A web-based survey of attitudes toward epilepsy in secondary and tertiary students in Malaysia, using the Public Attitudes Toward Epilepsy (PATE) scale

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Background: Students’ attitudes toward epilepsy have been studied in several countries, but none of the studies used a quantitative scale. We aimed to determine the validity and reliability of the Public Attitudes Toward Epilepsy (PATE) scale in a homogenous population consisting of secondary and tertiary students in Malaysia and to quantify their attitudes toward epilepsy, using a web-based survey.

Results: A total of 227 respondents with a mean age of 19.6±2.07 years, predominantly Chinese (85%), female (62%), and in a pre-university education level (71%) completed the web-based survey. Psychometric testing showed that the PATE is a valid and reliable scale to be applied in a homogenous population. The mean score in the personal domain was significantly higher than that in the general domain (2.73±0.61 vs. 2.12±0.60, respectively, p<0.001). Compared with a study previously performed on a general population (Lim et al., 2012 [10]), the mean score in the general domain was significantly lower (p<0.01), whereas there was no significant difference between the mean scores in the personal domain. The mean scores in the general domain were significantly lower for those with tertiary education (p<0.001) but did not correlate with gender and ethnicity.

Conclusion: The attitudes of secondary and tertiary students are more positive than those of the general population in the general domain but not in the personal domain.

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1. Introduction

Public attitudes in secondary and tertiary students have been studied in Cameroon [1–3], India [4,5], Kuwait [6], Tanzania [7], and Turkey [8], and these students showed more positive attitudes toward epilepsy than those in the general community in most countries, except Turkey. A systematic review by the first author [9] had concluded that the questions used in these studies were not standardized, making direct comparison between these countries difficult. In addition, only yes–no questions were used in these studies, making quantification of the attitudes toward epilepsy impossible.

The Public Attitudes Toward Epilepsy (PATE) scale was performed in a general population and factored into two domains, i.e., a general domain that required minimal or no consideration of respondents’ involvement and a personal domain that required a long-term personal commitment or involvement [10]. As reported in the previous study, the mean scores of those with tertiary education were significantly lower for the general domain but not for the personal domain, and age was positively correlated with the mean scores in the personal domain but not in the general domain [10]. Therefore, it is postulated that the secondary and tertiary students will score lower for the general domain but not for the personal domain. However, in order to apply the scale for future comparison, it is essential to test the reliability and validity of this scale in a homogenous group.

Web-based surveys or online surveys are becoming more popular in research, accounted for 20% of global-data-collection expenditure in 2006 [11]. There are several advantages to using a web-based survey, including faster and simpler data collection, cheaper cost, applicability of restriction to avoid missing data, and, more importantly, minimal social desirability effects as a result of being less intrusive [12].

This study, therefore, aimed to test the reliability and validity of this scale in a homogenous group and quantify the attitudes toward epilepsy in secondary and tertiary students in Malaysia, using a web-based design with a quantitative scale (PATE). A comparison with the previous study in a general population was also performed.
2. Methodology

2.1. Sample recruitment

This was the first web-based survey of public attitudes toward epilepsy in Malaysia, as well as in Asia, and was performed after approval from the ethics committees at the University Malaya Medical Center (MEC Ref No: 878.10). Two hundred and seventy-five high school and college students from Petaling Jaya and Kuala Lumpur in Malaysia were selected through convenience sampling and were invited to participate in this survey through an email invitation from the research team, and 227 (82.5%) responded. Responding to the email invitation was regarded as giving consent. All questionnaires were administered anonymously.

2.2. Measures

The Public Attitudes Toward Epilepsy (PATE) scale is a 14-item scale measuring attitudes of the public toward epilepsy [10]. A 5-point Likert scale was used for scoring with 1 being strongly disagree and 5 being strongly agree. Positively stated items were reversely scored so that a higher score would indicate a more negative attitude. This scale was performed in a general population and factored into two domains, i.e., a general domain (nine items) that required minimal or no consideration of respondents’ involvement and a personal domain (five items) that required a long-term personal commitment or involvement such as marrying a person with epilepsy, working with them, or employing them. This is a validated scale with good internal consistency (Cronbach’s alpha of 0.868 and 0.633 in the general and personal domains, respectively).

