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A Comparison of Computerized Classification Testing and Computerized Adaptive Testing in Clinical Psychology

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Supplementary Data

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Characteristics of the Anxiety items of Pilkonis al. (2011)

Tables 1 and 2, and Figure 1 provide details on the estimated item parameters of the Anxiety itembank of the study of Pilkonis al. (2011), which was used as a mould for the simulation study.

Characteristics of the simulation

Tables 3, 4, 5 and 6, and Figure 2 provide details on the populations and cut scores used and items generated in the simulation study.

Simulation results

Tabel 7 to 13 provide means and standard deviations for the outcomes plotted in Figures 3 to 7 of the article.

Table 1: GRM estimates of PROMIS Anxiety bank (Pilkonis et al., 2011).

Item	a	b_1	b_2	b_3	b_4
1	2.773	0.536	1.444	2.391	3.314
2	2.604	0.623	1.649	2.645	3.797
3	2.953	0.736	1.517	2.478	3.270
4	2.814	-0.097	0.846	1.774	2.806
5	2.520	0.820	1.369	2.357	2.996
6	2.062	0.548	1.369	2.290	3.228
7	2.304	-0.393	0.647	2.021	3.396
8	1.382	0.669	1.729	3.307	4.715
9	1.498	0.283	1.322	2.594	3.818
10	3.365	0.728	1.495	2.392	3.275
11	1.499	0.259	1.577	2.693	3.688
12	1.745	-0.245	0.999	2.364	3.481
13	1.633	0.489	1.151	2.086	3.492
14	1.650	0.067	1.080	2.283	3.926
15	2.410	0.587	1.449	2.408	3.293
16	2.582	-0.406	0.603	1.629	2.922
17	3.063	1.221	2.051	2.916	3.616
18	1.566	-0.184	0.883	2.098	3.072
19	2.913	0.740	1.631	2.664	3.508
20	2.617	0.549	1.286	2.242	3.132
21	1.096	0.746	1.898	3.550	5.301
22	3.002	-0.076	0.913	2.068	3.345
23	1.857	-0.170	0.854	2.031	3.307
24	2.378	-0.069	0.957	2.001	2.924
25	1.174	-0.935	0.132	1.564	3.008
26	1.998	-0.360	0.633	1.804	3.227
27	2.892	-0.090	0.867	1.972	3.065
28	2.381	-0.389	0.536	1.690	2.992
29	2.776	0.406	1.328	2.393	3.392

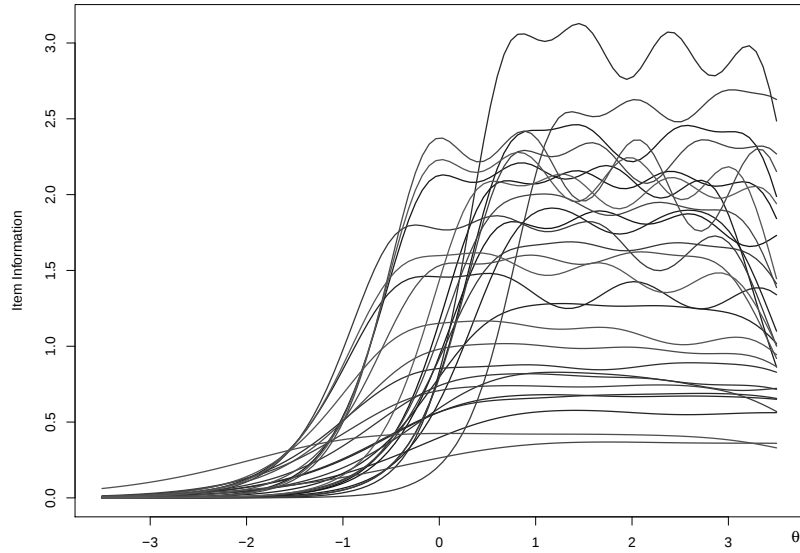


Figure 1: Item information of the 29-item PROMIS Anxiety bank (Pilkonis et al., 2011).

Table 2: Means and covariances of the GRM parameter estimates of the PROMIS Anxiety bank (Pilkonis et al., 2011). Left panel: parameter estimates; right-hand panel: covariance of the estimates.

