



Validation of the Chinese version of the Scale for Suicide Ideation-Worst in adult patients with epilepsy

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ABSTRACT

Objective: The aim of this study was to validate the Chinese version of the Scale for Suicide Ideation-Worst (SSI-W) for screening suicide ideation in Chinese adult patients with epilepsy (PWE).

Method: A consecutive sample of Chinese adult PWE from a tertiary hospital completed the SSI-W and the suicidality module of the Chinese version of the Mini International Neuropsychiatric Interview (MINI) Plus 5.0.0.

Results: A total of 269 PWE completed the scales. According to the MINI, 59 patients (21.9%) had suicidal ideation. The Cronbach's α coefficient for the SSI-W was 0.96. Receiver operating characteristic (ROC) curve analysis showed that the area under the curve (AUC) for the SSI-W was 0.957 (95% confidence interval [CI] = 0.935–0.980). With a cutoff score of 2 points, the SSI-W demonstrated the best psychometric properties: a sensitivity of 95.8%, a specificity of 87.3%, a positive predictive value (PPV) of 56.7%, and a negative predictive value (NPV) of 99.0%. The scores for items 11 (Reason for attempt) and 18 (Final acts) were not significantly different ($p > 0.05$) in patients with suicidal ideation, while the scores for the other items were significantly different between these groups of patients.

Conclusion: The Chinese version of the SSI-W proved to be a reliable and effective assessment tool for screening suicidal ideation in Chinese adult PWE.

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1. Introduction

Epilepsy is a common chronic neurological disease, and it is estimated that the number of lifetime patients with epilepsy (PWE) in China in 2015 was approximately 9.84 million [1]. It has been reported that epilepsy not only influences the quality of patients' life but also may lead to death [2]. Moreover, the standardized mortality rate for PWE is 1.6–9.3 times that of the general population [3]. More importantly, 10% of the causes of death in PWE are due to suicide [4], while the mortality rate of suicide in the general population is 1.4% [5]. Moreover, a recent meta-analysis reported that the pooled prevalence for suicide ideation and suicide attempts were 23.2% and 7.4%, respectively in PWE [6]. Therefore, it is very important to detect the suicidal ideation of PWE as soon as possible.

Suicidal ideation is a medical term for having thoughts about suicide but without the suicidal behavior itself [7]. To the extent that the act of

suicide or suicidal ideation are considered distinct phenomena [8], suicide ideation seems to be an important sign for identifying patients at risk of suicide [9] and suicide attempts [10], especially in high-risk populations such as PWE [5]. Although suicide is difficult to predict [8], we can use some simple scales to screen for suicidal ideation, such as the Scale for Suicide Ideation (SSI) [11].

The SSI is one of the most widely used measures of suicidal ideation in the West. Originally, the SSI was rated by trained clinicians during semistructured interviews. However, to screen for suicidal ideation in newly admitted psychiatric patients, Beck developed a self-report version of the SSI [12], and the self-report version had similar psychometric characteristics as the original SSI [13]. Moreover, the SSI has been standardized with adult psychiatric patients in the United States [14]. More importantly, the SSI has been validated for use in American college students [15], Chinese adolescents [16], and prisoners [17]; has become one of the global standards for assessing suicidal ideation; and has been translated into Chinese [18], Dutch [19], Norwegian [20], etc. There are two versions of the SSI: the Scale for Suicide Ideation-Current (SSI-C) and the Scale for Suicide Ideation-Worst (SSI-W). Beck, Kovacs, and Weissman developed 19 clinical assessment forms that were originally designed for psychiatric populations, and the SSI-C was determined to have good predictive validity [12]. The SSI-C aims to quantify

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the severity of current suicidal ideation by assessing various aspects of expectations of self-destructive ideas and plans. However, it was found that the SSI-C lacked predictive validity for suicidal ideation in hospitalized patients [21], indicating that it did not effectively assess long-term or chronic suicidal ideation. The most severe retrospective reports of suicidal ideation may more adequately reflect the likelihood of suicide [22,23]. Subsequently, a new measure has been developed, the SSI-W that uses the same format as the SSI-C to assess suicidal ideation at the worst point in a person's life. The reliability and effectiveness of the SSI-C has been verified in the Chinese university student population [24]. Moreover, the SSI-W was found to be a better predictor of completed suicide than the SSI-C in the United States [14]. However, the psychometric characteristics of the SSI-W in PWE have not been validated.

