



A model-based approach to understanding school status of students with epilepsy

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ABSTRACT

This study constitutes a preliminary test of a theoretical model proposed by Sexson and Madan-Swain to explain the school status of students with epilepsy. Sixty-six classroom teachers participated in the study, as did 74 of their students with epilepsy. Three predictor variables—teachers' attitude towards persons with epilepsy, teachers' training in instructing students with epilepsy, and students' seizure frequency—were examined. Consistent with the model, the three variables collectively predicted attendance ($F=54.48$, $p<.001$, $R^2=0.70$), reading ($F=21.40$, $p<.001$, $R^2=.48$), math ($F=12.61$, $p<.001$, $R^2=0.35$), writing ($F=12.61$, $p<.001$, $R^2=0.35$), and special education usage ($\chi^2=30.96$, $p<.001$). Moreover, both seizure frequency and teachers' attitude, but not teachers' training, uniquely predicted some outcome variables. Limitations and potential advantages of the model are discussed.

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1. Introduction

Children with chronic illnesses, including epilepsy, risk school difficulties. Understanding the specific manifestations of school difficulties and what factors influence them, however, remains elusive. Fortunately, a potentially heuristic theoretical formulation was advanced by Sexson and Madan-Swain [1,2]. This model describes four variable categories (i.e., Illness Factors, Attitudes of Significant Adults, Child Variables, and School or Educational Resources) with potential to explain ill students' school success upon school reentry and beyond. Although our study concerns this model's predictive ability, some theory-related facts are known about epilepsy and schooling.

Regarding educators' characteristics (this model's Attitudes of Significant Adults), it is clear that misconceptions about epilepsy are common among U.S. [3] and foreign teachers [4–6], as is hesitancy to teach such students. Furthermore, neither U.S. [7] nor foreign [8] teachers appear well informed about epilepsy or its threat to school success. Still, research suggests that more favorable attitudes and greater epilepsy-related knowledge occur if teachers are more experienced [3,9], if they have previously taught a student with epilepsy [3,9,7], and if they received pre-service or in-service epilepsy training [5,9].

Among the best documented predictors of academic success are seizure severity and seizure control (Illness Factors in this model). Among Israeli students with epilepsy, as an example, seizure frequency,

a variable used in our study, predicted special class usage with students suffering multiple daily seizures shown to be distinctly over-represented in mental retardation classrooms [10]. In Great Britain, well-controlled seizures (i.e., <1/month) predicted regular, rather than special, class placement [11]. Furthermore, both seizure control and severity predict scores on a host of laboratory-based neurocognitive measures (e.g., IQ, complex verbal learning [12]). Crucially, none of these studies explicitly addressed Sexson and Madan-Swain's model of educational success. Equally important, few of the outcome variables used to date came directly from school sites (i.e., possessed adequate "ecological validity"). Foreign studies also comprise much of extant literature. Thus, the capability of the Sexson and Madan-Swain model to elucidate the impact of epilepsy on North American children's academic performance remains unknown.

Because this model has yet to be tested for students, including those with epilepsy, we sought to do so by using three predictor variables, one from each of three categories in the model: (a) teachers' attitudes towards epilepsy (corresponding to Attitudes of Significant Adults in the model), (b) teachers' prior epilepsy training (corresponding to School and Educational Resources), and (c) students' seizure frequency (corresponding to Illness Factors in the model). Because the Sexson and Madan-Swain model concerns school success, three educationally valid outcome variables derived directly from students' school records were used: (a) attendance, (b) basic academic skill development determined by objective test scores found in students' school records, and (c) rate of participation in special education programs. It is noteworthy that all three of these educational variables are cited as critical in the seminal Sexson and Madan-Swain article. The resulting findings, thus, might offer a partial and preliminary test of the larger model.

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Our results might also reveal, or help confirm previously found, associations between our set of predictor and educational variables. The latter purpose, however, represents only a secondary concern of our investigation.

2. Methods

2.1. Instruments and dependent measures

2.1.1. Attitude Towards Persons with Epilepsy (ATPE)

The ATPE was used to measure two predictor variables in this study: teachers' attitude towards epilepsy (abbreviated here as Attitude) and teachers' prior epilepsy training (abbreviated here as Training). Attitude was assessed by 21 items. Seventeen of these items concern personally held beliefs and preconceptions relating to epilepsy, persons with epilepsy, and how individuals with epilepsy should live their lives [13]. Four of these 21 items concern both Attitude and Knowledge and are included in calculation of an "Attitude" dimension, according to the ATPE authors' guidelines. Training was assessed with four ATPE items concerning teachers' formal preparation to teach students with epilepsy (e.g., number of college classes and in-service experiences related to epilepsy). The ATPE scale was validated in 1982 and then again in 1990. For example, item content of its subscales was gathered through literature reviews, previously published scales concerning chronic illnesses, and interviews of experts [14]. Internal consistency estimates of the ATPE Attitude subscale appeared adequate as evidenced by item-total correlations and shared variance [14].

