

Teachers' knowledge about epilepsy and attitudes toward students with epilepsy: Results of a national survey

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Abstract

The attitudes and epilepsy-related knowledge of teachers are an important component of the educational experiences of children with epilepsy. Unfortunately however, the exploration of teacher attitudes and knowledge has been extremely limited in the United States. This article describes a survey-based research study of the attitudes and epilepsy-related knowledge of a randomly selected national sample of 512 elementary and middle school teachers in the United States. The questionnaire included the Scale of Attitudes Toward Persons with Epilepsy (ATPE), a summated rating scale that measures both attitudes toward persons with epilepsy and knowledge about epilepsy, as well as a demographic and teaching experience survey and several additional attitude and knowledge items developed by the researchers. The results suggest that although teachers' attitudes about epilepsy were generally positive, there were significant deficits in terms of general knowledge about epilepsy, its impact in educational settings, and the appropriate management of epilepsy and seizures in the classroom. Critical areas in which to focus remedial education and outreach efforts are identified.

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1. Introduction

Epilepsy is the most common neurological problem of childhood, and its incidence is highest in the first decade of life [1], a period during which children begin and complete a critical part of their social and educational development. School represents a significant component of life for all children. School is a place where they spend a large amount of their time during a critical period of social, psychological, and physical development. Further, because success in school is so important to success in adult roles, school experiences are a key factor in students' current and future quality of life [2,3]. Academic achievement and the development of effective work habits, social skill development, as well as social and programmatic participa-

tion, all contribute to the development of behaviors and skills important to success in adult roles.

Unfortunately, it has frequently been shown that children with epilepsy, for a variety of reasons, are at an increased risk for a number of education-related problems that negatively impact their current quality of life [4] and place them at increased risk for psychosocial problems later in adolescence and adulthood [2,3,5,6]. Specifically, children with epilepsy are at an increased risk for educational underachievement, learning disabilities, mental health problems, social isolation, and poor self-esteem [2–5,7].

Teachers' knowledge about and attitudes toward epilepsy can have a direct impact on students with epilepsy in terms of school performance, social skill development, and postschool success in the areas of employment, social skills, and social network development [8]. However, despite the significant impact of teachers' knowledge about and attitudes toward persons with epilepsy, very little research has been conducted in the United States in the last two decades either to assess the degree to which teachers

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have accurate knowledge and information about epilepsy or to gauge teachers' attitudes toward students with epilepsy [9].

Although there has been a lack of studies of teacher attitudes in the United States, examination of the numerous international studies of teacher attitudes and knowledge about epilepsy conducted over the past 20 years (e.g., [8,10–16]) indicates a troubling trend. Almost universally in these studies, teachers have reported having insufficient knowledge about epilepsy, inadequate training in their teacher preparation, and erroneous and potentially dangerous ideas about first-aid management of seizures. For example, Kankirawatana [10] conducted a small pilot study to assess knowledge of and attitude toward epilepsy in schoolteachers in Thailand. Using self-administered questionnaires in 360 schools across Thailand, Kankirawatana assessed teachers' awareness of and attitudes toward epilepsy and knowledge of first-aid management for seizures. Kankirawatana reported that 38% of the respondents had not heard of or read about epilepsy; 15% preferred to place all children with epilepsy in a special classroom; and half of the respondents who had experience with first-aid management of seizures used improper and potentially harmful measures.

In a survey among 142 schoolteachers in North Staffordshire in the United Kingdom, Bannon et al. [11] found that most of the respondents did not feel confident when teaching children who had epilepsy, and a minority considered their knowledge of the subject to be adequate. Only four teachers had received recent specific instruction on childhood epilepsy, and the majority requested further training on epilepsy and other medical conditions. Further, in their study of the knowledge of and attitudes toward asthma and epilepsy among 216 preschool teachers in Taiwan, Hsieh and Chiou [8] reported that perceptions of epilepsy and asthma among preschool teachers differed significantly. More than 30% of participants thought epileptic seizures were associated with insanity, and acceptance of children with epilepsy was significantly lower than that of children with asthma. Children with epilepsy were also less encouraged by teachers to play with others.

This article describes a study of teacher attitudes conducted among elementary and middle-school teachers in the United States. The purpose of this research project was to obtain results from a large and geographically diverse sample of primary and middle-school teachers. Teachers at this level were targeted due to the importance of these early stages in the school career of the child with epilepsy. The aims of the present research were to evaluate teachers' attitudes toward epilepsy and to identify areas in which further teacher training and education are required. A number of additional research questions were also evaluated, including (1) the degree to which teachers felt adequately trained and prepared to address issues related to teaching students with epilepsy, (2) teachers' knowledge of epilepsy relative to other chronic illnesses or developmental disabilities, and (3) the most effective medium from

which teachers could access more information about epilepsy and students with epilepsy.