Risk factors for suicidal tendency in adult PWE in China have been reported in our previous study [25]. However, a practical rapid suicidality screening instrument to screen these patients was still lacking because current scales need to be evaluated by psychiatrists. As part of previous prospective study, the aim of this study was to validate the Chinese version of the SSI-W for screening suicidal ideation in Chinese adult PWE.

2. Methods

2.1. Sample

The data collected in this study were from the follow-up observation programme of the epilepsy outpatient department of the First Affiliated Hospital of Wenzhou Medical University, China. Between October 2018 and April 2019, PWE were continuously recruited for this study. Before patients were recruited in our study, Hamilton Rating Scale for Depression (HAMD) is used by psychiatrists to screen for depressive disorders. After finishing the SSI-W, the suicidal ideation of PWE was assessed using the Mini International Neuropsychiatric Interview (MINI) by a well-trained psychiatrist in the same day.

The selection criteria were as follows: (1) a definite diagnosis of epilepsy according to the International League Against Epilepsy (ILAE) criteria; (2) 16 to 80 years of age; (3) no mental retardation or serious neurological or mental illness; (4) native Chinese speaker and fluency in Putonghua; and (5) willingness to participate and provide written informed consent.

Patients were excluded if (1) there was incomplete patient information or (2) the patient had cognitive impairment and could not understand the questionnaire. Demographic data and information on the diagnosis and treatment of patients were obtained from the Wenzhou Epilepsy Follow-Up Registry Database (WEFURD). The details of the WEFURD have been previously reported [26]; this project was approved by the Ethics Committee of the First Affiliated Hospital of Wenzhou Medical University, and written informed consent was obtained from all patients.

2.2. Instruments

2.2.1. The Chinese version of the MINI Plus 5.0.0

The MINI is a brief, simple, user-friendly structured diagnostic interview for psychiatric disorders following the Diagnostic and Statistical Manual of Mental Disorders/International Classification of Diseases (DSM/ICD) criteria. The MINI has been internationally proven to be reliable and effective and can be used for clinical research and applications [27,28]. The version of the MINI being used in the present study has also been verified in populations with epilepsy [29]. We selected the MINI Plus 5.0.0 (Chinese version) suicide module for diagnostic interviews. The total score of the module was calculated by summing the scores of each question based on the respondents' responses [30].

2.2.2. The Scale for Suicide Ideation-Worst (SSI-W)

The 19-item, self-rated SSI-W was used to assess the intensity of the patient's specific desires, actions, and suicidal plans. These 19 items assessed characteristics such as active suicidal desire, passive suicidal desire, frequency of ideation, duration of ideation, and reasons for attempted suicide. Each item consisted of three options, and each item was scored from 0 to 2 points based on the intensity of the suicidal ideation. Scale for Suicide Ideation-Worst positive were defined as those individuals who had a total SSI score greater than zero, and SSI-W negative were defined as those with a total SSI score equal to zero [31]. The total score was calculated by summing the scores of the 19 items and ranged from 0 to 38.

2.3. Statistical analysis

Statistical analysis was performed using Statistical Package for the Social Sciences Version 20.0 (SPSS Inc., Chicago, IL, USA). Cronbach's alpha coefficient was used to determine the internal consistency of the SSI-W. The SSI-W was used as a screening test for the diagnosis of suicidal ideation by the MINI, and receiver operating characteristic (ROC) curve of SSI-W was analyzed. The area under the curve (AUC) and 95% confidence intervals (95% CIs) of the ROC curve for the total SSI-W scores were used to assess sensitivity, specificity, Youden's index (YI), positive predictive value (PPV), negative predictive value (NPV), and the effects of different cutoff scores. The statistical significance level was set to $p < 0.05$ (two-tailed). The analysis of the relationship between SSI-W item scores were assessed by Pearson correlation analyses, and the item difficulty (P_i) coefficients were calculated as quotients of the sum of the item values that were obtained and the sum of the maximum achievable item values, multiplied by 100.

