Malaysian GAD-7 less sensitive than reported

In their paper on the validation of the Malay version of the GAD-7, Sidik et al. reported acceptable sensitivity (76.3%) and excellent specificity (94.4%) for detecting anxiety disorder in consecutive women attending a primary care clinic.[1] However, these results are biased because the authors failed to account for the stratified sampling procedure. When a stratified sampling procedure has been applied, the data must be 'weighted back' to mirror the source population in order to produce unbiased estimates of the operating characteristics for that population. Sidik et al. included 895 women who completed a PHQ-9 and GAD-7. Then they divided the group into women with normal scores (PHQ-9 <10 and GAD-7 <5) and women with high scores (PHQ-9 ≥10 and GAD-7 ≥5). From the first group, one in 10 women and from the second group one in two women were selected for a psychiatric diagnostic interview. Fifty participants were excluded, leaving 845 overall participants of whom 146 underwent a diagnostic interview. Sidik et al.'s Table 1 informs us that 38 of the latter 146 women had an anxiety disorder diagnosis and 35 of the 146 women had a positive GAD-7 test (≥8). In addition, Sidik et al. provided the information that 66 of the original 845 women (i.e. 7.8%) had a positive GAD-7 test. We can use this information to try to calculate the expected numbers for Table 1 when all 845 women (representing the source population of women attending the clinic) would have been examined instead of the stratified sample of 146: From a total of 845 women, 66 had a positive and 779 a negative GAD-7. Thus, the 35 women with a positive GAD-7 (from the 146 women examined) represented a sample of the original 66 women with a positive GAD-7. To weight back these women to the source population, they are assigned a weight factor of 66/35=1.9. The 29 women with a positive GAD-7 and an anxiety disorder diagnosis therefore probably

represented 29 x 1.9 = 55 women in the source population. Similarly, the six women with a positive GAD-7 and no anxiety disorder diagnosis probably represented 6 x 1.9 = 11 women in the source population. Analogously, the weight factor for women with a negative GAD-7 is 779/111 = 7.0. The nine women with a negative GAD-7 and an anxiety disorder diagnosis probably represented 9 x 7.0 = 63 women in the source population (!). A complete redraw of Table 1 looks like this:

Table 1. Numbers weighted back to mirror the source population

	Anxiety diagnosis	No anxiety diagnosis	Total
GAD-7 positive	55	11	66
GAD-7 negative	63	716	779
Total	118	727	845

Sensitivity of the GAD-7 in the source population was 55/118 = 46.6% (instead of 76.3% in the stratified sample). Specificity was 98.5%, the LR of a positive test was 30.81 and the LR of a negative test was 0.54%. The revised conclusion should be that the GAD-7 did not perform very well in detecting anxiety disorder in the Malaysian women attending a primary care clinic: the GAD-7 missed more than half of all anxiety disorders.

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Reference
1. Sidik S, Arroll B, Goodyear-Smith F. Validation of the GAD-7 (Malay version) among women attending a primary care clinic in Malaysia. J Prim Health Care. 2012;4(1):5–11.

Authors' response

In response to the 'Letter to the Editor' on the validity results of the GAD-7 (Malay version), the authors would like to maintain that their original calculations are correct. The validity of the GAD-7 (Malay version) was calculated based on the 146 participants interviewed with the CIDI, and not the whole study population (n=845). The objective of the paper was to validate the GAD-7 against the CIDI as the reference standard, which was stated in the abstract and method sections. Therefore, the authors are justified in calculating the sensitivity and specificity of the GAD-7 *only among the 146 participants who were interviewed with the CIDI*. The remaining 699 respondents were not interviewed with the CIDI, and therefore the validity findings were not generalised to the whole study population of 845. The sensitivity and specificity of a test are independent of the prevalence of a disorder. We accept that the likelihood ratios are based on small numbers but they are also independent of prevalence. Dr Terluin's extrapolation of results from a subset onto the total population, including those who had not had the reference standard risks, must be interpreted with caution due to the potential magnification of error, where numbers in some groups are actually small.

Letters may respond to published papers, briefly report original research or case reports, or raise matters of interest relevant to primary health care. The best letters are succinct and stimulating. Letters of no more than 400 words may be emailed to: **editor@rnzcgp.org.nz**. All letters are subject to editing and may be shortened.