	Min.	Mean	Max.	a	b_1	b_2	b_3	b_4
a	1.096	2.259	3.365	0.403				
b_1	-0.935	0.227	1.221	0.097	0.253			
b_2	0.132	1.180	2.051	0.043	0.214	0.201		
b_3	1.564	2.300	3.550	-0.050	0.177	0.185	0.211	
b_4	2.806	3.424	5.301	-0.161	0.111	0.141	0.206	0.278

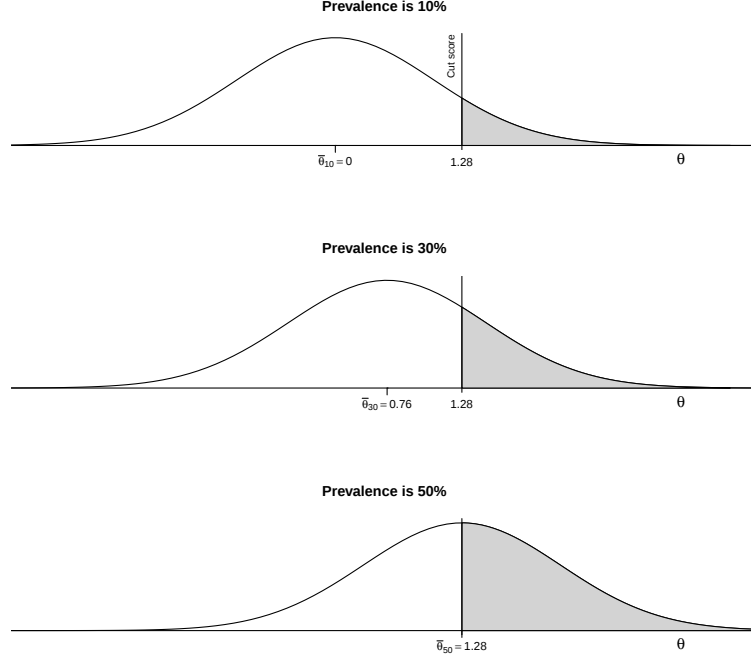


Figure 2: Distribution of θ in the three populations and the cut score.

Table 3: Average marginal maximum likelihood parameter estimates (SD) over 100 data files.

Prevalence	a	b_1	b_2	b_3	b_4
Calibration scale					
10%	1.698 (0.421)	-0.007 (0.490)	1.171 (0.494)	2.349 (0.514)	3.547 (0.572)
30%	1.650 (0.406)	-0.904 (0.497)	0.300 (0.491)	1.511 (0.500)	2.732 (0.518)
50%	1.693 (0.456)	-1.382 (0.643)	-0.203 (0.590)	0.975 (0.556)	2.156 (0.539)
Population scale [†]					
10%	1.698 (0.421)	-0.007 (0.490)	1.171 (0.494)	2.349 (0.514)	3.547 (0.572)
30%	1.650 (0.406)	-0.144 (0.497)	1.060 (0.491)	2.271 (0.500)	3.492 (0.518)
50%	1.693 (0.456)	-0.102 (0.643)	1.077 (0.590)	2.255 (0.556)	3.436 (0.539)

[†]Adding 0, 0.76, and 1.28 to the θ -scale of the 10, 30, and 50% prevalences, respectively.

Table 4: Average item variance and covariance (SD) over 100 data files.

Prevalence	Variance ^a	Covariance ^b
10%	1.005 (0.267)	0.430 (0.103)
30%	1.364 (0.231)	0.635 (0.118)
50%	1.497 (0.208)	0.713 (0.126)

^a $N = 100 \times 40 = 4,000$.

^b $N = 100 \times 40 \times 39 = 15,600$.

Table 5: Test information (TI) function values and associated standard errors (SE) for 21 values of θ in Figure 1 of the article.

θ	TI_{θ}	SE_{θ}
-3.50	0.569	1.325
-3.15	0.887	1.062
-2.80	1.385	0.850
-2.45	2.163	0.680
-2.10	3.367	0.545
-1.75	5.199	0.439
-1.40	7.904	0.356
-1.05	11.703	0.292
-0.70	16.591	0.246
-0.35	22.035	0.213
0.00	26.813	0.193
0.35	29.602	0.184
0.70	30.475	0.181
1.05	30.704	0.180
1.40	30.988	0.180
1.75	31.356	0.179
2.10	31.428	0.178
2.45	30.877	0.180
2.80	30.041	0.182
3.15	29.195	0.185
3.50	27.683	0.190

Table 6: Average cut score (SD) over 100 data files.