3. Results

As shown in Table 1, the study sample consisted of 269 PWE. According to the MINI, 40 (14.8%) patients considered suicide ideation. Regarding the sample, 56.5% were women, the majority of patients (82.2%)

Table 1
Sociodemographic characteristics of subjects.

| Sample characteristics | Total sample (N = 269) | SSI-W positive (N = 59) | SSI-W negative (N = 210) |
|--|---------------------------|----------------------------|-----------------------------|
| Gender | | | |
| Male | 152(56.5) | 25(42.4) | 124(59.0) |
| Female | 117(43.5) | 34(57.6) | 86(41.0) |
| Age (years) | 34.2(11.3) | | |
| 16–44 | 221(82.2) | 49(83.1) | 172(81.9) |
| 45–59 | 39(14.5) | 6(10.2) | 33(15.7) |
| 60–89 | 9(3.3) | 4(6.8) | 5(2.4) |
| Marital status | | | |
| Unmarried | 92(34.2) | 22(37.3) | 70(33.3) |
| Married | 169(62.8) | 35(59.3) | 134(63.8) |
| Divorced | 3(8.0) | 2(3.4) | 6(2.9) |
| Education time (years) | | | |
| 0–9 | 43(16.0) | 8(13.6) | 35(16.7) |
| 9–12 | 110(40.9) | 26(44.1) | 84(40.0) |
| 12–16 | 52(19.3) | 9(15.3) | 43(20.5) |
| >16 | 64(23.8) | 16(27.1) | 48(22.9) |
| Occupational status | | | |
| Yes | 207(77.0) | 44(74.6) | 163(77.6) |
| No | 62(23.0) | 15(25.4) | 47(22.4) |
| Annual household income (Ten thousand yuan) | | | |
| <5 | 92(34.2) | 20(33.9) | 72(34.3) |
| 5–10 | 102(37.9) | 25(42.4) | 77(36.7) |
| 10–20 | 56(20.8) | 11(18.6) | 45(21.4) |
| 20–50 | 14(5.2) | 1(1.7) | 13(6.2) |
| >50 | 5(1.9) | 2(3.4) | 3(1.4) |

Values are expressed as a number (%).

were aged 18–44 years, the marriage rate was 62.8%, the majority had 9–12 years of education (accounting for 40.9% of the sample), the employment rate was 77%, 88.5% had good family relationships, and 37.9% had a family annual income of 50,000–100,000 yuan.

Table 2 shows that the average age of epilepsy onset in these patients was 23.04 ± 12.55 years. The duration of epilepsy was >5 years in 65.4% of the patients, the seizure-free period was longer than 6 months in 54.6% of the patients, the seizure frequency was mostly 0–1 times per month in 85.5% of the patients, and more than half of the seizures (65.8%) were a partial secondarily generalized seizure. The type of epilepsy was commonly (72.1%) classified by the symptoms. Structural and metabolic factors accounted for the etiology in 34.9% of the patients. Approximately half of the patients had electroencephalograms (EEGs) with epileptiform abnormalities (57.6%), and normal and abnormal magnetic resonance imaging (MRI) findings were found in 44.6% and 45.7% of the patients, respectively. More than 3 antiepileptic drugs (AEDs) were used by 8.9% of the patients. After evaluation of psychiatrist, there are 17.5% of the PWE with depressive disorder, and in our study, these are the patients who are currently taking an antidepressant (ADT). The ADTs include citalopram hydrobromide, escitalopram oxalate, and sertraline hydrochloride.

