazepine, valproic acid, zonisamide, phenytoin, carbamazepine, and lamotrigine were prescribed. Because of sample size and number of medications given in a variety of combinations, we were unable to analyze the relationship between specific medications and SMFQ scores.

### Mental health-seeking behaviors

Of the 35 parent-child dyads that screened positive for symptoms of depression, two were lost to follow-up and did not complete this portion of the study. Of the remaining 33 families contacted by phone 6 months after screening, 12 (36%) had obtained mental health services for their child. Univariate logistic regression analyses failed to find a significant association between demographic factors, epilepsy variables, SMFQ-T scores, SMFQ-C and SMFQ-P subscores, and mental health help-seeking behaviors (see Table 2; see also Table S3 on the website).

Of the 12 children who received mental health services, two 6-year-old boys were subsequently diagnosed with attention deficit hyperactivity disorder (ADHD) and were receiving ongoing treatment. Three 8–13-year-olds were being followed by a school counselor for academic or behavioral issues. Four others aged 7–17 years were being followed by a psychiatrist for treatment of depression; of these, two had been admitted to a psychiatric inpatient facility for treatment of suicidal ideation. One additional child was being treated for self-injury, one child was diagnosed with anxiety, and one family stated the child was receiving psychiatric treatment, but preferred not to disclose a diagnosis.

The remaining 21 families did not obtain, nor did they attempt to obtain, mental health services for their children.

When asked for the main reason mental health services were not sought, all 21 parents stated, "s/he does not have depression, s/he is just a moody teenager, s/he was just upset that day, s/he is fine" or "depression is not a problem for him/her." Two parents stated that they were monitoring their child's mood, but did not think that a formal evaluation or intervention was warranted. Without exception, denial of clinical depression was named as the reason for not seeking treatment, and no other barriers to mental health services were mentioned. In addition, no families in this study attended the seminar on depression in pediatric epilepsy.

## DISCUSSION

The purpose of this study was to identify factors related to previously undetected symptoms of depression and mental health help-seeking behaviors in an ethnically diverse population of children and adolescents with epilepsy. With the exception of the number of AEDs, no epilepsy-related or demographic variables examined were independent predictors of previously undetected symptoms of depression. Neither demographic nor epilepsy-related variables predicted mental health help-seeking behaviors in this predominately African American sample.

### Demographics

Using SMFQ-T scores, 36% of the children and adolescents who entered our study screened positive for previously undetected symptoms of depression. Similar results have been reported in other studies surveying children and adolescents with epilepsy (Ettinger et al., 1998; Dunn et al., 1999; Alwash et al., 2000; Oguz et al., 2002; Thome-Souza et al., 2004; Adewuya & Ola, 2005; Caplan et al., 2005; Jones et al., 2007; Turkey et al., 2008). Consistent with previous studies (Ettinger et al., 1998; Baki et al., 2004; Adewuya & Ola, 2005; Jones et al., 2007), no significant association was found between age or gender and symptoms of depression. The present study is unique in that it was characterized by a predominantly African American and racially diverse sample. Our data indicate that African American and Caucasian patients attending tertiary pediatric epilepsy clinics experience previously undetected symptoms of depression at similarly high rates, and screening for depression among this population is equally important across age, gender, and ethnic background.

### Epilepsy-related variables

Consistent with previous findings (Ettinger et al., 1998; Dunn et al., 1999; Ott et al., 2001; Baki et al., 2004; Jones et al., 2007), the present data demonstrated no association between age of seizure onset, duration of epilepsy, seizure type, time since last seizure, and symptoms of depression. Greater number of AEDs was the only variable indepen-

dently predictive of more severe symptoms of depression. This correlation persisted even after controlling for age at seizure onset, duration of epilepsy, seizure type, and time since last seizure. This finding corresponds to studies examining medication subgroups sufficiently large for meaningful analysis (Oguz et al., 2002; Adewuya & Ola, 2005) and adds to the growing body of evidence, suggesting that the number of AEDs prescribed is an important independent risk factor for previously undetected symptoms of depression in pediatric epilepsy. Although further research in this area is necessary, these collective findings indicate that youths receiving AED polytherapy may be an important subgroup for regular depression screening and intervention. With changes in medication, outcomes should be evaluated both in terms of seizure control and mood.

It is difficult to define the relationship between antiepileptic drugs and symptoms of depression in children and adolescents with epilepsy. Valproic acid may stabilize mood in children at risk for bipolar disorder (Pavuluri et al., 2005; Saxena et al., 2006), and phenytoin, (Mishory et al., 2003, carbamazepine, lamotrigine (Mokhber et al., 2008), and zonisamide (Ghaemi, et al., 2006) have demonstrated mood-stabilizing effects on adults with psychopathology. On the other hand, levetiracetam and vigabatrin can exacerbate behavioral problems in vulnerable individuals (Levinson & Devinsky, 1999; Ben-Menachem & Gilland, 2003), and cognitive changes have been described in individuals taking topiramate (Gomer et al., 2007; Bootsma et al., 2008). In addition, AED side effects can mimic symptoms of depression such as psychomotor retardation, sleep disturbance, change in appetite, and difficulty with concentration (see Besag, 2001; Glauser, 2004; Mula & Sander, 2007 for reviews). When given in combination, it is particularly difficult to interpret the relative influence these medications have on symptoms of depression. Future research is needed to disentangle this complex problem as it relates to children with epilepsy and symptoms of depression.

