Development, Psychometric Analysis, and Validation of an Error-Choice Test to Measure Attitudes Toward Persons with Epilepsy

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ABSTRACT. The Test Of Knowledge About Epilepsy (KAE) is a disguised indirect measure of attitudes toward persons with epilepsy consisting of 20 error-choice test items requiring respondents to select one of four incorrect alternatives. To hide the true purpose of the test, 20 items of general knowledge about epilepsy are interspersed with the error-choice items. Study #1 involved the development of the KAE and psychometric analyses of prototype KAE data from a sample of 406 respondents. Results indicated satisfactory item characteristics, adequate reliability and homogeneity, and preliminary support for the measure's construct validity. In Study #2, analyses of data from a revised KAE obtained from a second sample of 325 respondents substantiated both the adequacy of the instrument's psychometric characteristics and its construct validity. The concurrent and discriminant validity of the KAE were supported by analyses of the associations of the KAE with a summated-rating direct measure of attitudes, a measure of social desirability responding, and measures of respondents' sociodemographic and experiential attributes. The KAE may be useful as a supplement to more traditional direct measures for the investigation of human-service providers' attitudes toward persons with epilepsy.

The stigma-of-epilepsy model has been proposed (Bagley, 1972; Dell, 1986) to account for the observed difficulties of psychosocial adjustment to impairment among persons with epilepsy (Antonak & Livneh, 1992; Levin, Banks, & Berg, 1988). This societal stigma consists of discrediting attributes (e.g., criminal propensities, seizure-induced aggressiveness, mental incompetence) that support restrictions on typical life experiences and limitations on opportunities to
achieve independence. If the person with epilepsy internalizes the rejection and discrimination by society, he or she may express reactions (e.g., denial, anxiety, depression, anger) and manifest behaviors (e.g., dependency, withdrawal, aggression) that reinforce the misconceptions, prejudicial attitudes, and discriminatory behaviors of persons without epilepsy. Scrambler and Hopkins (1990) have pointed out that perceived discrimination (felt stigma) may be more common among persons with epilepsy than actual instances of discrimination (enacted stigma). In both cases, the stigma may become self-perpetuating, similar to the stigma cycles associated with race, religion, or physical attractiveness (Ajzen & Fishbein, 1980; Goffman, 1963).

Interventions to remove attitude barriers to full integration in society (Gutteling, Seydel, & Wiegman, 1986; Mason, Fenton, & Jamieson, 1990; Sands & Zalkind, 1972; Stude, 1973) have been based in large part upon the results of research on the valuation of persons with epilepsy by various groups (Austin, McBride, & Davis, 1984; Beran, Jennings, & Read, 1981; Gade & Toutges, 1983; Holdsworth & Whitmore, 1974). The usefulness of this research, however, is limited by the quality of the method selected to operationalize attitudes toward persons with epilepsy. Without assurances of the freedom of the obtained data from bias, the validity of the conclusions may be questioned.

Attitude measurement methods are divided into two types (Antonak & Livneh, 1995; Dovidio & Fazio, 1992). Direct methods, in which respondents are made aware that their attitudes are being measured by the nature of the measurement technique, include: opinion surveys, interviews, sociometrics, rankings, adjective checklists, paired comparison scales, semantic differential scales, summed rating scales, and social distance scales. Although there is considerable diversity among these methods, all are subject to certain systematic errors that threaten the validity of the resultant data; namely, respondent sensitization, response styles, and reactivity (Antonak & Livneh, 1988). Four groups of indirect attitude measurement methods are available that overcome these threats: physiological methods, nonobtrusive behavioral observations, projective techniques, and disguised procedures (Livneh & Antonak, 1994). In contrast to the direct methods, the respondent's performance on an indirect measure is thought to reveal latent psychosocial constructs that are interpreted as attitude. Indirect methods have seldom been used in disability attitude research (Livneh & Antonak, 1994) and never to study attitudes toward persons with epilepsy. The goal of the present research was to investigate the usefulness of one of these indirect methods to measure attitudes toward persons with epilepsy—the disguised procedure called the error-choice test method.