The Cronbach's α coefficient for the SSI-W was 0.960, and the ROC curve analysis of the SSI-W shows (Fig. 1) that the AUC of the SSI-W was 0.957 (95% CI = 0.935–0.980). The ROC analysis of the SSI-W

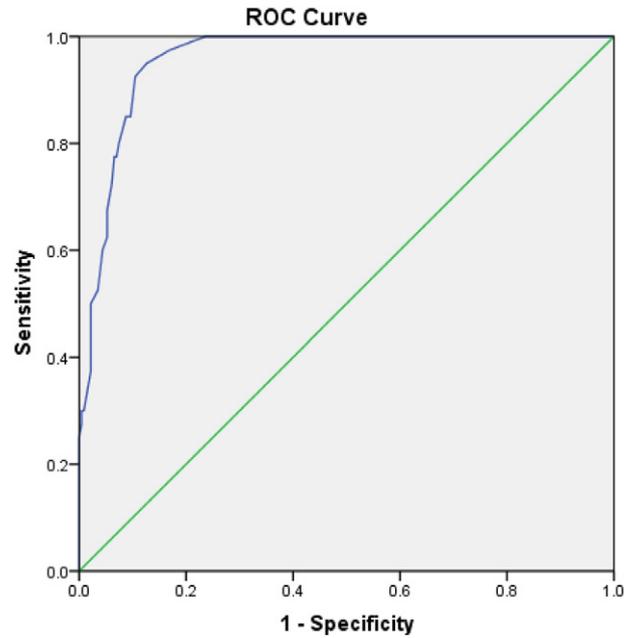


Fig. 1. Receiver operating characteristic curve of the SSI-W.

Table 2
Clinical characteristics of the subjects.

| Sample characteristics | Total sample (N = 269) | SSI-W positive (N = 59) | SSI-W negative (N = 210) |
|---|------------------------|-------------------------|--------------------------|
| Age at onset of epilepsy (years) | 23.04 ± 12.55 | 20.12 ± 10.03 | 23.86 ± 13.08 |
| Duration of epilepsy (years) | | | |
| 1–5 | 93(34.6) | 22(37.3) | 71(33.8) |
| >5 | 176(65.4) | 37(62.7) | 139(66.2) |
| Seizure-free period (months) | | | |
| <6 | 122(45.4) | 37(62.7) | 85(40.5) |
| ≥6 | 147(54.6) | 22(37.3) | 125(59.5) |
| Seizure frequency per month | | | |
| 0–1 | 230(85.5) | 48(81.4) | 182(86.7) |
| 2–5 | 29(10.8) | 9(15.3) | 20(9.5) |
| 6–10 | 6(2.2) | 1(1.7) | 5(2.4) |
| >10 | 4(1.5) | 1(1.7) | 3(1.4) |
| Type of seizure | | | |
| FES | 69(25.7) | 15(25.4) | 54(25.7) |
| 2nd GES | 177(65.8) | 40(67.8) | 137(65.2) |
| GES | 23(8.6) | 4(6.8) | 19(9.0) |
| Type of epilepsy | | | |
| Cryptogenic | 61(22.7) | 11(18.6) | 50(23.8) |
| Symptomatic | 194(72.1) | 44(74.6) | 150(71.4) |
| Idiopathic | 14(5.2) | 4(6.8) | 10(4.8) |
| Etiology | | | |
| Structural/metabolic | 94(34.9) | 24(40.7) | 70(33.3) |
| Others | 175(65.1) | 35(59.3) | 140(66.7) |
| EEG (within 3 month) | | | |
| Normal | 69(25.7) | 17(28.8) | 53(25.2) |
| Abnormal but without epileptiform abnormalities | 26(9.7) | 7(11.9) | 19(9.0) |
| Abnormal with epileptiform abnormalities | 155(57.6) | 29(49.2) | 125(59.5) |
| No EEG | 19(7.1) | 6(10.2) | 13(6.2) |
| MRI (within 6 month) | | | |
| Normal | 120(44.6) | 23(39.0) | 97(46.2) |
| Abnormal | 123(45.7) | 30(50.8) | 93(44.3) |
| No MRI | 26(9.7) | 6(10.2) | 20(9.5) |
| No. of AEDs | | | |
| 1 | 124(46.1) | 25(42.4) | 99(47.1) |
| 2 | 121(45.0) | 27(45.8) | 94(44.8) |
| ≥3 | 24(8.9) | 7(11.9) | 17(8.1) |
| Antidepressants | | | |
| Currently taking | 47(17.5) | 16(27.1) | 31(14.8) |
| Not currently taking | 222(82.5) | 43(72.9) | 179(85.2) |