2. Method

To identify and recruit participants, comprehensive statewide lists of teachers' names and school addresses were requested from each of 11 states. These states were selected to represent each of five regions of the United States: Northwest, Northeast, Southwest, Midwest, and Southeast. Teachers were randomly selected from these lists and invited to participate. A total of 2000 teachers were contacted, roughly 200 teachers from each state. Data collection began in April 2004 and continued through February 2005.

The selected teachers were contacted by mail and invited to participate by completing the survey instrument described next. The teachers were asked either to complete the mailed form (paper version) of the survey instrument or, if they preferred, to complete the survey online. To enhance response rate, a second request was mailed 30 days after the initial mailing.

2.1. Survey Instrument

The selected teachers were mailed letters describing the study, inviting participation, and discussing informed consent. The mailing included a postage-paid return envelope, as well as instructions for completing the survey online. The questionnaire itself included the Scale of Attitudes Toward Persons with Epilepsy (ATPE) [17], a demographic and teaching experience survey, and several additional attitude and knowledge items developed by the researchers.

The ATPE (Form S) is a summated rating scale developed to be a contemporary, brief, easily administered and scored, and psychometrically sound instrument for measurement of both attitudes toward persons with epilepsy and knowledge about epilepsy [17]. The item content for this scale was developed through a review of the literature, including previously published investigations of attitudes toward persons with epilepsy, and open-ended interviews with experts in the field of epilepsy, including neurologists, special educators, and rehabilitation counselors. The 28-item scale includes 17 attitude items, 7 knowledge items, and 4 combined knowledge and attitude items. Respondents are asked to rate each statement on a 6-point scale ranging from "I disagree very much" to "I agree very much." Weighted sums of the item responses provide measures of the respondents' knowledge or global attitude, "with higher scores representing more enlightened knowledge and a more favorable attitude" [17]. Investigations of the measure suggest that it is psychometrically sound in terms of item characteristics, scale reliability, and construct and criterion validity [17].

Additional items were developed by the researchers to assess the (1) teachers' knowledge about epilepsy specific to its potential impact in educational settings, (2) the

degree to which teachers felt adequately trained and prepared to address issues related to teaching students with epilepsy, and (3) teachers' relative knowledge about epilepsy compared with other common disabilities and chronic illnesses. These items were developed based on literature review and survey-based research recently conducted by the researchers examining both the concerns of families about their child's educational experience and epilepsy professionals' impressions of teachers' understanding of epilepsy. Finally, the questionnaire included a qualitative component, in which the teachers were asked to describe any particular aspects of epilepsy or seizure disorders about which they would like more information.

3. Results

3.1. Sample

A total of 512 teachers returned completed surveys, giving a response rate of 25.6%; 342 (67%) returned the survey by mail, and 170 (33%) completed the internet-based survey. Table 1 lists the number of teachers by state and region and the percentage of respondents among those contacted in each state. (Note: Teacher lists were unavailable from any of the states identified by the researchers as lying in the Southwest region of the United States.) The sample consisted primarily of female teachers (85.5%). The participants' reported ethnicities included white (96.7%), African-American (2.1%), Hispanic, Native American, and Asian (0.4 % each). Most of the participants were married (78.1%); 11.7% reported never having married, 9.2% were divorced, and 1% were widowed.

The mean age of teachers was 42.8 (SD = 10.75, range = 23–66). The average number of years of teaching experience was 15.97 (SD = 9.9, range = <1 to 45 years). With respect to level of education, 52.9% had a masters or higher degree, 30.1% had done postgraduate work, 15.6% were college graduates, and 1.4% had not graduated

from college. The majority (64.5%) of the teachers described their school as being in a rural as opposed to an urban setting.

3.2. Self-reported knowledge and experience

The teachers were asked to report (1) their general knowledge of the conditions and life circumstances of persons with epilepsy, (2) the frequency of their contact with a person with epilepsy, (3) whether they have ever been a teacher of a student with epilepsy, and (4) whether they were currently a teacher of a student with epilepsy. On the 6-point scale concerning general knowledge of the conditions and life circumstances of persons with epilepsy, ranging from "no knowledge" to "extensive knowledge," almost 70% of the respondents rated their knowledge on the lower half of the scale. Self-reported knowledge of epilepsy was not related to gender, ethnicity, or education level, but was positively correlated with both teacher's age (Pearson's $r = 0.22, P = 0.001$) and years of teaching experience (Pearson's $r = 0.17, P = 0.001$). More than half of the teachers rated their contact with a person with epilepsy as very infrequent. Half reported having taught a student with epilepsy in the past, but only 9.4% reported that they were currently teaching a student with epilepsy. Figs. 1 and 2 illustrate the results just described.