The error-choice test method (Antonak & Livneh, 1995) presents the respondent with a so-called information test consisting of multiple choice items in which all of the alternatives are incorrect. The results of previous research have shown that respondents select erroneous alternatives that are consistent with their attitude toward the referent of the test. That is, attitudes are measured by analyzing the biased guessing of respondents to objective test items with no right answer. Only 11 studies since 1948 have used the error-choice test method to study attitudes, and none of these concerned attitudes toward persons with disabilities.
This article begins with a description of the steps undertaken to develop the error-choice Test Of Knowledge About Epilepsy (KAE). Study #1 presents the results of psychometric and validity analyses of data from 460 respondents to a prototype form of the KAE. The instrument was then revised and KAE data from a second group of 325 respondents were collected. Study #2 presents the results of analyses investigating the psychometric characteristics of the KAE as well as its construct, concurrent, and discriminant validity.

STUDY #1

METHOD

Instrument Development

Principles for the construction of an error-choice test have been provided elsewhere (Antonak & Livneh, 1995). To construct the KAE, a set of 39 error-choice items was written: (a) 22 factual items for which the truth was determinable but with four incorrect answers (type TD), (b) 11 factual items for which the truth was indeterminable because there were no data to answer the question (type TIF), and (c) 6 controversial items for which the truth was indeterminable (type TIC). For the last two types, four answers varying in direction and intensity from a hypothetical neutral point were composed. In addition, a set of 28 very difficult general knowledge items concerning epilepsy was written that included the correct answer among the four alternatives (type GK).

Experts, representing the disciplines of neurology, pediatrics, neurosurgery, rehabilitation psychology, neuropsychology, nursing, and special education, were sent a detailed description of the error-choice technique, the research proposal, and the two sets of items. Examination of the responses of five experts (the nurse declined because of other commitments and the rehabilitation psychologist because of disagreement with the methodology) led to 55 revised items (15 type TD, 11 type TIF, 6 type TIC, and 23 type GK) that were randomly arranged on a prototype error-choice test called the “Test Of Knowledge About Epilepsy - Form P.”

Sample

The KAE - Form P data for these analyses were collected from a total of 406 respondents enrolled in a variety of undergraduate and graduate courses at two universities. Data were also collected on the respondent’s age, gender, marital status, heritage, educational level, and professional specialization as determined by degree program or major, or by occupation, if employed longer than one year. Of the total set of respondents: 96 were male and 310 were female; 331 were White, 31 were Oriental, 23 were Black, 13 were Hispanic, and 8 were other (e.g., Native American, Arab); 216 were single, 151 were married, and 39 were
either separated, divorced, or widowed. The mean age for the sample was 28.72 years (range from 18 to 58 years, SD = 8.79); the mean educational level was 16.20 years (range from 13 to 21 years, SD = 1.73). This sample is similar to samples with whom the measure will probably be used in future research, namely, undergraduate college students, preservice graduate students, and young well-educated professionals in health, rehabilitation, mental health, and education fields.

Four categories of professional specialization were defined: (a) regular educators (n = 78), (b) special educators (n = 47), (c) special service providers (e.g., speech/language pathologists, rehabilitation counselors; n = 130), and (d) non-human-service providers (n = 151). Responses to a question concerning relationship with a person with epilepsy were organized into six ordered categories: (a) self (n = 4), (b) intimate (e.g., family member; n = 12), (c) close (e.g., relative; n = 36), (d) casual (e.g., client, coworker; n = 59), (e) acquaintance (n = 95), and (f) none (n = 200). Respondents were coded into the highest relationship category if they reported more than one. Three questions asked respondents to indicate on 6-point scales the frequency and intensity of their contact with persons with epilepsy, and their general knowledge of epilepsy.

