

Summary of Rating Scale Model

July 29, 2018

1 Checking Assumptions

Table 1: Goodness of fit statistics related to the test of unidimensionality in the RSM-based instrument for measuring the intrinsic motivation of participants in the first empirical study

data	df	chisq	AGFI	TLI	CFI	DETECT	ASSI	RATIO
Intrinsic Motivation	16.260	44.744	0.980	0.649	0.456	0.227	0.221	0.008
Interest/Enjoyment	2.040	2.245	0.996	0.993	0.994	8.710	0.467	0.553
Perceived Choice	2.848	3.640	0.997	0.983	0.975	12.694	0.400	0.605
Pressure/Tension	1.676	2.886	0.979	0.924	0.925	5.922	0.333	0.480
Effort/Importance	0.000	0.000	1.000	1.000	1.000	13.237	0.333	0.564

df: degree of freedom; AGFI: Adjusted Goodness of Fit Index; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index;

Table 2: Item residual correlation statistics related to the test of local independence in the RSM-based instrument for measuring the intrinsic motivation of participants in the first empirical study

data	max.chisq	maxaQ3	MADaQ3	SRMSR	p.value
Intrinsic Motivation	147.064	0.616	0.190	0.225	0.000
Interest/Enjoyment	519.944	0.495	0.200	0.107	0.003
Perceived Choice	67.919	0.355	0.149	0.106	0.073
Pressure/Tension	42.092	0.397	0.159	0.099	0.017
Effort/Importance	49.082	0.057	0.038	0.015	1.000

aQ3: adjusted correlation of item residuals; maxaQ3: maximum aQ3; MADaQ3: Median Absolute Deviation of aQ3;

Table 3: Test of monotonicity in the RSM-based instrument for measuring the intrinsic motivation of participants in the first empirical study

data	ItemH	ac	vi	vi/ac	maxvi	sum	sum/ac	zmax	zsig	crit
Intrinsic Motivation.Item22IE	0.38	0	0		0.00	0.00		0	0	0

Table 3: (continued)

data	ItemH	ac	vi	vi/ac	maxvi	sum	sum/ac	zmax	zsig	crit
Intrinsic Motivation.Item09IE	0.47	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item12IE	0.43	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item24IE	0.28	6	1	0.17	0.03	0.03	0.01	0	0	29
Intrinsic Motivation.Item21IE	0.39	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item01IE	0.36	4	0	0.00	0.00	0.00	0.00	0	0	0
Intrinsic Motivation.Item17PC	0.44	3	0	0.00	0.00	0.00	0.00	0	0	0
Intrinsic Motivation.Item15PC	0.36	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item06PC	0.26	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item02PC	0.37	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item08PC	0.41	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item16PT	0.07	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item14PT	0.28	2	0	0.00	0.00	0.00	0.00	0	0	0
Intrinsic Motivation.Item18PT	0.36	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item13EI	0.10	0	0		0.00	0.00		0	0	0
Intrinsic Motivation.Item03EI	0.11	5	1	0.20	0.03	0.03	0.01	0	0	42
Intrinsic Motivation.Item07EI	0.12	0	0		0.00	0.00		0	0	0
Interest/Enjoyment.Item22IE	0.59	0	0		0.00	0.00		0	0	0
Interest/Enjoyment.Item09IE	0.66	0	0		0.00	0.00		0	0	0
Interest/Enjoyment.Item12IE	0.69	3	0	0.00	0.00	0.00	0.00	0	0	0
Interest/Enjoyment.Item24IE	0.57	5	0	0.00	0.00	0.00	0.00	0	0	0
Interest/Enjoyment.Item21IE	0.59	0	0		0.00	0.00		0	0	0
Interest/Enjoyment.Item01IE	0.57	0	0		0.00	0.00		0	0	0
Perceived Choice.Item17PC	0.69	0	0		0.00	0.00		0	0	0
Perceived Choice.Item15PC	0.63	0	0		0.00	0.00		0	0	0
Perceived Choice.Item06PC	0.53	0	0		0.00	0.00		0	0	0
Perceived Choice.Item02PC	0.59	3	0	0.00	0.00	0.00	0.00	0	0	0
Perceived Choice.Item08PC	0.62	0	0		0.00	0.00		0	0	0
Pressure/Tension.Item16PT	0.63	0	0		0.00	0.00		0	0	0
Pressure/Tension.Item14PT	0.61	0	0		0.00	0.00		0	0	0
Pressure/Tension.Item18PT	0.54	0	0		0.00	0.00		0	0	0
Pressure/Tension.Item11PT	0.56	0	0		0.00	0.00		0	0	0
Effort/Importance.Item13EI	0.44	0	0		0.00	0.00		0	0	0
Effort/Importance.Item03EI	0.48	0	0		0.00	0.00		0	0	0
Effort/Importance.Item07EI	0.47	0	0		0.00	0.00		0	0	0