3.3. ATPE Attitude scale scores

Analysis of the ATPE Attitude scale scores included evaluation of the weighted sum of the item responses and individual item analysis. Weighted sums of the item responses on the ATPE Attitude scale provide a measure of the teachers' global attitude, with higher scores representing a more favorable attitude [17]. Based on a 6-point, fully anchored Likert-type scale ranging from "I disagree very much" to "I agree very much," the possible scores for the 21-item scale range from 21 to 126. The mean score for the teachers in the present study was 109.85 (SD = 11.04, range = 40–126). The distribution of attitude

Table 1
Participants by state and region

Region (region total)	State	Number of teachers (% of those contacted)
Southeast (66)	Florida	26 (14%)
	Kentucky	40 (22%)
Northeast (78)	New Hampshire	40 (22%)
	Michigan	38 (21%)
Midwest (295)	Iowa	60 (33%)
	Indiana	92 (51%)
	Nebraska	55 (30%)
	Missouri	25 (13%)
	Kansas	63 (35%)
Northwest (73)	Oregon	40 (22%)
	Wyoming	33 (18%)

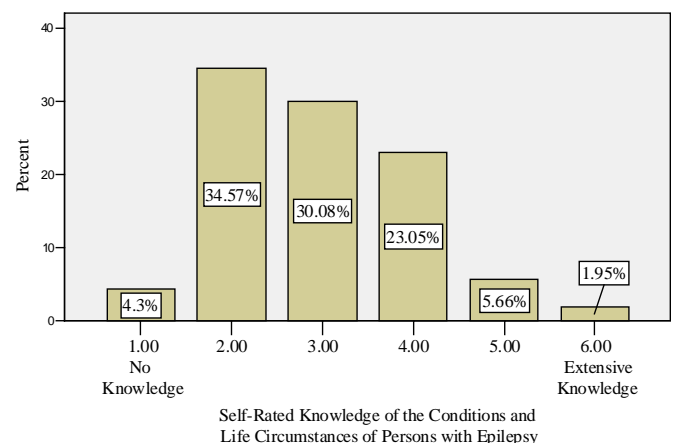


Fig. 1. Teachers' self-rated knowledge of the conditions and life circumstances of persons with epilepsy.

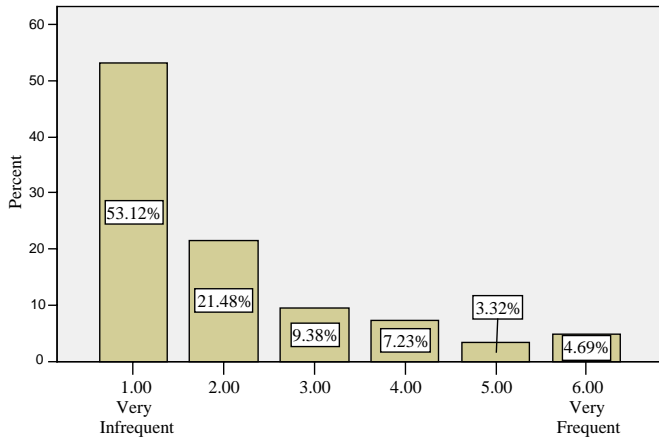


Fig. 2. Reported frequency of contact with a person with epilepsy.

scores is shown in Fig. 3. In addition to evaluating the sample’s total scale scores, analysis of the responses to individual items was conducted to assess teachers’ scores on items most relevant to educational settings. Table 2 lists the Attitude items and the mean responses of the participants in the present study.

To assess the relationships between selected teacher characteristics and Attitude scale scores, a backward regression analysis of demographic variables (gender, education level, and ethnicity) and school/teacher experience variables (years teaching, experience teaching a student with epilepsy, currently teaching a student with epilepsy, self-reported general knowledge of epilepsy, frequency of contact with persons with epilepsy, and location of school in an urban or rural district) was conducted on the ATPE Attitude score. This analysis produced a significant result:

$R^2 = 0.094$, $F = 6.517$, $P = 000$. All of the predictors except frequency of contact with persons with epilepsy entered the regression equation as predictors of Attitude scale score. Specifically, more positive Attitude scores were associated with more years of teaching experience, higher level of education, female gender, currently teaching a student with epilepsy, self-reported knowledge about epilepsy, and teaching in an urban versus a rural school. The results of the regression analysis are summarized in Table 3. An a priori power estimation was conducted in advance of the multiple regression analysis to determine the appropriate α level for hypothesis testing under conditions of a fixed sample size of 512. Given nine predictor variables and an α level of 0.05, and assuming a medium effect size ($R^2 = 0.15$), the preanalysis power estimation yielded a power greater than 0.95 for testing a research hypothesis using multiple regression. A statistical power of 0.80 is considered adequate for rejecting the null hypothesis if it is false [18]. The multiple regression analysis was therefore conducted at the 0.05 α level.