Procedure

The respondents were asked to participate voluntarily and anonymously in a large-scale, confidential investigation of knowledge about epilepsy. Booklets were distributed by the investigators and general directions were read aloud. It was emphasized that the test was difficult but to get accurate test data respondents should respond to every item, even if they did not know the answer, because there was no penalty for guessing. After everyone was finished and the booklets were collected, respondents were told of the true nature of the test and given an opportunity to ask questions about any aspect of the study, and about epilepsy and persons with epilepsy.

RESULTS

Preliminary Analyses

Responses to the KAE - Form P items were dichotomously scored and added to obtain an attitude score and a general knowledge score. The results of iterative item, scale, and factor analyses led to the final version of the KAE test consisting of 20 error-choice items (9 type TD, 7 type TIF, 4 type TIC) and 20 general knowledge items (type GK) by deleting 15 of the 55 items on the prototype test. The 12 error-choice items that were deleted manifested one or more of these unacceptable psychometric characteristics: (a) low item-total attitude score redundancy-corrected correlation, (b) low item reliability index (i.e., the product of the item's standard deviation and its correlation with the total test score corrected for redundancy), (c) increased coefficient alpha when
the item was removed, and (d) failure to load on a common alpha factor. For the three general knowledge items that were deleted, an additional criterion for elimination was: (e) item too easy.

The respondent's score on each of the final 20 error-choice items was summed to yield an attitude score (KAE-A) and, for these psychometric analyses, and the score on each of the final 20 general knowledge items was summed to yield a general knowledge score (KAE-GK). Complete item, scale, and factor analyses were then repeated.

**Item and Test Analyses**

Inspection of the item analysis results for the 20 attitude items revealed satisfactory item characteristics in all cases. The mean of the item-to-overall score correlations corrected for redundancy was 0.44 (range from 0.29 to 0.51) with a mean item difficulty (proportion answering correctly or favorably) of 0.55 (range from 0.23 to 0.86). The mean KAE-A score for the sample was 10.95 (range from 2 to 19; SD = 3.14). The distribution of scores was essentially symmetrical (skewness = -0.08, p = 0.25) but platykurtic (zero-centered index of kurtosis = -0.44, p = 0.04). The value of the Spearman-Brown corrected split-half reliability estimate was 0.63 with a standard error of estimate of 1.91, values considered to be reasonable for a measure composed of 20 items with unequal item difficulties (Sax, 1989). Bartlett’s sphericity test of the item response correlation matrix (Tabachnick & Fidell, 1989) supported the prerequisite assumption for principal factors analysis, $\chi^2(190) = 564.34, p < 0.01$. Only one component with eigenvalue greater than 1 was obtained with loadings ranging from 0.20 to 0.49 ($M = 0.31$), accounting for 14% of the total variance. The mean KAE-GK score for the sample was 6.67 (SD = 2.14; range from 1 to 13). The mean item difficulty was 0.33 (range from 0.07 to 0.65). The distribution of the knowledge scores was positively skewed (skewness = 0.22, p = 0.04), as expected, and mesokurtic (kurtosis = -0.12, p = 0.16). The correlation between the KAE-A and KAE-GK scores for this sample was 0.05, suggesting that the error-choice attitude items measured something different from what the general knowledge items measured.

**VALIDITY ANALYSES**

Multiple regression analyses were done to investigate the associations of the sociodemographic and familiarity variables with the KAE scores, a standard validity inquiry (Brindberg & Kidder, 1982). The Multivariate General Linear Hypothesis (MGLH) routine of the SYSTAT software package for the Macintosh (SYSTAT Inc., 1992) was used to estimate and test various linear models using the backward exclusion interactive stepwise procedure. That is, after building a model using all the predictors, variables were selected for removal based upon an inspection of the partial correlations, the regression coefficients and standard errors, and tolerance values (i.e., indices of multicollinearity). Because of
information redundancy in the relationship, contact frequency, contact intensity, and knowledge variables, a composite variable representing familiarity with persons with epilepsy was created to eliminate multicollinearity in these data (mean bivariate $r = 0.59$). Bartlett’s sphericity test supported the prerequisite assumption for principal components analysis, $x^2(6) = 711.35, p < 0.01$. A single component was extracted accounting for 79% of the variance in the four variables (mean loading = 0.83). A composite score was computed for each respondent.