vi: number of violations; vi/ac: proportion of active pairs; maxvi: maximum violations; sum: sum of all violations;

zmax: maximum z-value; zsig: number of significant z-values; crit: Critical value

2 Estimating Item Parameters

Table 4: Estimated parameters in the RSM-based instrument
Intrinsic Motivation

estimated	Item01IE	Item02PC	Item03EI	Item06PC	Item07EI	Item08PC	Item09IE	Item12IE	Item13EI	Item14EI
xsi.item	-0.213	-0.356	-0.497	-0.461	-0.706	-0.768	-0.543	-0.305	-1.228	-1.228
B.Cat0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
B.Cat1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
B.Cat2	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
B.Cat3	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
B.Cat4	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
B.Cat5	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000
B.Cat6	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
AXsi.Cat0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AXsi.Cat1	0.624	0.767	0.908	0.872	1.117	1.179	0.953	0.716	1.639	1.639
AXsi.Cat2	1.212	1.498	1.780	1.708	2.198	2.322	1.871	1.396	3.243	3.243
AXsi.Cat3	2.357	2.786	3.208	3.100	3.836	4.021	3.345	2.633	5.402	5.402
AXsi.Cat4	1.769	2.341	2.904	2.760	3.741	3.988	3.087	2.137	5.830	5.830
AXsi.Cat5	1.582	2.297	3.001	2.821	4.047	4.356	3.229	2.042	6.658	6.658
AXsi.Cat6	1.280	2.138	2.982	2.767	4.238	4.608	3.256	1.831	7.371	7.371
Outfit	0.710	1.022	1.130	1.309	1.424	0.834	0.512	0.587	1.705	1.705

Table 4: (continued)

estimated	Item01IE	Item02PC	Item03EI	Item06PC	Item07EI	Item08PC	Item09IE	Item12IE	Item13EI	Item14EI
Infit	0.720	1.084	1.087	1.292	1.434	0.845	0.526	0.569	1.305	1.305

Table 5: Estimated parameters in the RSM-based instrument for measuring the Interest/Enjoyment

estimated	Item01IE	Item09IE	Item12IE	Item21IE	Item22IE	Item24IE
xsi.item	-0.353	-0.989	-0.529	-0.661	-0.661	-0.307
B.Cat0	0.000	0.000	0.000	0.000	0.000	0.000
B.Cat1	1.000	1.000	1.000	1.000	1.000	1.000
B.Cat2	2.000	2.000	2.000	2.000	2.000	2.000
B.Cat3	3.000	3.000	3.000	3.000	3.000	3.000
B.Cat4	4.000	4.000	4.000	4.000	4.000	4.000
B.Cat5	5.000	5.000	5.000	5.000	5.000	5.000
B.Cat6	6.000	6.000	6.000	6.000	6.000	6.000
AXsi.Cat0	0.000	0.000	0.000	0.000	0.000	0.000
AXsi.Cat1	1.419	2.055	1.595	1.727	1.727	1.373
AXsi.Cat2	2.794	4.066	3.145	3.408	3.408	2.701
AXsi.Cat3	4.736	6.644	5.262	5.657	5.657	4.595
AXsi.Cat4	4.182	6.726	4.884	5.411	5.411	3.995
AXsi.Cat5	3.581	6.762	4.458	5.117	5.117	3.348
AXsi.Cat6	2.121	5.937	3.173	3.963	3.963	1.840
Outfit	1.034	0.750	0.633	1.010	1.013	1.383
Infit	1.036	0.785	0.651	1.112	1.111	1.416