3.4. ATPE Knowledge scale scores

The ATPE Knowledge scale includes 11 items. Respondents are asked to rate their agreement with each statement on a 6-point, fully anchored Likert-type scale ranging from “I disagree very much” to “I agree very much.” Weighted sums of the item responses provide measures of the respondents’ knowledge about epilepsy, with higher scores representing “more enlightened knowledge” [17]. Based on a 6-point scale, the possible scores for the 11-item scale range from 11 to 66. The mean score for the teachers in the present study was 54 (SD = 7.60, range = 12–66). The distribu-

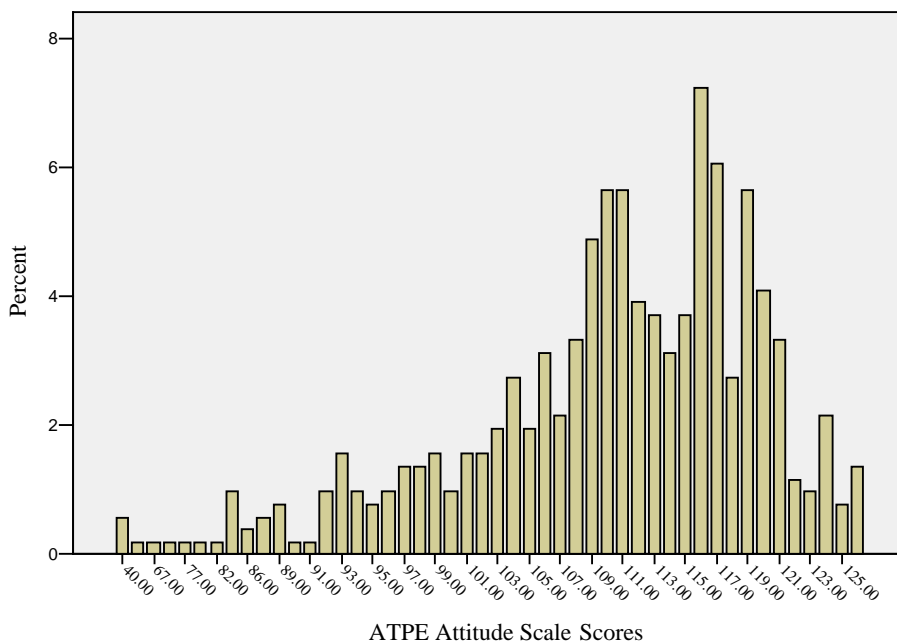


Fig. 3. ATPE Attitude scale scores.

Table 2
ATPE Attitude items and scores of participants

	Attitude item	Mean score
1.	Schools should not place children with epilepsy into regular classrooms.	-2.12 ^a
2.	Persons with epilepsy have the same rights as all people.	2.73
3.	Persons with epilepsy can safely operate machinery.	0.80
5.	Insurance companies <i>should not</i> deny insurance to individuals with epilepsy.	2.47
6.	The individual with epilepsy <i>should not</i> be prevented from having children.	2.41
7.	Persons with epilepsy should be prohibited from driving.	-0.41 ^a
8.	Children with epilepsy should attend regular public schools.	2.73
9.	The onset of epileptic seizures in a spouse is sufficient reason for divorce.	-2.76 ^a
11.	Persons with epilepsy are a danger to the public.	-2.54 ^a
12.	The responsibility for educating children with epilepsy rests with the community.	1.27
13.	Individuals with epilepsy are accident-prone.	-1.56 ^a
14.	Children need to be protected from classmates who have epilepsy.	-2.47 ^a
15.	Parents should expect of their child who has epilepsy what they expect of other children.	2.28
17.	Persons with epilepsy are more likely to develop and express criminal tendencies than are other people.	2.28 ^a
18.	Persons with epilepsy should not be prohibited from marrying.	-2.69
19.	Laws citing epilepsy as the basis for the annulment of adoption should be repealed.	2.43
20.	Persons with epilepsy prefer to live with others of similar characteristics.	2.08 ^a
21.	Equal employment opportunities should be available to individuals with epilepsy.	-2.01
24.	When their seizures are controlled by medication, persons with epilepsy are just like anyone else.	2.59
25.	Families of children with epilepsy should not be provided supportive social services.	2.68 ^a
27.	Children with epilepsy in regular classes have an adverse effect on the other children.	-2.00 ^a

Note. Potential range = -3 to +3, based on a fully anchored Likert-type scale including the following anchors: -3 = I disagree very much, -2 = I disagree pretty much, -1 = I disagree a little, 1 = I agree a little, 2 = I agree pretty much, and 3 = I agree very much.