A form comprising the 14 items in the PATE scale was designed in the SurveyMonkey website, which allowed the researchers to send out email invitations. Items in both domains were intermixed according to the item number in Table 1. Responding to a link in the email allowed the respondents to enter their answers, which were saved automatically into a database. Every item had to be answered before the respondents were allowed to proceed to the next item to avoid missing data. The instructions emphasized that the scale was not a test but rather an opinion questionnaire.

Demographic data were also collected on the subject’s gender, age, ethnicity, and highest education level and on the presence of the subject’s family member(s) with epilepsy or seizures.

2.3. Statistical analysis

This study employed the Statistical Package for Social Sciences version 19 (SPSS 19.0) for data analysis. All demographic data were analyzed descriptively, with nominal data presented as frequencies and percentages and with continuous data presented as means and standard variations. For continuous data, independent t-tests were used for group comparison.

2.3.1. Psychometric properties of the PATE in a specific population

The psychometric testing was based on the following assumptions:
1. Items measuring the same concept should have approximately equal variances (standard deviations); a test of equal item variance.
2. Items should be internally consistent and assessed as having item-total correlations of 0.4 and above.
3. Items in a given scale should contain approximately the same proportion of information about a concept, with roughly equal item-total correlations.
4. An item should correlate more highly with its hypothesized scale than with scales measuring other concepts (item discriminant validity), tested with correlation analysis. Pearson correlation coefficients of 0.5 to 1.0 were accepted as indicators of a strong correlation [13].

5. Scale scores should be reproducible (as assessed by Cronbach’s α coefficient) and interpretable (i.e., the correlation between scales should be less than their internal reliability coefficients if each scale measures a unique concept). Cronbach’s α values of 0.7 to 0.9 were considered acceptable [14], whereas values of 0.6 to 0.7 were considered satisfactory. Mean inter-item correlation was used if α values were below 0.7, and a range of 0.2 to 0.4 was used to ensure that items were measuring the same construct [15].

2.3.2. Comparison between the scores in personal and general domains

The difference between the mean scores in the personal and general domains was tested with a paired sample t-test. In order to test whether the score in the personal domain in the PATE scale was influenced by the score in the general domain, regression analysis was performed.

2.3.3. Comparison with previous study

Independent t-tests were calculated using OpenEpi [16], an open-source statistical software package, to determine the significance of differences in the mean scores between the current and previous studies.

3. Results

3.1. Demographic characteristics of the sample

A total of 227 respondents completed the web-based survey. The mean age of the respondents was 19.6 ± 2.07 years (ranging from

Table 1

<table>
<thead>
<tr>
<th>ID</th>
<th>Item</th>
<th>Mean (SD)</th>
<th>Item-total correlation</th>
<th>General domain</th>
<th>Personal domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I feel uncomfortable working with someone who has epilepsy.</td>
<td>2.62 (0.93)</td>
<td>.344</td>
<td>.629</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I will advise my family members against marrying someone with epilepsy.</td>
<td>2.73 (0.92)</td>
<td>.250</td>
<td>.658</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I would marry someone with epilepsy, even though he/she has epilepsy.</td>
<td>3.01 (0.88)</td>
<td>.284</td>
<td>.657</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I would date someone even though he/she has epilepsy.</td>
<td>2.85 (0.94)</td>
<td>.428</td>
<td>.716</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>If I am an employer, I would give equal employment opportunities to someone with epilepsy.</td>
<td>2.42 (1.12)</td>
<td>.286</td>
<td>.524</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I will not mind being seen in the company with someone known to have epilepsy.</td>
<td>2.14 (0.86)</td>
<td>.619</td>
<td>.373</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I would stay away from a friend if I knew she/he had epilepsy.</td>
<td>1.96 (0.86)</td>
<td>.602</td>
<td>.307</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>People with epilepsy have the same rights as all people.</td>
<td>1.96 (1.04)</td>
<td>.511</td>
<td>.230</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>People with epilepsy should be isolated from others.</td>
<td>2.02 (0.97)</td>
<td>.706</td>
<td>.349</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>People with epilepsy should not marry.</td>
<td>2.01 (0.92)</td>
<td>.645</td>
<td>.353</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>People with epilepsy should not participate in social activities.</td>
<td>2.00 (0.90)</td>
<td>.725</td>
<td>.373</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>People with epilepsy should not study in college or university.</td>
<td>1.78 (0.80)</td>
<td>.794</td>
<td>.426</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>People with epilepsy should study in a special school.</td>
<td>2.69 (1.08)</td>
<td>.574</td>
<td>.239</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Schools should not place children with epilepsy in regular classrooms.</td>
<td>2.44 (1.03)</td>
<td>.620</td>
<td>.306</td>
<td></td>
</tr>
</tbody>
</table>