The correlations of the KAE-A scores with composite familiarity and age were significantly different from zero ($r_s=0.17$ and $0.16, p<0.01$), but the correlations with education and gender were not ($r_s = 0.07$ and 0.09). The best multiple regression model included, in order, the predictors’ familiarity, age, education, and gender, multiple $R^2 = 0.26, F (4, 401) = 5.74, p<0.01$, but only the familiarity standardized coefficient (0.16) and the age standardized coefficient (0.15) were significant, $t_s (406) = 2.97$ and 2.80, $p$s < 0.01.

A fixed-effects least-squares analysis of variance of the attitude scores for respondents in the four professional specialization groups was conducted using the MGLH module due to unequal sample sizes. Inspection of probability plots and nonsignificant statistical test results supported the tenability of the prerequisite assumptions of independence, normality, and homogeneity of the residuals. The main effect of professional specialization was significant, $F (3,402) = 4.37, p<0.01$. Post hoc Tukey HSD tests with a 1% alpha level showed that both the special service providers ($M = 11.58$) and the special educators ($M = 11.33$) in the sample expressed more favorable attitudes than either the regular educators ($M = 10.42$) or the non-human-service providers ($M = 10.38$). There were no significant differences among the mean KAE-A scores for individuals in the heritage or marital groups.

**STUDY #2**

A second study was undertaken to corroborate the results of Study #1 and to permit investigation of the concurrent and discriminant validity of the KAE for the study of attitudes toward persons with epilepsy. The respondents in Study #2 were administered the indirect measure and a direct measure of attitudes. This study also investigated the claim that indirect attitude measurement methods are not susceptible to respondent reactivity validity threats. Meager data from previous investigations have supported equivocal conclusions (Brigham & Cook, 1970; Rankin & Campbell, 1955). The reactivity variable selected for study was social desirability (SD) responding. SD responding is evident when the respondent, who wishes to deny or disguise socially undesirable traits, endorses only those statements on an attitude scale that he or she believes represent the socially appropriate or culturally sanctioned response (Crowne & Marlowe, 1964).
METHOD

Instruments

The KAE created in Study #1 was the indirect disguised measure of attitudes toward persons with epilepsy. Respondents were asked to provide the same sociodemographic and experiential information (e.g., age, gender, marital status, heritage, educational level, professional specialization, familiarity with persons with epilepsy).

The direct measure was the Scale of Attitudes Toward Persons with Epilepsy (ATPE), a self-report summated rating scale (Antonak & Rankin, 1982). The respondent rates each of 28 statements on a 6-point scale: -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 sum of 21 item responses provides a measure of the respondent's global attitude toward persons with epilepsy (ATPE-A), with high scores indicating a more favorable attitude; a sum of 11 item responses provides a measure of the respondent's knowledge about epilepsy (ATPE-K), with high scores indicating greater knowledge; four items are scored as both attitude and knowledge items.

The psychometric soundness of the ATPE has been supported (Antonak, 1990). In particular, the attitude and knowledge items were found to have satisfactory item characteristics. For the attitude scores, the Spearman-Brown corrected split-half reliability estimate was 0.70; for the knowledge scores, the value of the KR-20 reliability estimate was 0.54. Attitude scores were found to be significantly positively related to respondent educational level and frequency of contact with persons with epilepsy. Knowledge scores were significantly positively related to respondent age, educational level, contact frequency, and contact intensity. The best predictor of both knowledge and attitude score was educational level.

The Crowne-Marlowe Social Desirability Scale (SDS) (Crowne & Marlowe, 1960) was selected as the measure of SD responding. The SDS consists of 33 True or False statements concerning personal attitudes and traits. The items are scored according to an SD responding key and summed to yield an overall score, with high scores indicating a greater tendency toward SD responding. The lack of a significant correlation between the attitude and SDS scores in a sample is regarded as support for the conclusion that scores on the attitude instrument are not compromised by SD responding.