^a Items for which a “disagree” response (scored negatively) indicates a positive attitude.

Table 3
Results of the regression analysis of teacher variables on ATPE Attitude Scale scores

Predictor	B	β	t	P
1. Teach now	5.93	0.175	3.824	0.000
2. Ethnicity	-3.91	-0.129	-2.990	0.003
3. Education	1.63	0.128	2.962	0.003
4. Rural/urban	2.53	0.114	2.644	0.008
5. Years teaching	0.127	0.114	2.431	0.015
6. Gender	2.70	0.086	2.004	0.042
7. Have taught	-1.80	-0.085	-1.741	0.082
8. Knowledge	0.822	0.081	1.847	0.065

Note. Teach now = currently teaching a student with epilepsy; Have taught = have previously taught a student with epilepsy; Knowledge = self-reported knowledge of the conditions and life circumstances of a person with epilepsy.

tion is shown in Fig. 4. Table 4 lists the individual knowledge items and the scores of the participants.

To assess the relationships between teachers' characteristics and teachers' scores on the Knowledge scale items, a second regression analysis of the same demographic variables (gender, education level, and ethnicity) and school/teacher experience variables (years teaching, experience teaching a student with epilepsy, currently teaching a student with epilepsy, self-reported general knowledge of epilepsy, frequency of contact with persons with epilepsy, and location of school in an urban or rural district) was conducted on the ATPE Knowledge score. This analysis also produced a significant result: $R^2 = 0.091$, $F = 8.315$, $P = 0.000$. Level of education, years of teaching experience, currently teaching a student with epilepsy, self-reported general knowledge of epilepsy, frequency of contact with persons with epilepsy, and ethnicity entered the regression

equation as predictors of Knowledge scale score. The results of the regression analysis are summarized in Table 5.

3.5. Additional Knowledge and Attitude items

As described above, in addition to the items on the ATPE, 12 additional attitude and knowledge survey items were developed by the researchers for inclusion on the survey instrument. The response format for these items was consistent with that of the ATPE (i.e., a 6-point scale ranging from “I disagree very much” to “I agree very much”). The additional items are listed in Table 6, along with the means and SD of the participants' responses to these items. A number of issues directly related to teacher preparation and teaching practice are identifiable in these responses. Only 14% of the teachers reported that they had received adequate training in handling seizures during their teacher training. Approximately 64% of the teachers felt well prepared to handle a seizure in the classroom. About half of the teachers (49%) reported that they felt knowledgeable about epilepsy. Only 44% reported that they had sufficient training in first-aid for seizures, and 43% said that they were familiar with the different types of seizures.

3.6. Comparative familiarity items

Participants were asked to rate how familiar they were with the following health conditions or disabilities: asthma, HIV/AIDS, diabetes, autism, mental retardation, epilepsy, and ADHD. Ratings were based on a 4-point scale ranging from 1 (“not at all familiar”) to 4 (“very familiar”). Based

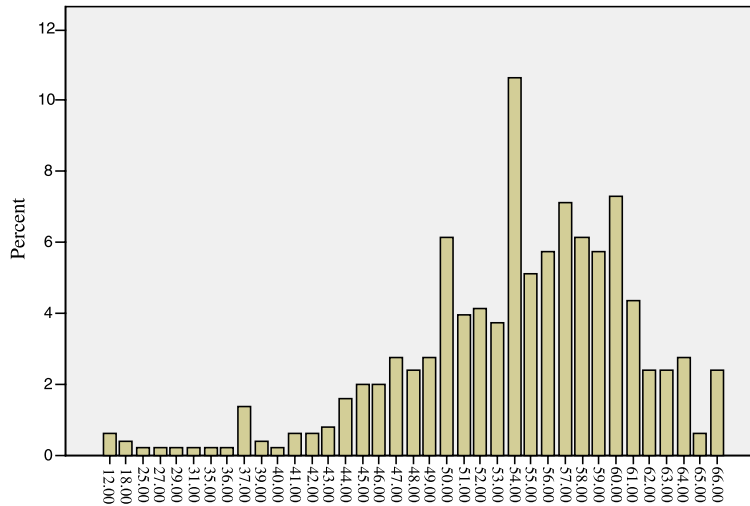


Fig. 4. Scores on the ATPE Knowledge scale.