FES, focal epileptic seizure; GES, generalized epileptic seizure. EEG, electroencephalogram; MRI, magnetic resonance imaging; AEDs, antiepileptic drugs.

with different cutoff scores between 0 and 4 is shown in Table 3. For screening suicidal ideation, the SSI-W showed the best psychometric screening value when the cutoff score was 2: the sensitivity was 95.8%, the specificity was 87.3%, the PPV was 56.7%, the NPV was 99.0%, and the YI was 0.823. Table 4 shows the mean, standard deviation, item difficulty, and corrected items of the 19 items of the SSI-W in the risk group. The scores for items 11 (Reason for attempt) and 18 (Final acts) were not significantly different ($p > 0.05$) in the groups with suicidal ideation, while there were significant differences in scores for the other items, with item 19 (Final notes) at the $p < 0.05$ level and the remaining 16 items at the $p < 0.01$ level.

4. Discussion

An effective measure to identify suicidal ideators is crucial, and studies have shown that suicide attempters report similar characteristics to those who have suicide ideation [32]. Furthermore, there are reports that some subjects who attempted suicide in the past still have suicidal tendencies. In the first year after suicidal ideation, the risk of attempted suicide increased by approximately 170 times [29]. Therefore, identifying suicidal ideators may assist in controlling suicide rates through preventive measures, and suicidal ideation in PWE needs special attention to prevent the completion of suicide.

In our study, we continuously recruited people with epilepsy in China to investigate the quality of the psychometric measurements of the Chinese version of the SSI-W. The Chinese version of the SSI-W demonstrated excellent internal consistency ($\alpha = 0.96$), in line with previous research with coefficients ranging from 0.75 to 0.98, e.g.,

Table 3
ROC and diagnostic efficiency of the SSI-W for the diagnosis of suicidal ideation based on the MINI.

| Cutoff score | Sensitivity | Specificity | PPV | NPV | YI |
|--------------|-------------|-------------|-------|-------|-------|
| >0 | 1 | 0.764 | 0.426 | 1 | 0.764 |
| >1 | 0.975 | 0.830 | 0.500 | 0.995 | 0.805 |
| >2 | 0.950 | 0.873 | 0.567 | 0.990 | 0.823 |
| >3 | 0.925 | 0.895 | 0.607 | 0.986 | 0.820 |
| >4 | 0.850 | 0.904 | 0.607 | 0.972 | 0.754 |

PPV = positive predictive value; NPV = negative predictive value; YI = Youden index.

Table 4
Item properties for the entire SSI-W and total scores in the risk group.

| Item | M | SD | Pi | r |
|------------------------------------|-------|-------|----|---------|
| 1 Wish to live | 1.23 | 0.692 | 61 | 0.557** |
| 2 Wish to die | 1.23 | 0.751 | 61 | 0.625** |
| 3 Reason for living or dying | 1.06 | 0.727 | 53 | 0.621** |
| 4 Active suicide attempt | 1.17 | 0.694 | 58 | 0.620** |
| 5 Passive suicide attempt | 1.54 | 0.504 | 77 | 0.600** |
| 6 Duration of suicide thoughts | 0.63 | 0.761 | 31 | 0.586** |
| 7 Frequency of ideation | 0.71 | 0.743 | 35 | 0.611** |
| 8 Attitude toward ideation | 1.17 | 0.663 | 58 | 0.544** |
| 9 Control over suicidal action | 0.63 | 0.789 | 31 | 0.859** |
| 10 Deterrents to attempt | 0.75 | 0.786 | 38 | 0.663** |
| 11 Reasons for attempt | 1.12 | 0.444 | 56 | 0.072 |
| 12 Specificity of planning | 0.81 | 0.673 | 41 | 0.685** |
| 13 Availability or opportunity | 0.58 | 0.821 | 29 | 0.728** |
| 14 Capability to carry out attempt | 0.75 | 0.786 | 38 | 0.773** |
| 15 Expectancy of actual attempt | 0.92 | 0.710 | 46 | 0.747** |
| 16 Extent of actual preparation | 0.40 | 0.707 | 20 | 0.595** |
| 17 Suicide note | 0.29 | 0.544 | 15 | 0.344* |
| 18 Final acts | 0.25 | 0.526 | 13 | 0.097 |
| 19 Deception and concealment | 0.83 | 0.595 | 42 | 0.419** |
| Total score | 16.06 | 7.634 | 42 | - |

Pi, item difficulty.