Sample

The data for these analyses were collected from a total of 325 respondents enrolled in a variety of undergraduate and graduate courses at two universities. Of the total set of respondents: 75 were male and 250 were female; 286 were White, 13 were Oriental, 12 were Black, 5 were Hispanic, and 9 were other (e.g.,
Native American, Arab); 181 were single, 110 were married, and 34 were either separated, divorced, or widowed; 24 were health care providers (e.g., nurses, physicians), 53 were special service providers, 17 were special educators, 96 were regular educators, and 135 were non-human-service providers. The mean age for the sample was 29.40 years (range from 18 to 64 years, \( SD = 9.67 \)); the mean educational level was 16.42 years (range from 13 to 21 years, \( SD = 1.72 \)). Answers to the question concerning the respondents' relationships to persons with epilepsy were organized into six ordered categories as in Study #1: (a) self \((n = 0 \text{ in this sample})\), (b) intimate \((n = 11)\), (c) close \((n = 21)\), (d) casual \((n = 44)\), (e) acquaintance \((n = 77)\), and (f) none \((n = 172)\). As in Study #1, a principal components analysis was conducted to eliminate multicollinearity in the data from the four familiarity variables (mean \( r = 0.52 \)). The sphericity assumption was tenable, Bartlett's \( x^2 \) (6) = 444.29, \( p < 0.01 \). A single component was extracted accounting for 64% of the variance (mean loading = 0.80). A composite score representing familiarity with persons with epilepsy was computed for each respondent.

**Procedure**

The administration of the KAE was the same as described in Study #1. All respondents also received the ATPE and were told to respond directly on the questionnaire. The instructions emphasized that the ATPE statements expressed opinions or ideas about persons with epilepsy and that there were many differences of opinion. The respondents were encouraged to express their honest opinions about epilepsy and persons with epilepsy. Selected subsamples at both universities were administered the SDS along with the KAE and the ATPE. After everyone was finished and the booklets and questionnaires were collected, respondents were debriefed as in Study #1.

Because some of the 325 respondents failed to provide complete data, the results to be presented are based on analyses of data from 323 respondents to the KAE, 320 respondents to the ATPE, and 318 respondents to both instruments. A total of 218 respondents provided complete data on the SDS.

**Statistical Analyses**

The first set of analyses investigated the adequacy of the psychometric characteristics of the three instruments. Absent psychometric adequacy, statistical analyses of data from these instruments necessary to answer the KAE validity questions could not be performed. The concurrent validity of the KAE was then investigated using bivariate correlation analyses. Multivariate multiple regression analysis (Finn, 1974) was used to investigate the discriminant validity of the KAE. This analysis provides information on the simultaneous relationship of a set of predictors (the sociodemographic and experiential variables) with two criterion variables (the KAE-A and the ATPE-A). A signifi-
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Significant omnibus relationship test is followed up with univariate (one criterion) hierarchical multiple regression analyses to locate the sources of the differential prediction. All analyses in Study #2 were done using SYSTAT's TESTAT and MGLH routines for the Macintosh (SYSTAT Inc., 1992).

RESULTS

Psychometric Analyses

Inspection of the item analysis results for the KAE-A, KAE-GK, ATPE-A, ATPE-K, and SDS items revealed satisfactory item characteristics in all cases. Table 1 presents various psychometric indices for the five scales. The reliability estimates for the KAE-A, ATPE-A, ATPE-K, and SDS were judged to be adequate. The negative skewness indices for the KAE-A, ATPE-A, and ATPE-K were expected, given the above-average levels of education, professional experience, and familiarity with persons with epilepsy in the samples. The low values for the median, reliability, mean item-to-total score correlation, and mean item difficulty, and the positive skewness for the KAE-GK, were also expected as these items were written to be obscure and difficult. The sphericity assumption concerning the KAE-A item correlation matrix was tenable, Bartlett's $x^2$ (190) = 460.26, $p < 0.01$. Only one component with eigenvalue greater than 1 was obtained, accounting for 13% of the variance with loadings for the items ranging from 0.20 to 0.43 ($M = 0.34$). The correlation between the KAE-A and KAE-GK scores for this sample was 0.12, consistent with the result of Study #1 that the

