Short Communication

Validity and reliability of the English version of the sick, control, one stone, fat, food (SCOFF) in Malaysia

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Background & aims: Several questionnaires to screen for eating disorders have been validated in Malaysia. However, these tools are lengthy, and require specialist interpretation. The sick, control, one stone, fat, food (SCOFF) is easy to administer by non-specialists, but has not been validated in Malaysia. Therefore, the aim of our study was to validate the SCOFF on a non-clinical sample of tertiary students to determine if it could identify individuals with an eating disorder.

Methods: We recruited second year tertiary students from five faculties in a university in Malaysia, from June–November 2014, who could understand English. The SCOFF and the EAT-26 were administered at baseline. Two weeks later, the SCOFF was re-administered to assess for reliability.

Results: A total of 292 students were approached, and all agreed to participate (response rate = 100%). There was moderate correlation between the total SCOFF score with the EAT-26’s dieting domain (spearman’s rho = 0.504, p < 0.001), bulimia and food preoccupation domain (spearman’s rho = 0.438, p < 0.001), and total score (spearman’s rho = 0.483, p < 0.001). The internal consistency of the SCOFF was low (Cronbach alpha = 0.470). At retest, kappa scores ranged from 0.211 to 0.591. The sensitivity of the SCOFF was 77.4%, and its specificity was 60.5%. The positive predictive value was 18.9%, and its negative predictive value was 95.8%.

Conclusions: The SCOFF was found to have adequate convergent validity and stable reliability. However, its internal consistency was low. The SCOFF can still be used in clinical practice. However, its positive results should be interpreted with caution due to its low positive predictive value.

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1. Introduction

Anorexia nervosa (AN) and bulimia nervosa (BN) are psychiatric disorders that mostly affect female adolescents or young women, and have significant multiple long-term health consequences [1]. Persons with AN or BN often remain undiagnosed, as they usually present with vague or somatic symptoms. In the United States and Western Europe, the prevalence rates for AN and BN are 0.3% and 1%, respectively [2].

As a result of rapid globalization, and exposure to western culture, young women in Asia are also at risk of developing an eating disorder. In Malaysia, the prevalence of AN is 0.05% [3], whilst the prevalence of BN is unknown. To date, several questionnaires to screen for eating disorders have been validated in Malaysia [4,5], but they are lengthy, and require specialist interpretation. We selected the Sick, Control, One stone (14 lbs/6.2 kg), Fat, Food (SCOFF) as it has been used globally, and is easy to administer by non-specialists. We hypothesize that the SCOFF would be a valid and reliable instrument to screen for eating disorder in a non-clinical sample of individuals in Malaysia. Hence, our aim was to validate the SCOFF on a non-clinical sample of tertiary students to determine if the SCOFF can identify individuals who were at risk of an eating disorder.

2. Materials and methods

2.1. Participants

Second year undergraduate tertiary students from the faculties of Medicine, Economics, Science, Arts and Social Science, and
Engineering in a university in Malaysia, who were able to understand English were recruited prospectively, from June–November 2014. We decided to validate the SCOFF in English, as English is widely understood by tertiary students, and is an important second language in Malaysia.

The sample size required was calculated based on the number of items to participant ratio of 1:10 to perform factor analysis. The SCOFF has five items. Therefore, the minimum number of participants required was 5 * 10 = 50. However, this sample size was too small. Hence, we calculated our sample size based on the prevalence of eating disorder in Malaysia, which was 18% [5]. Assuming a 20% loss to follow-up, the total number of participants required was 288.

2.2. The sick, control, one stone (14 lbs/6.2 kg), fat, food (SCOFF)

We used the British version of the SCOFF, which consists of one domain with 5 items targeting core features of AN and BN. Its aim is to raise suspicion of eating disorder rather than to diagnose the condition. Each item has a dichotomous response of a “yes” and “no” answer. Each “yes” response is given 1 point. The total score is computed by summing the scores. A score >2 indicates a likely case of eating disorder.

2.3. The eating attitude test 26 (EAT-26)

The EAT-26 (which was validated in Malaysia) was used to assess for convergent validity [4]. It consists of 26 items and 3 domains: dieting, bulimia and food preoccupation, and oral control. Responses to items are based on a 6-point Likert scale. A score of ≥20 indicates possible anorectic/bulimic eating concerns.

2.4. Procedure

Participants were recruited through convenience sampling. The researcher explained the purpose of the study to potential participants. For those who agreed to participate, written informed consent was obtained. Participants were instructed to respond honestly when completing the SCOFF and the EAT-26. This took approximately 10–15 min. Two weeks later, the SCOFF was re-administered to assess for reliability. Ethics approval was obtained (approval no: 1010.5).