The correlations in bold indicated that all items correlated more strongly with their domain total, as compared with their correlation with other domain.

* Based on Pearson’s correlations, with p-value as <0.001 unless stated otherwise.

* These items were reversely scored.
17 to 28 years). The respondents were predominantly female (62.1%) and Chinese (85.5%). A total of 12.8% of the respondents were at the secondary level, 71.4% at pre-university level, and 15.9% at tertiary level. A total of 2.6% of the respondents had family member(s) with epilepsy or seizures.

3.2. Psychometric properties of the PATE scale for secondary and tertiary students

As a test of equal item variance, the standard variations of the items in the personal and general domains were measured. Within the personal domain, the standard variations of all items were approximately equal, ranging from 0.88 to 1.12. The standard variations of all items within the general domain were also approximately equal (ranging from 0.80 to 1.08), as shown in Table 1.

The items were internally consistent within each domain, with item-total correlations from 0.524 to 0.716 in the personal domain and from 0.511 to 0.794 in the general domain, which are within the acceptable range of 0.4 and above. The items correlated more highly with their hypothesized domain than with the other domain (Table 1).

Cronbach’s $\alpha$ for the general domain was 0.816 (within the acceptable range of $0.7-0.9$), with a mean inter-item correlation of 0.343, as shown in Table 2. For the personal domain, Cronbach’s $\alpha$ was 0.620 (satisfactory), with a mean inter-item correlation of 0.259.

3.3. Relationship between personal and general domains

The mean score in the personal domain was significantly higher than that in the general domain, using a paired samples t-test ($2.73 \pm 0.61$ vs. $2.12 \pm 0.60$, respectively, $p<0.001$). Regression analysis was performed to assess the ability of the score in the general domain to predict the attitudes measured by the personal domain in the PATE scale. The total variance explained by the general domain was only 25.6%, $F (1, 225)=77.53, p<0.001$, as demonstrated graphically by the scatter plot and linear curve estimation in Fig. 1.

3.4. Comparison with previous study

As shown in Fig. 2, the mean score in the general domain was significantly lower than that in the previous study performed on a general population ($p<0.01$), whereas there was no significant difference between the mean scores in the personal domain.

3.5. Scores by domains and demographic characteristics

The mean scores in the general domain were significantly lower for those with tertiary education ($p<0.001$) but not correlated with gender and ethnicity. For the personal domain, none of the demographic variables showed significant difference between the subgroups (see Table 3).

### Table 2

<table>
<thead>
<tr>
<th>Domain (number of items)</th>
<th>Study</th>
<th>Mean (SD)</th>
<th>Reliability (Cronbach’s $\alpha$)</th>
<th>Mean inter-item correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>General domain (9)</td>
<td>Current</td>
<td>2.12 (0.60)</td>
<td>0.816</td>
<td>0.343</td>
</tr>
<tr>
<td></td>
<td>Previous</td>
<td>2.24 (0.68)</td>
<td>0.688</td>
<td>0.333</td>
</tr>
<tr>
<td>Personal domain (5)</td>
<td>Current</td>
<td>2.73 (0.61)</td>
<td>0.620</td>
<td>0.259</td>
</tr>
<tr>
<td></td>
<td>Previous</td>
<td>2.70 (0.58)</td>
<td>0.633</td>
<td>0.263</td>
</tr>
</tbody>
</table>

*p-Value is $<0.01$, as compared with the previous study.