Table 6: Estimated parameters in the RSM-based instrument for measuring the Perceived Choice

estimated	Item02PC	Item06PC	Item08PC	Item15PC	Item17PC
xsi.item	-0.541	-0.688	-1.117	-0.292	-1.284
B.Cat0	0.000	0.000	0.000	0.000	0.000
B.Cat1	1.000	1.000	1.000	1.000	1.000
B.Cat2	2.000	2.000	2.000	2.000	2.000
B.Cat3	3.000	3.000	3.000	3.000	3.000
B.Cat4	4.000	4.000	4.000	4.000	4.000
B.Cat5	5.000	5.000	5.000	5.000	5.000
B.Cat6	6.000	6.000	6.000	6.000	6.000
AXsi.Cat0	0.000	0.000	0.000	0.000	0.000
AXsi.Cat1	1.607	1.754	2.183	1.358	2.350
AXsi.Cat2	2.434	2.729	3.587	1.937	3.920
AXsi.Cat3	3.944	4.386	5.674	3.199	6.174
AXsi.Cat4	3.608	4.197	5.914	2.614	6.581
AXsi.Cat5	3.659	4.396	6.542	2.417	7.375
AXsi.Cat6	3.245	4.129	6.704	1.754	7.704
Outfit	1.038	1.430	0.911	0.990	0.617
Infit	1.081	1.309	0.845	1.062	0.700

Table 7: Estimated parameters in the RSM-based instrument for measuring the Pressure/Tension

estimated	Item11PT	Item14PT	Item16PT	Item18PT
xsi.item	1.344	2.034	1.310	1.765
B.Cat0	0.000	0.000	0.000	0.000
B.Cat1	1.000	1.000	1.000	1.000
B.Cat2	2.000	2.000	2.000	2.000
B.Cat3	3.000	3.000	3.000	3.000
B.Cat4	4.000	4.000	4.000	4.000
B.Cat5	5.000	0.000	0.000	0.000
B.Cat6	6.000	0.000	0.000	0.000
AXsi.Cat0	0.000	0.000	0.000	0.000

Table 7: *(continued)*

estimated	Item11PT	Item14PT	Item16PT	Item18PT
AXsi.Cat1	-0.810	-1.566	-0.843	-1.298
AXsi.Cat2	-1.985	-3.498	-2.051	-2.960
AXsi.Cat3	-2.780	-5.050	-2.880	-4.243
AXsi.Cat4	-5.108	-8.135	-5.241	-7.059
AXsi.Cat5	-6.783			
AXsi.Cat6	-8.065			
Outfit	0.957	0.883	0.878	1.249
Infit	1.193	0.841	0.919	1.151

Table 8: Estimated parameters in the RSM-based instrument for measuring the Effort/Importance

estimated	Item03EI	Item07EI	Item13EI
xsi.item	-1.543	-1.880	-2.684
B.Cat0	0.000	0.000	0.000
B.Cat1	1.000	1.000	1.000
B.Cat2	2.000	2.000	2.000
B.Cat3	3.000	3.000	3.000
B.Cat4	4.000	4.000	4.000
B.Cat5	5.000	5.000	5.000
B.Cat6	6.000	6.000	6.000
AXsi.Cat0	0.000	0.000	0.000
AXsi.Cat1	6.967	7.305	8.108
AXsi.Cat2	8.636	9.312	10.918
AXsi.Cat3	9.827	10.840	13.250
AXsi.Cat4	10.075	11.426	14.639
AXsi.Cat5	10.097	11.785	15.802
AXsi.Cat6	9.256	11.282	16.102
Outfit	0.859	1.110	1.066
Infit	0.829	1.186	1.152