Prevalence	Raw Cut score ^a	Transformed Cut score ^b
10%	1.290 (0.058)	1.290 (0.058)
30%	0.523 (0.039)	1.283 (0.039)
50%	−0.002 (0.040)	1.278 (0.040)

^aCalibration scale. ^bPopulation scale.

Table 7: Fidelity coefficient outcomes.

		1	2	3	4	5	6	7
		Prevalence is 10%						
CAT	M	0.758	0.850	0.889	0.911	0.924	0.934	0.941
	SD	0.031	0.018	0.012	0.010	0.009	0.007	0.007
CCT	M	0.736	0.823	0.864	0.886	0.902	0.913	0.921
	SD	0.049	0.032	0.026	0.021	0.017	0.015	0.013
		Prevalence is 30%						
CAT	M	0.782	0.871	0.908	0.928	0.941	0.949	0.955
	SD	0.023	0.014	0.009	0.007	0.006	0.005	0.004
CCT	M	0.780	0.865	0.901	0.921	0.934	0.943	0.949
	SD	0.025	0.015	0.011	0.009	0.008	0.007	0.006
		Prevalence is 50%						
CAT	M	0.796	0.881	0.915	0.934	0.945	0.953	0.959
	SD	0.025	0.013	0.009	0.007	0.006	0.005	0.005
CCT	M	0.795	0.879	0.913	0.931	0.943	0.951	0.957
	SD	0.025	0.014	0.010	0.008	0.006	0.005	0.005

Table 8: Proportion of correct decisions outcomes.

		1	2	3	4	5	6	7
Prevalence is 10%								
CAT	M	0.921	0.938	0.944	0.948	0.950	0.951	0.951
	SD	0.017	0.012	0.013	0.013	0.013	0.014	0.015
CCT	M	0.922	0.939	0.945	0.948	0.950	0.951	0.950
	SD	0.016	0.012	0.013	0.013	0.014	0.014	0.015
Prevalence is 30%								
CAT	M	0.838	0.873	0.887	0.900	0.906	0.910	0.914
	SD	0.024	0.021	0.021	0.021	0.022	0.022	0.023
CCT	M	0.841	0.871	0.888	0.899	0.905	0.910	0.914
	SD	0.023	0.024	0.023	0.020	0.022	0.022	0.023
Prevalence is 50%								
CAT	M	0.805	0.834	0.850	0.863	0.871	0.876	0.882
	SD	0.040	0.055	0.064	0.070	0.075	0.078	0.080
CCT	M	0.804	0.835	0.850	0.863	0.872	0.877	0.882
	SD	0.040	0.056	0.067	0.070	0.075	0.077	0.080

Table 9: Type I error outcomes.

		1	2	3	4	5	6	7
Prevalence is 10%								
CAT	M	0.029	0.031	0.034	0.035	0.037	0.038	0.041
	SD	0.025	0.015	0.017	0.018	0.019	0.020	0.021
CCT	M	0.030	0.030	0.034	0.036	0.038	0.039	0.041
	SD	0.024	0.016	0.017	0.018	0.019	0.021	0.022
Prevalence is 30%								
CAT	M	0.112	0.100	0.093	0.087	0.088	0.089	0.088
	SD	0.064	0.041	0.039	0.041	0.041	0.042	0.043
CCT	M	0.111	0.100	0.093	0.086	0.089	0.089	0.088
	SD	0.061	0.046	0.039	0.039	0.041	0.042	0.044
Prevalence is 50%								
CAT	M	0.225	0.208	0.189	0.180	0.173	0.169	0.163
	SD	0.144	0.152	0.166	0.172	0.181	0.184	0.186
CCT	M	0.227	0.205	0.192	0.180	0.172	0.168	0.162
	SD	0.144	0.154	0.172	0.174	0.179	0.183	0.186

Table 10: Type II error outcomes.