Table 1. Psychometric Indices for the KAE, ATPE, and Crowne-Marlowe SD Scales

<table>
<thead>
<tr>
<th>Index</th>
<th>KAE-A</th>
<th>KAE-GK</th>
<th>ATPE-A</th>
<th>ATPE-K</th>
<th>SDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n$</td>
<td>323</td>
<td>323</td>
<td>320</td>
<td>320</td>
<td>218</td>
</tr>
<tr>
<td>Minimum</td>
<td>2</td>
<td>1</td>
<td>51</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Maximum</td>
<td>19</td>
<td>13</td>
<td>117</td>
<td>11</td>
<td>29</td>
</tr>
<tr>
<td>Median</td>
<td>12</td>
<td>6</td>
<td>100</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>$M$</td>
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<td>97.80</td>
<td>8.44</td>
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<td>$SD$</td>
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<td>2.12</td>
<td>11.80</td>
<td>1.60</td>
<td>6.34</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.40**</td>
<td>0.28*</td>
<td>-1.00**</td>
<td>-1.07**</td>
<td>0.16</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>0.10</td>
<td>-0.15</td>
<td>0.98**</td>
<td>1.43**</td>
<td>-0.71*</td>
</tr>
<tr>
<td>$r_{xx}^a$</td>
<td>0.57</td>
<td>0.20</td>
<td>0.86</td>
<td>0.52</td>
<td>0.88</td>
</tr>
<tr>
<td>$s_{yy}^b$</td>
<td>2.42</td>
<td>2.08</td>
<td>6.02</td>
<td>1.36</td>
<td>3.01</td>
</tr>
<tr>
<td>Mean $r^c$</td>
<td>0.43</td>
<td>0.24</td>
<td>0.49</td>
<td>0.41</td>
<td>0.42</td>
</tr>
<tr>
<td>Mean $d^d$</td>
<td>0.60</td>
<td>0.32</td>
<td>N/A</td>
<td>0.77</td>
<td>0.40</td>
</tr>
</tbody>
</table>

*a Reliability estimate (Spearman-Brown corrected split-half coefficient, KR-20, or coefficient alpha, as appropriate)

*b Standard error of estimate.

c Mean of the item-to-total score correlations.

d Mean of the item difficulties (mean proportion answering correctly or favorably).

*p < 0.05  **p < 0.01.
error-choice attitude items measured something different from what the general knowledge items measured.

Validity Analyses

The health care providers, special service providers, and the special educators were combined into one group, called special service providers. Three dummy dichotomous variables were then created to represent professional group membership (i.e., special service providers, regular service providers, non-human-service providers) in the subsequent validity analyses (Suits, 1957). The correlation matrix for the KAE-A, KAE-GK, ATPE-A, ATPE-K, and SDS scores, and the sociodemographic and experiential predictors (i.e., age, gender, education, familiarity, and the three dummy professional group membership variables) are presented in Table 2.

The largest bivariate correlation was between the KAE-A and the ATPE-A, with 21% shared variance. Although both the KAE-A and the ATPE-A were significantly related to the ATPE-K, the ATPE-K accounted for 49% of the variation in the ATPE-A scores whereas it accounted for only 12% of the variation in the KAE-A scores. As expected, the highest scores on the KAE-GK were obtained by the respondents with the most education, familiarity, and professional training and experience related to persons with epilepsy, individuals who were the oldest among those in the sample. Neither the KAE-A nor the ATPE-A scores were related to SD responding scores.

