Appendix V – Goodness of Fit plots for Three Latent Variable IRT Model with Mixture

This appendix contains diagnostic plots evaluating the performance of the three latent variable IRT model with mixture.

Figure V- 1: For items 1 – 5: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey)
Figure V-2 For items 6 – 10: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and $\geq 1$; panel with “2” (second column from left) shows values with scores 1 and $\geq 2$; panel with “3” (third column from left) shows values with scores 2 and $\geq 3$; and panel with “4” (right most column) shows values with scores 3 and $\geq 4$. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 3: For items 11 – 15: Red dots indicate the observed scores.
Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey)
For items 16 – 20: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 5: For items 21 – 25: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 6: For items 26 – 30: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 7: For items 31 – 35: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 8: For items 36 – 40: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 9: For items 41 – 45: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey)
For items 46–50: Red dots indicate the observed scores. Panel with “1” (leftmost column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (rightmost column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 11: For items 51 – 55: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey)
Figure V - 12: For items 56 – 59: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 13: For items 60 – 61 (binary items): Red dots indicate the observed scores. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).

Figure V - 14: For item 62 (rated from 0-5): Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; panel with “4” (fourth column from the left) shows values with scores 3 and ≥ 4; and panel with “5” (right most column) shows values with scores 4 and ≥ 5. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).
Figure V - 15: For items 63 - 68: Red dots indicate the observed scores. Panel with “1” (left most column) shows values with scores 0 and ≥ 1; panel with “2” (second column from left) shows values with scores 1 and ≥ 2; panel with “3” (third column from left) shows values with scores 2 and ≥ 3; and panel with “4” (right most column) shows values with scores 3 and ≥ 4. The ICC curves from the IRT model fit (black line) is compared to the fit of a generalized additive model (GAM) with cross-validated cubic spline as a smoothing function (dark red line and the associated 95% confidence interval is shown in grey).