R, item-total correlations.

* $p < 0.05$.

** $p < 0.01$.

[28,33]. This instrument has satisfactory reliability, and the use of the Chinese SSI-W among Chinese adult PWE is supported.

In Fig. 1, the ROC analysis showed that the SSI-W had an AUC of 0.957 and showed high levels of screening accuracy compared with the gold standard, the MINI. In Table 4, the results showed that the optimal cutoff score for the SSI-W was 2 points. When the cutoff score was 2 points, the YI of the SSI-W was 0.823, the sensitivity was 95%, the specificity was 87.3%, the PPV was 56.7%, and the NPV was 99%. Moreover, this cutoff score is roughly the same as the scores determined by other researchers in other countries. Brown et al. conducted a 20-year follow-up of 6891 psychiatric outpatients and found that the total score on the SSI was >2 points, which was associated with an increased chance of a suicide act in the future by sevenfold [9], and the cutoff score of the Dutch SSI was 2 [26]. Although there are differences in the acceptance of suicidal ideas among these cultures and populations, the cutoff score >2 is very sensitive. Our results indicated that the cutoff score of 2 is suitable for Chinese adult PWE.

Unlike other items in the SSI-W, items 11 (Reasons for attempt) and 18 (Final acts) showed low total score relevance ($r = 0.072$ and 0.097 , respectively). However, the validation of the SSI-W in a group of German college students found that items 11 (Reasons for attempt) and 19 (Deception and concealment) had a low overall correlation with the total score ($r = 0.19$ and 0.20 , respectively) [34]. Moreover, validation of the SSI-W in a group of Pakistani adolescents and young adults found that all items were clearly related to the total scale score, with the exception of item 19 [20]. The discussion of suicidal ideation has been considered a social taboo in China, and women with epilepsy have a reduced possibility of marriage [35]; thus, even though women with epilepsy have suicidal thoughts, they also conceal these thoughts to avoid disgrace. We found that item 17 (Suicide note) was significantly different in the groups with suicidal ideation at the $p < 0.05$ level, while the other 16 items were significantly different at the <0.01 level, which may be because Chinese individuals are not as likely to exert their will to control circumstances.

After we removed the scores of these two items (items 11 and 18), the analysis of the ROC showed that the AUC of the SSI-W scale with the items deleted was 0.957, which was no different from the AUC before the deletion, and which further indicated that items 11 and 18 have low correlations with the total score. Moreover, the SSI-W is a clinical screening tool designed to assess all aspects of suicidal ideation and

takes into account the sensitivity of the information collected; therefore, when assessing a person's suicidal ideation, both items, regardless of their relevance, should be included. It is possible to pay attention to all of the patient's behavior when conducting an assessment or performing treatment, but the scores for these two items can be excluded when calculating a total score for this scale.

According to the MINI, 14.8% of the PWE were diagnosed with suicidal ideation in the study. A study in Canada showed that the suicidal ideation of PWE was 25% [36], and a Croatian study showed that young people's suicidal ideation was 21.3% [28]. However, our results are lower than other studies, and the first reason may be that Chinese people were more willing to conceal their own ideas because of cultural differences with other countries. In addition, this was hospital-based research, and most PWE are able to keep their seizures and depressive disorders under control with medical treatment.

In summary, the Chinese version of the SSI-W is an effective and reliable assessment tool for screening suicidal ideation in Chinese adult PWE. First, the MINI needs to be assessed by trained psychiatrists, but a psychiatrists' diagnosis of suicidal ideation in PWE is not easy to obtain in China. The SSI-W is a self-rating scale for the rapid screening of suicidal ideation, and obtaining SSI-W scores can help clinicians identify suicidal ideation earlier and prevent suicide in China. Second, the tool has sufficient sensitivity, specificity, PPV, and NPV, and the optimal cut-off score is 2. Finally, the suicide module of the MINI cannot be used to screen the population who have had suicidal ideation but did not attempt suicide, while the SSI-W is available to this part of the population.