For the multivariate multiple regression analysis of these data, the KAE-A and ATPE-A were selected as criterion variables, and the eight predictor variables were KAE-GK, ATPE-K, age, gender, education, familiarity, and the first two dummy professional group membership variables. The value of the omnibus test statistic was significant, Wilks’ $\lambda = 0.40$, Rao’s approximate $F(16,624) = 25.25$, $p < 0.01$. Inspection of the standardized multivariate multiple regression coefficients suggested a source of this differential prediction, namely, variation in KAE-A scores was attributable to variation in ATPE-K scores (0.25), age (0.24), and familiarity (0.15), whereas variation in ATPE-A scores was attributable to variation in ATPE-K scores alone (0.62).

A hierarchical univariate multiple regression analysis for each attitude measure separately was used as a follow-up procedure. The sociodemographic and experiential variables (i.e., age, gender, education, familiarity, and the first two profession groups) were entered as a block in the first step, the two knowledge variables were entered as a block in the second step, and the ATPE-A was entered in the last step. This model was selected to investigate whether the ATPE-A contributed significantly to the prediction of KAE-A scores after the contributions of the sociodemographic, experiential, and knowledge variables had been taken into account at previous steps. The squared multiple correlation coefficient increased significantly from the first to the second step (0.16 to 0.22), $F(2,309) = 11.49$, $p < 0.01$. The increment to step 3 (multiple $R^2$ change = 0.04) was significant, $F(1,308) = 18.86$, $p < 0.01$. Although the full model regression was significant, multiple $R = 0.52$, $F(9,308) = 12.35$, $p < 0.01$, only the
Table 2. Correlation Matrix for the Attitude Scores, Knowledge Scores, SD Responding Score, and Seven Sociodemographic and Experiential Variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) KAE-A</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) KAE-GK</td>
<td>12</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) ATPE-A</td>
<td>46***</td>
<td>14</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) ATPE-K</td>
<td>34***</td>
<td>12</td>
<td>70***</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) SD</td>
<td>00</td>
<td>—</td>
<td>-07</td>
<td>—</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(6) Age</td>
<td>29***</td>
<td>30***</td>
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<td>18</td>
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<td>(8) Education</td>
<td>20*</td>
<td>23**</td>
<td>34***</td>
<td>22**</td>
<td>00</td>
<td>64***</td>
<td>01</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>(9) Familiarity</td>
<td>24**</td>
<td>22**</td>
<td>26***</td>
<td>19*</td>
<td>-20</td>
<td>16</td>
<td>09</td>
<td>18</td>
<td>—</td>
</tr>
<tr>
<td>(10) PG1</td>
<td>19*</td>
<td>26***</td>
<td>21**</td>
<td>11</td>
<td>-18</td>
<td>30***</td>
<td>06</td>
<td>37***</td>
<td>17</td>
</tr>
<tr>
<td>(11) PG2</td>
<td>-03</td>
<td>-05</td>
<td>07</td>
<td>00</td>
<td>19</td>
<td>09</td>
<td>08</td>
<td>24***</td>
<td>00</td>
</tr>
<tr>
<td>(12) PG3</td>
<td>-14</td>
<td>-19*</td>
<td>-26***</td>
<td>-10</td>
<td>01</td>
<td>-36***</td>
<td>-13</td>
<td>-57***</td>
<td>16</td>
</tr>
</tbody>
</table>

Note. Decimal points are omitted. Pairwise correlation n’s range from 318 to 325, except for the SD pairwise correlations with n’s that range from 215 to 218. PG1 = dummy variable representing special service providers, PG2 = regular service providers, PG3 = nonhuman-service providers. *p < 0.05, **p < 0.01, ***p < 0.001.

standardized coefficients for the predictors ATPE-A (0.32), age (0.20), and familiarity (0.12) were significant, ts (406) = 4.35, 3.06, and 2.35, ps < 0.01.

For the ATPE-A, the full model multiple regression equation for the sociodemographic, experiential, and knowledge predictors was significant, multiple R = 0.75, F(8, 309) = 47.87, p < 0.01. Only the standardized coefficients for the predictors ATPE-K (0.62) and gender (0.10) were significant, ts (406) = 15.63 and 2.62, ps < 0.01.