3 Latent Trait Estimates

	Intrinsic Motivation.theta	Intrinsic Motivation.error	Intrinsic Motivation.Outfit	Intrinsic Motivation.Infit	Interest/Enjoyment.theta	Interest/Enjoyment.error	Interest
10169	0.081	0.188	0.888	0.884	0.774	0.401	0.774
10170	0.435	0.216	0.331	0.341	0.339	0.388	0.388
10171	0.435	0.216	0.568	0.585	0.774	0.401	0.401
10172	0.012	0.184	0.999	0.735	0.339	0.388	0.388
10174	0.046	0.186	0.467	0.460	0.045	0.393	0.393
10175	0.582	0.233	2.160	1.196	0.774	0.401	0.401
10176	-0.179	0.176	0.651	0.702	-0.622	0.399	0.399
10178	0.152	0.192	0.554	0.392	0.194	0.389	0.389
10179	-0.413	0.169	0.513	0.532	-0.944	0.376	0.376
10181	0.152	0.192	0.669	0.743	-0.447	0.403	0.403
10183	-0.209	0.175	0.441	0.436	-0.790	0.389	0.389
10184	0.116	0.190	0.662	0.648	-0.275	0.402	0.402
10185	-0.385	0.170	0.159	0.141	-0.790	0.389	0.389
10186	0.189	0.195	1.271	1.106	-0.111	0.398	0.398
10187	0.826	0.269	2.906	1.891	3.747	1.435	1.435
10188	-0.269	0.173	0.261	0.248	-0.944	0.376	0.376
10189	-0.269	0.173	1.213	1.010	-0.790	0.389	0.389
10190	-0.117	0.178	0.697	0.774	-0.275	0.402	0.402
10191	0.081	0.188	1.074	1.161	0.774	0.401	0.401
10192	0.081	0.188	1.990	2.285	1.281	0.457	0.457
10193	-0.148	0.177	0.463	0.473	0.045	0.393	0.393
10195	0.116	0.190	0.477	0.417	0.482	0.389	0.389
10196	-0.179	0.176	0.960	0.999	-0.790	0.389	0.389
10197	0.306	0.204	1.249	1.259	0.045	0.393	0.393
10198	3.433	1.352	0.030	0.034	3.747	1.435	1.435
10199	0.046	0.186	1.503	1.549	-0.790	0.389	0.389
10200	0.390	0.212	1.049	0.755	1.495	0.495	0.495
10201	0.637	0.240	1.181	0.671	1.495	0.495	0.495
10202	-0.607	0.166	1.613	1.457	-0.790	0.389	0.389
10203	0.081	0.188	2.427	2.880	-0.790	0.389	0.389
10204	0.983	0.298	1.019	1.077	2.625	0.830	0.830
10206	0.081	0.188	0.802	0.674	-0.275	0.402	0.402
10208	0.582	0.233	1.369	1.071	1.495	0.495	0.495
10209	-0.662	0.166	1.676	1.710	-1.436	0.337	0.337
10210	-0.716	0.166	1.157	1.122	-1.210	0.352	0.352
10211	-0.413	0.169	1.845	1.928	1.281	0.457	0.457
10212	0.435	0.216	1.137	0.867	1.495	0.495	0.495
10213	-0.117	0.178	1.603	1.681	0.626	0.393	0.393

	Intrinsic	Motivation.theta	Intrinsic	Motivation.error	Intrinsic	Motivation.Outfit	Intrinsic	Motivation.Infit	Interest/Enjoyment.theta	Interest/Enjoyment.error	Interest/
10214		-0.634		0.166		0.420		0.397	-1.540	0.332	
10215		0.531		0.227		0.983		0.952	0.194	0.389	

	Intrinsic	Motivation.theta	Intrinsic	Motivation.error	Intrinsic	Motivation.Outfit	Intrinsic	Motivation.Infit	Interest/Enjoyment.theta	Interest/Enjoyment.error	Interest
10216		0.347		0.208		1.114		1.342	0.045	0.393	
10217		0.152		0.192		0.965		1.090	-0.944	0.376	
10218		-0.298		0.172		0.812		0.794	-1.326	0.343	
10219		-0.385		0.170		0.454		0.427	-1.083	0.364	
10220		0.531		0.227		1.140		1.367	0.626	0.393	
10221		0.116		0.190		0.353		0.320	-0.275	0.402	
10222		-1.430		0.190		0.779		0.811	-4.054	1.200	
10223		0.637		0.240		0.738		0.466	1.495	0.495	
10224		-0.179		0.176		1.965		2.040	1.757	0.553	
10226		-0.413		0.169		0.841		0.835	-0.944	0.376	
10227		-0.825		0.167		0.743		0.729	-1.643	0.331	
10228		-0.239		0.174		0.522		0.406	-0.790	0.389	
10230		-0.441		0.169		1.544		1.607	-1.744	0.331	
10231		1.664		0.476		0.874		0.975	3.747	1.435	
10232		0.189		0.195		0.477		0.528	0.626	0.393	
10233		-0.689		0.166		0.712		0.715	-1.950	0.341	
10234		-0.580		0.167		0.808		0.818	-1.326	0.343	
10237		-0.021		0.182		0.792		0.859	0.045	0.393	
10238		-0.716		0.166		0.825		0.771	-0.944	0.376	
10240		-0.743		0.166		0.948		0.943	-1.210	0.352	