Our results have the following limitations. First, all subjects in the study were from specialized epilepsy clinics in a tertiary hospital, which may have resulted in a study sample of patients who were more difficult to treat or had severe epilepsy. Second, we did not carry out a test-retest reliability measure, which is an important measure to ensure that the results are stable over time. Finally, our research was carried out only in south-eastern China. There are slight differences in the environment between North and South China. To better validate the SSI-W, additional research in other parts of China may be helpful.

5. Conclusions

The SSI-W as a rapid suicidality screening instrument to screen suicidal ideation in adult PWE was validated with a high sensitivity and specificity in our study.

Application of SSI-W in clinical practice would be beneficial for identifying PWE with suicidal ideation and provide timely treatment to lessen the risk of suicide.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

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References

- [1] Song P, Liu Y, Yu X, Wu J, Poon AN, Demayo A, et al. Prevalence of epilepsy in China between 1990 and 2015: a systematic review and meta-analysis. *J Glob Health* 2017; 7:020706.
- [2] Chang YH, Ho WC, Tsai JJ, Li CY, Lu TH. Risk of mortality among patients with epilepsy in southern Taiwan. *Seizure* 2012;21:254-9.
- [3] Ficker DM. Sudden unexplained death and injury in epilepsy. *Epilepsia* 2000;41 (Suppl. 2):S7-12.