Table 4
ATPE Knowledge items and percentage of correct responses by participant

Knowledge item	Mean score (SD)
Persons with epilepsy can safely operate machinery. ^a	0.79 (1.65)
The individual with epilepsy does not possess a normal life expectancy.	-1.73 (1.60)
Persons with epilepsy should be prohibited from driving.	-0.43 (1.80)
Individuals with epilepsy are also mentally retarded.	-2.87 (0.56)
Individuals with epilepsy are accident-prone.	-1.59 (1.46)
Persons with epilepsy can safely participate in strenuous activity. ^a	1.80 (1.31)
Persons with epilepsy should not be prohibited from marrying. ^a	2.40 (1.68)
You can expect the condition of a person with epilepsy to deteriorate.	-1.49 (1.47)
The offspring of parents with epilepsy will also have epilepsy.	-1.85 (1.31)
Epilepsy is not a contagious disease. ^a	2.96 (0.59)
Individuals with epilepsy can cope with a 40-hour work week. ^a	2.25 (1.22)

Note. Potential range of mean scores = -3 to +3, based on a fully anchored Likert-type scale including the following anchors: -3 = I disagree very much, -2 = I disagree pretty much, -1 = I disagree a little, 1 = I agree a little, 2 = I agree pretty much, and 3 = I agree very much.

^a Items deemed correct if answered in the affirmative.

Table 5
Results of the regression analysis of teacher variables on ATPE Knowledge scores

Predictor	B	β	t	P
1. Knowledge	1.41	0.200	3.957	0.000
2. Years teaching	0.11	0.144	3.238	0.001
3. Frequency	-0.74	-0.135	-2.601	0.010
4. Education	1.14	0.130	2.971	0.003
5. Teach now	2.70	0.115	2.587	0.010
6. Ethnicity	-1.68	-0.080	-1.879	0.061

Note. Teach now = currently teaching a student with epilepsy; Knowledge = self-reported knowledge of the conditions and life circumstances of a person with epilepsy; Frequency = frequency of contact with a person with epilepsy.

on the average familiarity rating for each condition, the teachers were most familiar with ADHD, with an average rating of 3.5 (SD = 0.64). Epilepsy was the condition with which teachers reported being the least familiar, with an average rating of 2.52 (SD = 0.79). Table 7 summarizes the responses to this question.

3.7. Most effective medium for gaining epilepsy information

To understand how to most effectively deliver information about epilepsy and its effects in the context of education, the teachers were asked to select their preferred medium for obtaining more information from a list of six options. Because some teachers endorsed more than one option, we present here the total number of times each item was endorsed, followed by the percentage of teachers endorsing the item. The most frequently endorsed medium for obtaining information was through printed materials, such as pamphlets, endorsed by 225 (44%) teachers; this was followed by education by the child’s parents (167 teachers, 33%), a personal conversation with an Epilepsy Foundation representative, nurse, or other professional (160 teachers, 31%), an epilepsy-related web page (155 teachers, 30%), and an instructional video (77 teachers, 15%).

Finally, the teachers were asked whether they had ever looked at the Epilepsy Foundation web site for information on or resources for epilepsy. Only 3% of the teachers (n = 15) reported that they had done so.

Table 6
Additional knowledge and attitude items

Statement	Mean response (SD)	% Agreeing with statement
1. Epilepsy is a form of mental illness or insanity.	−2.80 (0.64)	1.2
2. I would be well prepared to handle a seizure if one of my students had one during class.	0.56 (2.06)	64.6
3. I feel I am very knowledgeable about epilepsy.	−0.25 (1.95)	49.1
4. I have had sufficient training in first-aid management of seizures.	−0.45 (2.08)	43.9
5. I am familiar with different types of seizures and what they look like.	−0.49 (2.04)	43.2
6. The Individuals with Disabilities Education Act (IDEA) should apply to children with epilepsy.	1.86 (1.39)	90.1
7. When someone is having a seizure it is a medical emergency and 911 should be called immediately.	0.20 (1.98)	47.8
8. Epilepsy and epilepsy medications can have a significant effect on students' mood, memory, and learning.	0.77 (1.64)	71.6
9. I would like to have more general information about epilepsy.	2.04 (1.24)	95.3
10. I would like to have more information about how to respond when a student is having a seizure.	2.07 (1.34)	92.1
11. I know quite a bit about the Individuals with Disabilities Education Act (IDEA) and legislation related to the education of students with disabilities.	0.25 (2.07)	57.8
12. I received adequate training about seizure management and epilepsy in my teacher training.	−1.91 (1.59)	14.0

Note. Potential range = −3 to +3, based on a fully anchored Likert-type scale including the following anchors: −3 = I disagree very much, −2 = I disagree pretty much, −1 = I disagree a little, 1 = I agree a little, 2 = I agree pretty much, and 3 = I agree very much.