2.5. Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences v22.0 software (IBM Corporation, Armonk, NY, USA).

2.6. Validity

Content validity was performed by a psychiatrist, a Family Medicine Specialist, a researcher experienced in the validation of instruments, and a Clinical Masters Family Medicine Trainee. Face validity was conducted among 20 students. Convergent validity was assessed using Spearman’s rho correlation coefficient. Factor analysis was not performed as the SCOFF only had dichotomous responses with one domain.

2.7. Reliability

Internal consistency was assessed using Cronbach's alpha. Corrected item-total correlations were used to determine items that did not agree well with other items in the questionnaire. Item-total correlations should be >0.20 to be considered as acceptable. The effect of removing a single item from the scale was also determined. Reliability was assessed using Cohen’s kappa coefficient.

3. Results

A total of 292 participants were recruited. Our participants were mainly female (64.7%), of Malay (43.8%), Chinese (42.1%) and Indian (14.1%) ethnicity, and had a mean age of 20.4 ± 0.5 years (range: 18–22 years). The cultural approaches regarding nutrition habits among the three major ethnic groups in Malaysia were similar.

3.1. Validity

No problems were encountered during the pilot study. Hence, no modifications were made to the SCOFF. There was moderate correlation between the total SCOFF score with the EAT-26 dieting domain (Spearman’s rho = 0.504, p < 0.001), bulimia and food preoccupation domain (Spearman’s rho = 0.438, p < 0.001) and its total score (Spearman’s rho = 0.483, p < 0.001).

3.2. Reliability

The overall Cronbach’s α for the SCOFF was 0.470. Items 1 and 3 had corrected item-total correlations of <0.20. At retest, kappa scores ranged from 0.211 to 0.591 (Table 1).

3.3. Sensitivity and specificity

A total of 127 (43.5%) participants were suspected of having an eating disorder when screened with the SCOFF. However, when the EAT-26 was used, only 31 (10.6%) were suspected to have an eating disorder. The SCOFF had a sensitivity of 77.4% (95% CI: 58.9–90.4) and a specificity of 60.5% (95% CI: 54.3–66.5), when compared with the EAT-26 (Table 2). The positive predictive value (PPV) was 18.9% (95% CI: 12.5–26.8), whilst the negative predictive value (NPV) was 95.8% (95% CI: 91.5–98.3).

4. Discussion

The English version of the SCOFF was found to have adequate convergent validity and reliability. However, its internal consistency and its PPV were low. The SCOFF had adequate convergent validity with the EAT-26, which was similar to a previous study [6]. The overall Cronbach’s alpha of the SCOFF was low (0.470). Despite the low Cronbach alpha value of <0.7, previous studies [6–8] reported that the internal consistency of the SCOFF was acceptable. Only one study reported that their internal consistency of 0.400 was unacceptable [9]. The poor internal consistency of the SCOFF could be due to the 5 items and its dichotomous response. Two items had a corrected item-total correlation value of <0.2. The purpose of item 3 was to screen for massive weight loss within the past 3 months. However, participants who had already lost a huge amount of weight prior to the last 3 months would not have answered “yes” to this item. Deletion of item 3 increased the Cronbach alpha value from 0.470 to 0.503. However, deletion of item 1 would not have increased the Cronbach alpha value. We retained all items as one of the conditions of use of the SCOFF was that no changes were to be made to the instrument. All items in the SCOFF showed fair to moderate agreement at test-retest.

The prevalence of those suspected of having an eating disorder in a non-clinical sample of tertiary students was 43.5% when screened using the SCOFF. Our prevalence was higher compared to previous studies, which reported rates of 16.2%–38.7% [7,10]. This could be due to the low PPV of the SCOFF. However, when the EAT-
and specificity of the SCOFF, the EAT-26 should be administered to rule out false positives. However, its positive results should be interpreted with caution. In cases where a person is suspected of having an eating disorder, the EAT-26 should be administered to rule out false positive cases, before referral to a specialist is made.

Ideally a screening tool should have high sensitivity and specificity. This means that the SCOFF was able to detect eating disorder easily, but many of these cases may be false positives. Some validation studies reported that the SCOFF had high sensitivity and low specificity [6,7], whilst others reported low sensitivity and high specificity [10]. Studies which reported high sensitivity and specificity were performed in two discriminate groups: patients with a probable eating disorder and a healthy group [7]. When the SCOFF was administered in the general population, the sensitivity and specificity was not as high [8]. We were not able to recruit patients that were known to have a probable eating disorder, as the prevalence of eating disorders in Malaysia is low.