### Fig. 1.
Linear curve estimation on how scores in the general domain related to the scores in the personal domain ($n=227$).

### Fig. 2.
The mean scores in the personal and general domains of the PATE scale in the current (on students, $n=227$) and previous (on a general population, $n=130$) studies.

* $p$-Value is $<0.01$ (two-tailed).

4. Discussion

This study showed that the PATE scale is a validated and reliable scale to measure attitudes toward epilepsy in a homogenous group, which fulfilled the assumptions of (1) equal item variance, with the items within the same domain having approximately equal variances, (2) internal consistency, with all item-total correlations above 0.4, (3) equal item-total correlation, (4) item discriminant validation, with all items correlating more strongly with their domain total, as compared with their correlation with other domain and (5) reproducibility, with acceptable Cronbach’s $\alpha$ of 0.816 and 0.620 in the general and personal domains, respectively.

The psychometric properties of the PATE scale in the current study were comparable with those found in the previous study, with good item discriminant validation in each domain and internal consistency. The degree of internal consistency as measured by Cronbach’s $\alpha$ in the current study was comparable with that in the previous study,
i.e., 0.816 vs. 0.868 in the general domain and 0.620 vs. 0.633 in the personal domain. The item-to-total correlations in the current study were all above 0.4, probably because the current study was performed in a homogenous group.

Although the mean score in the personal domain was significantly correlated with the mean score in the general domain, the correlation coefficient was lower than the internal reliability coefficients, supporting the contention that each domain was measuring a unique concept. Regression analysis demonstrated that only 25.6% of the variance of the score in the personal domain was explained by the score in the general domain. This indicates that there are other factors, besides those covered by the general domain, that influence the score in the personal domain. Future studies determining the predictive or correlated factors covered by the attitudes in the personal domain will be important to help overcome stigma in epilepsy.

As shown in this study, the attitudes of the students for the general domain were significantly more positive than the attitudes of the general population. This is consistent with the findings of previous studies on the public attitudes of students [1–7]. However, such a relationship was not found in the personal domain.

Similarly, a positive correlation between the education level and the attitudes toward epilepsy was noted for the general domain but not for the personal domain. This is consistent with the results noted in the initial PATE study, which reported a positive correlation between increased education and more positive attitudes toward epilepsy only in the general domain [10]. This supports the notion proposed in that study that there is an isolation of generalized knowledge-based attitude vs. an interpersonal emotion-based attitude toward perceiving people with epilepsy.

4.1. Limitations

Social desirability may have affected the results obtained from the public survey. However, an interview with paper-and-pencil is more intrusive, causing a tendency to answer more positively. A web-based survey tends to minimize social desirability effects, and thus, the results will tend to be more negative, especially when answering the questions in the personal domain. This possibility has to be taken into consideration when interpreting the results.

A second limitation was that the study method required fluency and reading comprehension in English, as well as access to the web, which could have biased the sample. However, learning English is part of the primary and secondary education systems in Malaysia, and most families or schools have access to the web.

This study recruited students from private colleges and Chinese secondary schools, resulting in the majority (85.5%) of the participants being Chinese, which is disproportionate to the ethnic distribution in Malaysia with only 24.6% Chinese.

4.2. Study implications

As far as is known, this is the first study on attitudes toward epilepsy using a web-based survey. This ensured an easier, simpler, and more reliable data collection, with possibly less social desirability effects. This should enable standardized replication of the study and increase the ease of comparison, either with other populations or longitudinally in the same population.

This study has demonstrated the validity and reliability of the PATE scale in a homogenous population and, thus, allows the scale to be applied to either a general or a specific population. In addition, differences between the scores of different populations can be tested quantitatively.

5. Conclusion

The PATE scale is a validated and reliable scale to measure attitudes toward epilepsy in a homogenous population and can be delivered through a web-based survey. The attitudes of secondary and tertiary students are better than those of the general population for the general domain but not for the personal domain.

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