Table 7
Comparative familiarity with chronic conditions/disabilities

Condition/disability	Average rating (SD)
ADHD	3.50 (0.64)
Diabetes	3.10 (0.70)
Asthma	3.09 (0.87)
HIV/AIDS	2.96 (0.75)
Mental retardation	2.89 (0.79)
Autism	2.73 (0.82)
Epilepsy	2.52 (0.79)

Note. Ratings based on a 4-point scale ranging from 1 (“not at all familiar”) to 4 (“very familiar”).

4. Discussion

This study evaluated a number of general and specific aspects of teachers' attitudes toward and knowledge about epilepsy. The results have important implications for students with epilepsy, their families, and those concerned with their education, as well as for epilepsy professionals. The findings are discussed here in terms of these implications and the need for additional research.

The teachers' composite scores on the Attitude scale of the ATPE were almost entirely on the positive side of the continuum, suggesting predominantly positive attitudes toward persons with epilepsy. This is an encouraging result of the present study, being the first large-scale, national study of teacher attitudes in the United States in recent years. These results, however, should be considered in the context of two qualifications. First, although the Attitude scores may be generally described as positive, some troubling issues are apparent in the individual item analysis. For example, it appears as though the majority of respondents believe that persons with epilepsy “prefer to live with others with similar characteristics.” The apparently underlying belief in the concept of an “epilepsy personality,” or that persons with epilepsy may be defined in terms of “characteristics” that separate them from persons without epilepsy in the context of social living, is troubling, perhaps

particularly so in the light of the frequently endorsed belief that persons with epilepsy are more likely to develop criminal tendencies. Other interesting results were that the present sample apparently did not generally support the provision of supportive social services to families of persons with epilepsy. A belief in increased accident proneness and the need for driving restrictions was also, but less dramatically, suggested.

A second important qualification in considering the Attitude scale results is that the present study used a direct measure of attitude, in which, based on the item content, it is clear to the respondents that the purpose of the instrument is attitude measurement. This is in contrast to indirect measures, in which the nature of the instrument is hidden in the format of the questionnaire items, and latent psychological constructs are interpreted as attitudes.

Attitude researchers have suggested that in the course of the last 50 years, attitudes toward people with epilepsy have consistently improved [6,19]. For example, between 1949 and 1987, the percentage of respondents in the United States who agreed that epilepsy is a form of insanity decreased from 12 to 3%, and the percentage who would allow their child to play with a child with epilepsy increased from 57 to 89% [6]. Investigators using indirect methods of attitude measurement, which are less vulnerable to socially desirable responses, have, however, suggested a different reality. For example, in their report of a Kentucky survey of the general population in which a graded response format was used, Baumann et al. concluded that their data did not support contentions that prejudices against persons with epilepsy are disappearing [6]. Further, a recent study of teacher attitudes conducted in the United States, in which an indirect measure was used, suggested a less positive view than was found in the present study [9].

Attitude and Knowledge scores were significantly related to a number of demographic and experience variables. Specifically, scores on both the Attitude and Knowledge scales of the ATPE were associated with more years of teaching experience, higher level of education, and higher

self-reported general knowledge of epilepsy. Teachers with higher scores on the Attitude scale also tended to be female, currently teaching a student with epilepsy, and teaching in an urban versus a rural setting. The relationship between higher levels of education and more positive attitudes toward persons with disabilities has consistently been observed in prior attitude research [19], as has the relationship between more years of teaching experience and attitudes toward students with epilepsy [9]. Further research will be important in evaluating the consistency of the findings between epilepsy-related attitudes and such teacher characteristics as gender and rural-versus-urban settings, as better understanding of these relationships might enable the focusing of educational and attitudinal interventions.

The results of the Knowledge scale of the ATPE appear also to indicate a positive trend with respect to general knowledge items. However, the Knowledge items suggest a level of uncertainty about epilepsy and its impact on the lives of persons with epilepsy. This is seen, for example, with regard to apparent uncertainty about the prognosis of epilepsy and current ability to participate in activities. The latter uncertainty may lead to restrictions in participation in physical school activities, such as physical education and participation in school trips. Finally, with respect to the Knowledge domain, it is troubling that almost 70% of the teachers described their level of knowledge of the conditions and life circumstances of persons with epilepsy at the lower end of the continuum.