A limitation of our study was that we recruited participants using convenience sampling and only from one site. This limits the generalizability of our results. Another limitation was that we used the EAT-26 as a “reference standard” when assessing the sensitivity and specificity of the SCOFF. We selected the EAT-26 to assess the convergent validity of the SCOFF as it was already validated in Malaysia as a screening tool. However, we are aware that when assessing the sensitivity and specificity of the SCOFF, psychiatric evaluation should have been used instead as the “reference standard”.

The SCOFF was found to have adequate convergent validity and stable reliability. However, its internal consistency and its PPV were low. The SCOFF can still be used in clinical practice, as it is simple to administer. However, its positive results should be interpreted with caution. In cases where a person is suspected of having an eating disorder, the EAT-26 should be administered to rule out false positive cases, before referral to a specialist is made.

Table 1
The psychometric properties of the sick, control, one stone (14 lbs/6.2 kg), fat, food (SCOFF) questionnaire.

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Test (n = 292)</th>
<th>Retest (n = 228)</th>
<th>p-value</th>
<th>Kappa value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cronbach's</td>
<td>Cronbach alpha</td>
<td>Participants that answered &quot;yes&quot; at baseline [n [%]]</td>
<td>Participants that answered &quot;yes&quot; two weeks later [n [%]]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>alpha</td>
<td>alpha if item deleted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Do you make yourself sick (vomit) because you feel uncomfortably full?</td>
<td>0.470</td>
<td>0.196</td>
<td>29 (9.9)</td>
<td>13 (5.7)</td>
</tr>
<tr>
<td>2</td>
<td>Do you worry you have lost control over how much you eat?</td>
<td>0.323</td>
<td>0.357</td>
<td>121 (41.4)</td>
<td>67 (29.4)</td>
</tr>
<tr>
<td>3</td>
<td>Have you recently lost more than one stone (6.2 kg) in a 3-month period?</td>
<td>0.048</td>
<td>0.503</td>
<td>13 (4.5)</td>
<td>2 (0.9)</td>
</tr>
<tr>
<td>4</td>
<td>Do you believe yourself to be fat when others say you are too thin?</td>
<td>0.402</td>
<td>0.288</td>
<td>93 (31.8)</td>
<td>66 (28.9)</td>
</tr>
<tr>
<td>5</td>
<td>Would you say that food dominates your life?</td>
<td>0.263</td>
<td>0.410</td>
<td>133 (45.5)</td>
<td>93 (40.8)</td>
</tr>
</tbody>
</table>

Only 228 students completed the SCOFF (absent – 64, response rate – 78%); Data were not normally distributed. Hence, non-parametric tests were used.

*Statistically significant at p < 0.05.

The bold figures had a corrected item-total correlation of <0.2.

a The McNemar test was used for categorical variables.

b The Wilcoxon signed rank test was used for continuous variables.

Table 2
Cross tabulation of the sick, control, one stone (14 lbs/6.2 kg), fat, food (SCOFF) questionnaire with the eating attitude test 26 (EAT-26).

<table>
<thead>
<tr>
<th></th>
<th>EAT-26</th>
<th>Total [n [%]]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Suspected of having an eating disorder [n [%]]</td>
<td>Not suspected of having an eating disorder [n [%]]</td>
</tr>
<tr>
<td><strong>SCOFF</strong></td>
<td>24 (77.4%)</td>
<td>103 (39.3%)</td>
</tr>
<tr>
<td></td>
<td>7 (22.6%)</td>
<td>158 (60.5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31 (100.0%)</td>
<td>261 (100.0%)</td>
</tr>
</tbody>
</table>

SCOFF — sick, control, one stone (14 lbs/6.2 kg), fat, food; EAT-26 — eating attitude test 26.

26 was used, the prevalence of those suspected of having an eating disorder was 10.6%, which was lower than previously reported rates. This could be because the EAT-26 requires the participant to fill in more information on their eating disorder.

WMZWW conceived the study, collected the data, analyzed the data and drafted the manuscript. PSML conceived the study, analyzed the data and helped to draft the manuscript. HAH data and drafted the manuscript. All authors read and approved the final manuscript.

**Statement of authorship**

WMZWW conceived the study, collected the data, analyzed the data and drafted the manuscript. PSML conceived the study, analyzed the data and helped to draft the manuscript. HAH conceived the study, analyzed the data and helped to draft the manuscript. All authors read and approved the final manuscript.

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**Conflict of interest**

The authors declare that they have no competing interest.
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