		1	2	3	4	5	6	7
Prevalence is 10%								
CAT	M	0.525	0.339	0.251	0.201	0.168	0.145	0.123
	SD	0.216	0.112	0.091	0.088	0.090	0.084	0.081
CCT	M	0.506	0.336	0.247	0.196	0.164	0.145	0.123
	SD	0.202	0.106	0.098	0.091	0.089	0.084	0.082
Prevalence is 30%								
CAT	M	0.281	0.193	0.159	0.132	0.109	0.092	0.081
	SD	0.127	0.074	0.066	0.055	0.051	0.045	0.043
CCT	M	0.272	0.199	0.158	0.136	0.109	0.093	0.081
	SD	0.117	0.073	0.061	0.057	0.053	0.047	0.045
Prevalence is 50%								
CAT	M	0.164	0.124	0.109	0.093	0.083	0.078	0.072
	SD	0.088	0.062	0.055	0.047	0.045	0.042	0.041
CCT	M	0.163	0.125	0.108	0.093	0.083	0.077	0.073
	SD	0.088	0.062	0.053	0.047	0.044	0.042	0.041

Table 11: Predictive utility outcomes.

		1	2	3	4	5	6	7
Prevalence is 10%								
CAT	M	0.294	0.321	0.333	0.338	0.341	0.343	0.345
	SD	0.042	0.041	0.036	0.036	0.035	0.035	0.035
CCT	M	0.295	0.324	0.335	0.342	0.345	0.346	0.348
	SD	0.046	0.042	0.039	0.038	0.036	0.036	0.036
Prevalence is 30%								
CAT	M	0.364	0.398	0.414	0.421	0.426	0.429	0.431
	SD	0.040	0.039	0.039	0.038	0.038	0.037	0.037
CCT	M	0.364	0.398	0.413	0.422	0.426	0.430	0.432
	SD	0.040	0.042	0.041	0.040	0.039	0.038	0.038
Prevalence is 50%								
CAT	M	0.392	0.428	0.444	0.452	0.457	0.460	0.464
	SD	0.035	0.033	0.032	0.032	0.031	0.031	0.031
CCT	M	0.391	0.428	0.444	0.452	0.457	0.461	0.464
	SD	0.035	0.034	0.032	0.032	0.031	0.031	0.031

Table 12: Sensitivity outcomes.

		1	2	3	4	5	6	7
Prevalence is 10%								
CAT	M	0.253	0.329	0.372	0.388	0.407	0.415	0.426
	SD	0.124	0.072	0.081	0.084	0.084	0.084	0.086
CCT	M	0.259	0.326	0.372	0.393	0.406	0.415	0.428
	SD	0.121	0.076	0.078	0.084	0.082	0.082	0.085
Prevalence is 30%								
CAT	M	0.504	0.549	0.565	0.576	0.588	0.598	0.602
	SD	0.118	0.078	0.069	0.066	0.069	0.067	0.068
CCT	M	0.511	0.546	0.564	0.574	0.589	0.598	0.603
	SD	0.108	0.078	0.067	0.070	0.069	0.068	0.069
Prevalence is 50%								
CAT	M	0.693	0.715	0.719	0.724	0.728	0.730	0.731
	SD	0.104	0.091	0.093	0.089	0.089	0.090	0.090
CCT	M	0.694	0.713	0.719	0.725	0.728	0.730	0.729
	SD	0.103	0.091	0.092	0.089	0.089	0.090	0.090

Table 13: Specificity outcomes.

		1	2	3	4	5	6	7
Prevalence is 10%								
CAT	M	0.946	0.932	0.924	0.919	0.916	0.913	0.909
	SD	0.035	0.021	0.022	0.023	0.024	0.025	0.026
CCT	M	0.944	0.932	0.924	0.918	0.914	0.912	0.909
	SD	0.034	0.021	0.023	0.024	0.025	0.025	0.026
Prevalence is 30%								
CAT	M	0.797	0.790	0.789	0.789	0.783	0.780	0.778
	SD	0.070	0.044	0.041	0.041	0.040	0.039	0.040
CCT	M	0.796	0.792	0.790	0.791	0.782	0.780	0.778
	SD	0.066	0.047	0.039	0.039	0.040	0.040	0.041
Prevalence is 50%								
CAT	M	0.632	0.631	0.639	0.637	0.638	0.639	0.640
	SD	0.123	0.122	0.127	0.128	0.134	0.135	0.135
CCT	M	0.631	0.633	0.635	0.639	0.639	0.639	0.640
	SD	0.123	0.124	0.131	0.130	0.133	0.134	0.135