Despite the generally positive trend associated with the ATPE results, the responses to the additional items developed specifically for this study were not as encouraging. Taken as a whole, these results suggest that a significant number of teachers feel that they lack sufficient knowledge about epilepsy and its impact in educational settings, and feel unprepared to recognize or appropriately respond to seizures. Further, the teachers reported feeling less aware and knowledgeable about epilepsy than any of a range of other chronic illnesses or disabilities. Clearly these are critical areas in which to focus remedial education and outreach efforts. More than 90% of the teachers would like to have more general information about epilepsy and the appropriate management of seizures in the classroom.

The qualitative component of this study, in which the teachers were asked to describe any particular aspect of epilepsy or seizure disorders about which they would like more information, provides further information about specific concerns and awareness of deficits and highlights the areas in which more education is required. Specifically, teachers identified the need for more information about seizure classification, classroom seizure management and first-aid, etiology and treatment, impact of epilepsy and its treatment on school performance, talking about epilepsy in the classroom and helping other students understand seizures and epilepsy, and effective parent-teacher communication.

The Epilepsy Foundation web site, which was extensively reviewed during preparation of this research, currently

provides a wealth of information on these specific topics, and appears to have appropriately and effectively targeted the information needed by teachers. In addition, both The Epilepsy Project (*epilepsy.com*) and the Centers for Disease Control and Prevention have very informative and reliable web sites that provide both general epilepsy information and information specifically developed for parents and teachers concerning epilepsy and education. Unfortunately, however, it appears clear from the present study that teachers are not accessing this information. Although the need for better preparation and provision of information during teacher training is critical, much of the information that currently employed teachers are seeking is available and easily accessible through the Epilepsy Foundation and other information sources. The issue, therefore, appears to be raising awareness of the availability of this information, and making it more accessible, possibly through the use of printed materials, which appears to be the preferred medium for gaining such information.

Several important limitations affect the application of these results. The response rate represents a particularly limiting aspect of this study and the generalization of the results. The response rate of 25.6% is below the generally accepted minimum of 40%, but is similar to that reported in other large-scale studies conducted among teachers in the United States [9,20]. Further, the sample, although geographically diverse, was composed almost entirely of white female teachers, and the majority (58%) were recruited from the Midwest. It does appear from both an analysis of the teacher lists that we received and other large-scale surveys performed by other researchers that U.S. middle school and elementary teachers are still predominantly both female and white. For example, in a 1999 survey conducted among 4000 public school teachers from across the United States, the sample was 76% female and 92% white [20]. However, the slightly higher percentage of white females in the present sample suggests that a better representation of males and teachers from ethnically diverse backgrounds would be preferable. This is particularly important to further evaluate relationships suggested in the present study, such as that between ethnicity and the Attitude scale and, to a lesser extent, the Knowledge scale of the ATPE. Further, a better representation of teachers from each region of the country would provide a more accurate representation of the questions under study.

Finally, with respect to instrumentation, although the ATPE appears to be a valid and reliable instrument, it is based on the direct measurement approach to attitude assessment. Development of a current and psychometrically sound indirect measure of epilepsy attitudes is critically needed and would be a most helpful addition to epilepsy attitude research. Further, there is some ambiguity associated with the items on the Knowledge scale of the ATPE, which may affect the validity and reliability of these items. Specifically, for many of the items, the “correct” answer would in fact depend on undefined variables, such as factors inherent in a specific individual (e.g., “Persons with

epilepsy can safely operate machinery”) or the location of the respondent (e.g., “Persons with epilepsy should be prohibited from driving,” for which respondents in different states may provide different but perhaps equally correct answers, based on their knowledge of relevant laws in their state, because driving restrictions vary by state).

5. Summary and conclusion

The present study represents the largest collection of data on teachers’ attitudes toward and knowledge about epilepsy in the United States in recent times. It may be said that the results suggest a somewhat positive picture of teachers’ attitudes about epilepsy. It appears, however, that a number of historically problematic and stigmatizing ideas about epilepsy and persons with epilepsy remain prevalent. Further, the levels of preparedness for teaching students with epilepsy and awareness of the condition appear to remain significant problems among the nation’s teachers.

To address this issue, the results suggest a number of specific foci. First, at the level of teacher preparation, it is necessary to identify ways to increase exposure to accurate epilepsy information and provide information about appropriately handling seizures in the educational setting to teachers-in-training. Second, it is necessary to increase awareness of and access to existing resources that already address many of the questions teachers have, such as are available through the Epilepsy Foundation. Finally, in light of the potentially critical role that teachers play in the relationship between the early educational experience and future success and quality of life, and because the results suggest that a significant number of teachers feel unprepared to effectively deal with a number of aspects of epilepsy, it is critical that further attention be paid to this relationship. Specifically, further assessment of the role of teachers in the psychosocial development and quality of life of students with epilepsy, further teacher attitude research, and ongoing development and implementation of epilepsy education programs are needed.

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