Attitude Towards Persons with Epilepsy scores are calculated as follows. Teachers complete each Attitude item by selecting a point of a Likert-type scale ranging from "I agree very much" to "I disagree very much." The ATPE authors provide a scoring key that allows individual Attitude items to be assigned values from 1 (strongly agree) to 6 (strongly disagree); this process, in part, addresses the reverse wording of some items. Examples are item #8 (children with epilepsy should attend public school) and item #14 (children need to be protected from classmates who have epilepsy). Consequently, Attitude raw score values as used in this study range from 20 to 120, higher values reflecting positive attitude and absence of negative bias towards students with epilepsy. The ATPE contains four Training items that are converted to a 1 to 5 metric, higher values indicating more extensive preparation to teach students with epilepsy. Thus, total ATPE Training values in this study ranged from 4 to 20.

2.1.2. Seizure frequency

A third predictor variable, Seizure Frequency, comprised a single item on which parents estimated the frequency of their sons'/daughters' seizures: In a typical month, how many seizures does your child have (reported and observed)? 5 or more seizures; 4 seizures; 3 seizures; 2 seizures; 1 seizure; no seizures. This item's readability and face validity were established through a focus group of parents, teachers, and university graduate students. Content validity was documented via a focus group of nurses. Raw scores in this study ranged from 5 to 0 depending on which option parents selected, moving from more to less frequent seizures.

2.1.3. Attendance

The first of three educational dependent measures was Attendance, calculated by examining official records for the total number of whole days missed during a 180-day academic year. Attendance data were collected at year's end to permit the current teacher's attitude and training, as well as seizure frequency, to be expressed in an entire year's attendance data.

2.1.4. TerraNova Comprehensive Test of Basic Skills (CTBS)

The CTBS is standardized, norm-referenced measure of reading, writing, and mathematics skill development [15] used as the set

of second educational outcome measures (referred to as Reading, Writing, and Mathematics). The psychometric qualities of the CTBS are well established [16]. Comprehensive Test of Basic Skills scores were available on all second-grade through ninth-grade students participating in this study, based on local policy. In addition, because the CTBS is administered in April, it served as an academic indicator influenced by nearly an entire year teachers' attitude and training. Comprehensive Test of Basic Skills normal curve equivalent (NCE) scores were used for statistical purposes in this study. Use of NCE scores, by virtue of their equal-interval scale characteristics, circumvents inherent limitations of typical percentiles in statistical calculations.

2.1.5. Special Education Usage

Special Education Usage was the final educational outcome variable. Using end-of-year official school records, any indication of special education participation during the year was coded as yes. However, it is noteworthy that an exclusion criterion in this study (see below) was a current self-contained special education placement. Thus, this dichotomous variable distinguished students with resources or in-class special education services (i.e., coded yes) from those with no special services (i.e., coded no).

2.2. Participants

Seventy-four students, grades 2 through 12, from two large, urban/suburban school districts in a large city in the Southwest participated in this study. The inclusion criteria are as follows: enrollment in grades 2–12, and a record of epilepsy or seizure diagnosis in school health records. The exclusion criterion is enrollment in a self-contained special education program (determined through parental reports and district records). The study also involved participation of 66 teachers (some teachers were instructing more than one student with epilepsy; see Table 1 for demographics on students and their teachers).

2.3. Procedures

Subsequent to IRB approval, two school districts were solicited. Both districts agreed that their school nurses could be contacted to support the study. Each nurse who consented ($N = 68$) then searched his/her standard health records for names of students with "epilepsy" (or "epilepsy/seizures"). Identified students' parents/guardians were then mailed a packet containing the following: (a) an overview letter explaining the study (b), an informed consent form to permit participation of their minor child, (c) parental permission to release school attendance records and CTBS Reading, Writing, and Mathematics scores, (d) permission to contact the student's classroom teacher, (e) a seizure frequency item, and (f) items concerning the family and student's demographics. Packets were available in both English and Spanish, all material having undergone a standard forward and backward English/Spanish translation process. Parents/guardians were provided a stamped, pre-addressed envelope to return completed paperwork. Parents with completed forms were eligible to enter a raffle for a gift certificate.

After items b–f were returned, one teacher for each enrolled student (listed by a parent) was emailed a link to this study's SurveyMonkey website. The email message stated that the study involved students with epilepsy, but no students were identified by name. Teachers then entered the SurveyMonkey website, completed the ATPE and a demographic form, and chose whether to enter a teacher-only lottery for a gift certificate. School records (i.e., CTBS Reading, Writing, and Mathematics scores and attendance records) were sent to the researchers electronically after the school record clerks received parental release of record forms.

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