- [4] Christensen J, Vestergaard M, Mortensen PB, Sidenius P, Agerbo E. Epilepsy and risk of suicide: a population-based case-control study. *Lancet Neurol* 2007;6:693–8.
- [5] Jones JE, Hermann BP, Barry JJ, Gilliam FG, Kanner AM, Meador KJ. Rates and risk factors for suicide, suicidal ideation, and suicide attempts in chronic epilepsy. *Epilepsy Behav* 2003;4(Suppl. 3):S31–8.
- [6] Abraham N, Buvanawari P, Rathakrishnan R, Tran BX, Thu GV, Nguyen LH, et al. A meta-analysis of the rates of suicide ideation, attempts and deaths in people with epilepsy. *Int J Environ Res Public Health* 2019;16.
- [7] Lim HW, Song HS, Hwang YH, Lee HW, Suh CK, Park SP, et al. Predictors of suicidal ideation in people with epilepsy living in Korea. *J Clin Neurol* 2010;6:81–8.
- [8] Moller HJ. Suicide, suicidality and suicide prevention in affective disorders. *Acta Psychiatr Scand Suppl* 2003;73–80.
- [9] Brown GK, Beck AT, Steer RA, Grisham JR. Risk factors for suicide in psychiatric outpatients: a 20-year prospective study. *J Consult Clin Psychol* 2000;68:371–7.
- [10] Mann JJ, Watermaux C, Haas GL, Malone KM. Toward a clinical model of suicidal behavior in psychiatric patients. *Am J Psychiatry* 1999;156:181–9.
- [11] Beck AT, Kovacs M, Weissman A. Assessment of suicidal intention: the scale for suicide ideation. *J Consult Clin Psychol* 1979;47:343–52.
- [12] Beck AT, Steer RA, Ranieri WF. Scale for suicide ideation: psychometric properties of a self-report version. *J Clin Psychol* 1988;44:499–505.
- [13] Winters NC, Myers K, Proud L. Ten-year review of rating scales. III: scales assessing suicidality, cognitive style, and self-esteem. *J Am Acad Child Adolesc Psychiatry* 2002;41:1150–81.
- [14] Beck AT, Brown GK, Steer RA. Psychometric characteristics of the Scale for Suicide Ideation with psychiatric outpatients. *Behav Res Ther* 1997;35:1039–46.
- [15] Nock MK, Kazdin AE. Examination of affective, cognitive, and behavioral factors and suicide-related outcomes in children and young adolescents. *J Clin Child Adolesc Psychol* 2002;31:48–58.
- [16] Zhang J, Norvilitis JM. Measuring Chinese psychological well-being with Western developed instruments. *J Pers Assess* 2002;79:492–511.
- [17] Blaauw E, Arensman E, Kraaij V, Winkel FW, Bout R. Traumatic life events and suicide risk among jail inmates: the influence of types of events, time period and significant others. *J Trauma Stress* 2002;15:9–16.
- [18] Zhang J, Brown GK. Psychometric properties of the scale for suicide ideation in China. *Arch Suicide Res* 2007;11:203–10.
- [19] De Beurs DP, de Vries AL, de Groot MH, de Keijser J, Kerkhof AJ. Applying computer adaptive testing to optimize online assessment of suicidal behavior: a simulation study. *J Med Internet Res* 2014;16:e207.
- [20] Ayub N. Validation of the Urdu translation of the Beck Scale for Suicide Ideation. *Assessment* 2008;15:287–93.
- [21] Beck AT, Steer RA, Kovacs M, Garrison B. Hopelessness and eventual suicide: a 10-year prospective study of patients hospitalized with suicidal ideation. *Am J Psychiatry* 1985;142:559–63.
- [22] Pierce DW. The predictive validation of a suicide intent scale: a five year follow-up. *Br J Psychiatry* 1981;139:391–6.
- [23] Beck AT, Brown GK, Steer RA, Dahlsgaard KK, Grisham JR. Suicide ideation at its worst point: a predictor of eventual suicide in psychiatric outpatients. *Suicide Life Threat Behav* 1999;29:1–9.
- [24] Chioqueta AP, Stiles TC. Psychometric properties of the Beck Scale for Suicide Ideation: a Norwegian study with university students. *Nord J Psychiatry* 2006;60:400–4.
- [25] S D XL, Y H FD, J L YD, J S NX, Z Z XW, R Z, Epilepsy XHJ, E b. Risk factors for suicidal tendency in adult patients with epilepsy in China. 2019;97:118–22.
- [26] Zeng QY, Fan TT, Zhu P, He RQ, Bao YX, Zheng RY, et al. Comparative long-term effectiveness of a monotherapy with five antiepileptic drugs for focal epilepsy in adult patients: a prospective cohort study. *PLoS One* 2015;10:e0131566.
- [27] de Azevedo Marques JM, Zuairi AW. Validity and applicability of the Mini International Neuropsychiatric Interview administered by family medicine residents in primary health care in Brazil. *Gen Hosp Psychiatry* 2008;30:303–10.
- [28] Mordal J, Gundersen O, Bramness JG. Norwegian version of the Mini-International Neuropsychiatric Interview: feasibility, acceptability and test-retest reliability in an acute psychiatric ward. *Eur Psychiatry* 2010;25:172–7.
- [29] Jones JE, Hermann BP, Woodard JL, Barry JJ, Gilliam F, Kanner AM, et al. Screening for major depression in epilepsy with common self-report depression inventories. *Epilepsia* 2005;46:731–5.
- [30] Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, et al. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry* 1998;59(Suppl. 20):22–33 quiz 34–57.
- [31] Zhang J, Brown GK. Psychometric properties of the Scale for Suicide Ideation in China. *Arch Suicide Res* 2007;11:203–10.
- [32] Fergusson DM, Beautrais AL, Horwood LJ. Vulnerability and resiliency to suicidal behaviours in young people. *Psychol Med* 2003;33:61–73.
- [33] Pinninti N, Steer RA, Rissmiller DJ, Nelson S, Beck AT. Use of the Beck Scale for suicide ideation with psychiatric inpatients diagnosed with schizophrenia, schizoaffective, or bipolar disorders. *Behav Res Ther* 2002;40:1071–9.
- [34] Kliem S, Lohmann A, Mossle T, Braehler E. German Beck Scale for Suicide Ideation (BSS): psychometric properties from a representative population survey. *BMC Psychiatry* 2017;17:389.
- [35] Nag D. Gender and epilepsy: a clinician's experience. *Neurol India* 2000;48:99–104.
- [36] Tellez-Zenteno JF, Patten SB, Jette N, Williams J, Wiebe S. Psychiatric comorbidity in epilepsy: a population-based analysis. *Epilepsia* 2007;48:2336–44.