

Appendix

Table 1. Analysis history

	Analysis	Item fit residuals mean (SD)	Person fit residuals mean (SD)	PSI (CF)	Overall model fit χ^2 (p value)	Status of disorder items	% Significant t-test CI
K10 Original scale	1	0.14 (2.50)	-0.19 (1.24)	0.85 (0.87)	262.28 (0.0000)	Five items (1,4,7,8,9)	9.33% CI (6.9–11.8)
Rescore only disorder items to 01123	2	-0.71 (2.34)	-0.30 (1.13)	0.84 (0.87)	202.53 (0.0000)	One item (5)	7.3% CI (4.9–9.8)
Rescore all to 01123	3	-1.48 (2.38)	-0.55 (1.44)	0.83 (0.87)	166.67 (0.0000)	No items	4.7% CI (2.2–7.1)
Positive worded items (1,2,3,5,6)	4	-0.15 (1.92)	-0.30 (1.04)	0.85 (0.83)	107.05 (0.0000)	One item (1)	6.3% CI (3.9–8.8)
Negative worded items (4,7,8,9,10)	5	0.51 (1.90)	-0.21 (1.03)	0.59 (0.80)	98.51 (0.0000)	Three items (4, 7, 8)	3.0% CI (0.5–5.5)
Remove only tired from the model	6	-1.07 (2.39)	-0.57 (1.55)	0.81 (0.87)	107.13 (0.0000)	No item	6.7% CI (4.2–9.1)
Remove only depressed from the model	7	-1.50 (1.97)	-0.67 (1.49)	0.85 (0.88)	96.61 (0.0000)	No item	10.3% CI (7.9–12.8)
Remove only worthless from the model	8	-1.58 (2.59)	-0.53 (1.40)	0.82 (0.86)	164.14 (0.0000)	No item	8.3% CI (5.9–10.8)
Remove tired and depressed together from the model	9	-1.27 (1.66)	-0.73 (1.62)	0.83 (0.88)	58.73 (0.0027)	No item	16.0% CI (13.5–18.5)
Remove tired and worthless together from the model	10	-1.20 (2.61)	-0.55 (1.48)	0.80 (0.86)	126.24 (0.0000)	No item	12.0% CI (9.5–14.5)
Remove depressed and worthless together from the model	11	-1.55 (1.90)	-0.64 (1.42)	0.85 (0.87)	76.64 (0.0000)	No item	9.3% CI (6.9–11.8)
Remove tired, depressed and worthless from the model	12	-1.34 (1.27)	-0.70 (1.53)	0.84 (0.88)	40.11 (0.0647)	No item	6.7% CI (4.2–9.2)
Remove Further from tired, depressed and worthless from the model+ one person id 164	13	-0.20 (1.20)	-0.06 (1.41)	0.84 (0.88)	39.83 (0.0685)	No item	3.3% CI (0.9–5.8)

The history of statistical analysis of the K10 using Rasch analysis has been mentioned in Table 1 (supplementary file). First, we ran the Rasch analysis with original ten items. Out of the ten items, five items had disordered thresholds, and overall chi-square values as well as item fit residuals that were high and significant. We rescored only the disordered items by following the pattern of categorical probability curve, which suggested the combination of the middle two response categories into one, but one item still had a disordered threshold. Next, we rescored all items to 0,1,1,2, 3 from 0, 1, 2, 3, 4. The problem of disordered items was solved, but overall chi-square values and item fit residuals SD were high. Then, we tried to use the PCA technique to check whether the scale was more than one dimension. To achieve this, we used PCA technique to separate positively and negatively worded items. We found that items 1, 2, 3, 5 and 6 were positively worded items, and 4, 7, 8, 9 and 10 were negatively worded items. We applied Rasch analysis technique to positively and negatively worded items and found one disordered item among the positively worded items and three among the negatively worded items, and overall model fits were poor for both models. We confirmed that the K10 was not a two-factor solution. Then we revisited the model where we rescored all items to 01123.

We checked the individual items fit chi-square value, which might influence the overall chi-square value. We found that item 1 (feel tired) had a high chi-square value followed by item 7 (feel depressed) and item 10 (worthless). First, we removed the item 'feel tired' from the model and then 'depressed' and finally 'worthless.' Removing one item at a time in the following sequential order, 'tired', 'depressed' and 'worthless' resulted in chi-square values (SD) of 107.13 (SD = 2.34), 96.61 (SD=1.97) and 164.14 (2.59), respectively, indicating the models were poorly fit. Removing two items at a time in the following sequential order, 'tired and depressed', 'depressed and worthless', and 'worthless and tired' did not improve the model significantly. Going through different iteration process in removing items, removing three items together produced the desired model except the individual's person fit statistics SD (1.53). Further investigation showed that one person was misfit. Removing the misfit person, Rasch analysis produced a perfect fit model with seven items, with four categories for each item (Appendix Table 1). All the assumptions of the Rasch analysis have been met in our model.