### Help-seeking behaviors

In the current study, 12 (36%) of the 33 parent-child dyads advised to obtain mental health services did indeed seek and obtain mental health care for their child such as school counseling, private therapy, or psychiatric care. The remaining 21 parents stated that their child's symptoms did not warrant formal mental health intervention. The decision to seek psychiatric care was not linked to any demographic variables, epilepsy-related variables, parent ratings of child depressive symptoms, or severity of depressive symptoms at the time of screening. Specifically, there was no association between ethnic background (African American, Caucasian, other) and mental health seeking behaviors among these families caring for children and adolescents with epilepsy.

Previous studies in the general population have indicated that African American children and adolescents are less likely than Caucasians to receive mental health services (Cunningham & Freiman, 1996; Wu et al., 2001; Sen, 2004; Zimmerman, 2005), and that female children and adolescents are more likely than their male peers to seek services for emotional problems (Rickwood & Braithwaite, 1994; Sen, 2004). In the present study, help-seeking behaviors (or lack thereof) remained consistent across gender and ethnic background. African Americans were just as likely to seek mental health care services for their child or adolescent with epilepsy as Caucasians, and male subjects were just as likely as female subjects to receive mental health care services. Such findings suggest that mental health help-seeking behaviors among this group may differ from those found in the general population. Perhaps established connection with specialty providers, the added burden of a possible second diagnosis, or fear of compounded stigma, differentiate this group from the general population. Further research specific to pediatric epilepsy is needed to identify factors influencing a family's decision to seek mental health services for diverse populations of children and adolescents with epilepsy.

Although many studies have proposed depression screening, education, and referral as a standard of care for children with epilepsy (Dunn et al., 1999; Baki et al., 2004; Adewuya & Ola, 2005), little is known about subsequent behaviors and outcomes. To our knowledge, this is the first study of psychiatric help-seeking in pediatric epilepsy subsequent to depression screening, targeted education, and follow-up recommendations. This intervention mobilized some families to seek mental health services but was not sufficient for the majority of cases. Among those who did not obtain mental health care for their child, none expressed frustration with barriers to services. Rather, these parents uniformly discounted screening results and dismissed follow-up recommendations. Douma et al. (2006) reported similar findings among parents of children with intellectual disabilities and psychopathology, and studies from the general population have found that parental evaluation of a child's behavior and perception of mental health care services were correlated with subsequent treatment utilization (McMiller & Weisz, 1996; Flisher et al., 1997; Zahner & Daskalakis, 1997; Pescosolido et al., 2008). Poor access and inadequate coverage may block access to mental health services for some children with epilepsy, but in this study, it appears that parental reluctance to acknowledge the need for intervention trumped these barriers. This finding persisted for both African American and Caucasian subjects. Perhaps interventions such as: discussion of depression as a comorbid risk factor at the time epilepsy is diagnosed; exploration of the rationale used by parents to discount screening results and follow-up recommendations; or

repeated on-site screening would promote mental health care linkage. Additional research is needed to identify methods that promote parental understanding of depressive symptoms and increase willingness to seek mental health care.

### Limitations

These results must be interpreted in light of the present study's methodologic limitations. First, symptoms of depression were measured using a self-report screening tool, rather than a clinical psychiatric evaluation. We did not formally assess participants' cognitive abilities prior to administering the screening measure. In addition, the screening tool was not re-administered during the follow-up phone contact. Therefore, the proportions reported for this study indicate probable, but not confirmed, cases of previously undiagnosed depression.

Secondly, we recruited a convenience sample of patients drawn from a tertiary care center. These sample characteristics were beneficial in several respects but may not be representative of the general pediatric epilepsy population, especially with respect to seizure-related variables and number of antiepileptic medications prescribed. A small subsample was used to evaluate variables related to help-seeking behaviors, and generalizations based on a sample of this size must be made with care. In addition, this study did not attempt to assess the role of socioeconomic status as it related to symptoms of depression or psychiatric help-seeking behaviors.

### CONCLUSION

This study supports the utility and necessity of screening for previously undetected symptoms of depression in tertiary pediatric epilepsy clinics serving both African American and Caucasian children. Screening for and discussion of depression symptoms were acceptable to the vast majority of those invited to participate in the study, with only 3% declining to enroll. The time required to administer the SMFQ did not disrupt clinic flow and presented an opportunity for dialogue on depression in pediatric epilepsy. In addition, it is encouraging that this brief intervention resulted in relevant outcomes for 12 children with previously undetected symptoms of depression who received ongoing mental health services subsequent to this study. However, the lack of help-seeking among the remaining 21 families is cause for concern. Although our study supports the assertion that depression in pediatric epilepsy is largely underdiagnosed and undertreated for both African American and Caucasian children and adolescents, it also highlights the need for further research to illuminate determinants of psychiatric help-seeking behaviors among parents of youth with epilepsy.

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We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines. We would like to express our gratitude to Russell Derry of the Michigan Epilepsy Foundation who participated in the design of this study.

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## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

**Table S1.** Prediction of severity of depressive symptoms using demographic profiles and epilepsy variables (univariate linear regression analyses).

**Table S2.** Prediction of severity of depressive symptoms using demographic profiles and epilepsy variables (multiple linear regression analysis).

**Table S3.** Prediction of mental health-seeking behaviors using measures of severity of depressive symptoms, demographic profiles, and epilepsy variables (univariate logistic regression analyses).

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