GENERAL DISCUSSION

The psychometric characteristics of the 20 error-choice items on the KAE were found to be adequate, and the test’s internal consistency reliability was judged acceptable. Principal components analyses supported the homogeneity of the items and revealed that the KAE measured a single construct. These conclusions are based upon analyses of data obtained in two studies from a total of 731 respondents similar to respondents with whom the measure will most likely be used in future research.

Four findings in Study #1 supported an assertion of the construct validity of the KAE as a measure of attitudes toward persons with epilepsy, namely, (a) the instrument was unidimensional (i.e., it measured a single construct), (b) the construct being measured was not general knowledge of epilepsy, (c) KAE attitude scores were significantly related in the predicted direction to the respondent’s familiarity with persons with epilepsy and to professional training and experience in special education and special services, and (d) scores were not related to the respondent’s age, gender, heritage, or marital status. The results of
Study #2 corroborated the construct validity of the KAE. Analyses of data in Study #2 also supported the concurrent validity of the KAE. In particular, the respondents' scores on this indirect measure were found to be unidimensional and significantly related to their scores on the direct measure of attitudes.

Two findings of study #2 provided support for the discriminant validity of the KAE. First, KAE scores were not compromised by the reactivity threat of SD responding. The finding that scores on the direct measure also were not compromised by SD responding was not unexpected as it had been revealed in an earlier study (Antonak, 1990). Second, although the KAE and the ATPE are related measures of attitudes toward persons with epilepsy, they appear to be tapping somewhat different dimensions of this construct. The bivariate correlations showed that although knowledge of epilepsy, as measured by the ATPE-K, accounted for 49% of the variation in the direct attitude score, only 12% of the variation in the indirect attitude score was accounted for by knowledge. The multivariate multiple regression analysis clarified this finding. The regression coefficients revealed that both measures were positively related to knowledge about epilepsy, but respondent age and familiarity with persons with epilepsy differentiated between the indirect and the direct measures. Moreover, respondent gender was related to score on the direct measure but not to score on the indirect measure.

Additional validity investigations are needed to relate KAE scores to other respondent sociodemographic, experiential, and personality characteristics (e.g., ethnocentrism, acquiescence, self-concept, locus of control), and, what is more important, to behavioral indicators of attitudes (e.g., working with or serving persons with epilepsy and other disabling impairments). If it can be shown that the KAE is a valid predictor of attitudes toward persons with epilepsy, it should be useful as a supplement to the more traditional direct attitude instruments for the investigation of questions concerning the formation, structure, and correlates of those attitudes among special service providers.

Many rehabilitation psychology, rehabilitation counseling, and related human-service programs expose their trainees to the study of attitudes toward persons with disabilities. Many trainees, in fact, are expected to respond to one or more of the most commonly used attitude scales (e.g., the Attitude Toward Disabled Persons scale, the Disability Factor Scales - General, the Scale of Attitudes toward Disabled Persons) as part of their psychometric and clinical training. Administered in conjunction with one of these direct scales, an indirect measure such as an error-choice test may point out discrepancies between trainees' professed attitudes as tapped by the direct measure and those that surface in response to an indirect measure. When discrepancies occur, they may also serve as a basis for the trainee's self-awareness and self-growth, and as a goal for personal counseling that is often required as a component of a rehabilitation professional's training program. Moreover, data from a less biased, indirect measure, such as an error-choice test, may prove useful in an evaluation study of a program to train rehabilitation professionals that includes attitude change as one criterion of success.
NOTE

1. It must be emphasized that the final 40-item version of the KAE yields only a single score from the 20 error-choice items measuring a respondent’s attitude toward persons with epilepsy. The 20 general knowledge items are present on the KAE only to disguise the true purpose of the measure and do not yield a score measuring the respondent’s general knowledge of epilepsy. These 20 general knowledge items were selected not because they met generally accepted psychometric criteria for the construction of a mastery test but because they were the most obscure and difficult that we could write.

REFERENCES


Notes. Researchers wishing to collect data for the validation of the KAE may obtain a copy of the instrument and scoring key free of charge from either author.

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