TEST DEVELOPMENT PROJECT

Project Assignment 4

Team C

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Preparation: Data cleaning

Listwise: Case 149, 153, 166 (Did not respond to any item)

Series Mean (after Listwise) 15 items in total:

Case 1 - I2, I8, I17, I18, St8, St10, St14, St15

Case 52 - I10

Case 125 - St10

Case 133 - St8

Case 149 - I1

Case 153 - I17

Case 166 - I10

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n = 205

The following items were reverse coded:

Integrity: Items 1,7, 9, 10, 13, 18

Stress Tolerance: Items: 1, 7, 8, 10, 13

Step 1: Calculate mean and SD of each item.

In Step 1, we calculated the mean and the standard deviation of the responses for each item. Prior to conducting the calculations, we reverse coded the following items: I1, I7, I9, I10, I13, I18, St1, St7, St8, St10, and St13. Figure 1 presents the means for each item

I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13
3.333171	4.299024	4.180488	4.448780	4.580488	3.863415	4.219512	4.529268	2.790244	2.900976	4.219512	4.137073	4.390244
I14	I15	I16	I17	I18	St1	St2	St3	St4	St5	St6	St7	St8
3.951220	3.770732	4.453659	4.048780	3.083415	3.400000	4.000000	4.068293	4.126829	4.400000	4.063415	3.121951	3.285854
St9	St10	St11	St12	St13	St14	St15						
4.097561	3.088780	3.512195	3.985366	3.658537	3.858049	3.940976						

Figure 1. Means of each item.

Figure 2 presents the standard deviations for each item

I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13
1.316067	1.001861	0.9556897	0.7692376	0.6857154	0.9553144	1.055151	0.7567487	1.232685	1.208669	0.9577392	1.043557	0.9670566
I14	I15	I16	I17	I18	St1	St2	St3	St4	St5	St6	St7	St8
1.008572	1.120715	0.7303295	1.114768	1.170687	1.262584	0.9701425	0.967724	0.9306924	0.7383076	0.9756235	1.163057	1.251331
St9	St10	St11	St12	St13	St14	St15						
0.8746113	1.287961	1.153043	1.059403	1.287378	1.007032	1.0509						

Figure 2. Standard deviation of each item.

Step 2: Conduct EFA to examine the dimensionality.

In Step 2, we conducted EFA to examine the dimensionality of our items. We began with a KMO and Bartlett test. The KMO value was 0.875, this suggests that the sample size is very good for EFA. The Barlett test was significant at an alpha level of 0.05 (χ^2 (528) = 2432.13, p < .001). This means there are correlations between the items. Next, we used the Principal Axis Factoring extraction method and used a variety of different methods to determine the number of

factors to extract. We conducted a MAP analysis that suggested 3 factors. The BIC and the screen plot (presented in Figure 3) suggests 2 factors. We decided to extract 2 factors as this was the number of dimensions we had created.

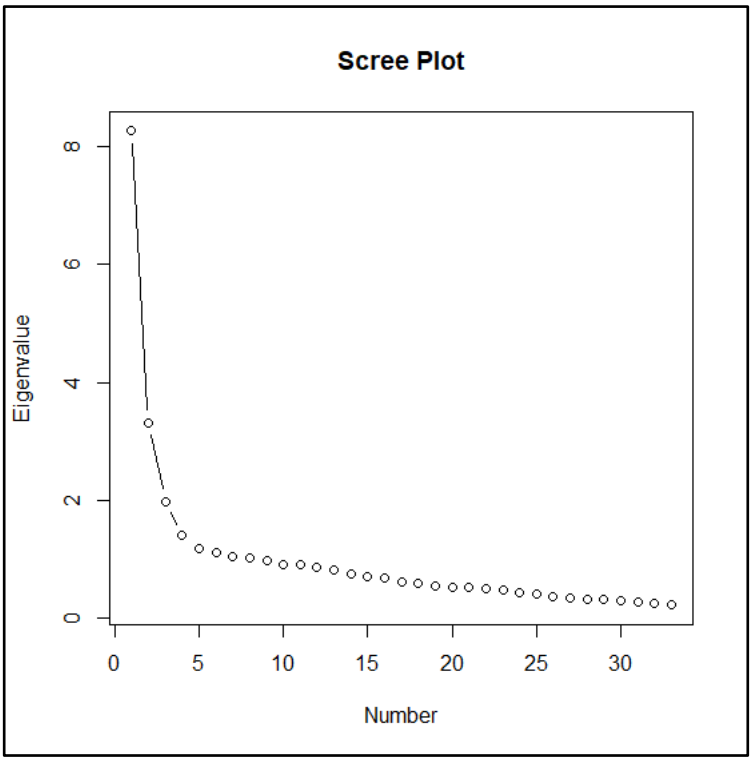

Figure 3. Scree Plot.

Step 3: Examine the results of Step 1 and 2.

In Step 3, we examined the results of EFA. Table 1 presents the factor loadings, communalities, uniquenesses, and complexities of each item. According to table 1, there are 2 factors that reflect our dimensions and can be determined by the factor loadings. Items I1 to I18 are loaded onto factor PA2, which reflects integrity. Items St1 to ST15 are loaded onto factor PA1, which reflects stress tolerance. The factor loadings are above 0.3 for all but 3 items for factor PA2 (integrity). The complexities for most items are close to 1.0, with items I4 and I7 being closer to 1.5 and 1.3 respectively. The factor loadings for all items for factor PA1 (stress tolerance) are above 0.3 and most complexities are close to 1 or 1.5. The following items could be used for each dimension:

- Overall, the mean and standard deviation values indicate that the majority of our items are able to distinguish between respondent's trait level. To elaborate, none of our items had a mean value that's too small (mean = 1), or too big (mean = 5). When it comes to standard deviation, most of the items demonstrated a decently large value. However, given that the standard of determining a small standard deviation is arbitrary and does not have a cutoff score, we list two items that demonstrate the lowest standard deviation

value. Items I5, I7 had the lowest standard deviation value and therefore could be weaker in their ability to distinguish the trait level differences of respondents.

- Integrity (PA2): I1-I8, I11-I17 could be used because the factor loadings were above 0.3. Items I11, I12, and I16 had communality that was greater than 0.4, which indicates that these are the best items to use. The other items (Items I9, I10, and I17) had factor loadings below 0.3 and should be removed.
- Stress Tolerance (PA1): St1 - St15 could be used because the factor loadings were above 0.3. Items St4, St6, St9, St11 - St15 could also be used because they had a high communality.

	PA1	PA2	Communality	Uniquenesses	Complexity
St12	0.7833	-0.04008	0.588795352	0.411204648	1.005237183
St11	0.76627	-0.20935	0.496262757	0.503737243	1.148453574
St6	0.739794	-0.03169	0.528611133	0.471388867	1.003668982
St14	0.727973	-0.07836	0.488176561	0.511823439	1.023167497
St13	0.713072	-0.07304	0.470062629	0.529937371	1.020981611
St9	0.677247	0.042747	0.48480622	0.51519378	1.007967671
St15	0.655188	-0.00536	0.426348514	0.573651486	1.000133987
St4	0.636267	0.072443	0.448796707	0.551203293	1.025922317
St8	0.571738	0.018934	0.336335043	0.663664957	1.002193331
St10	0.546173	0.067889	0.334056792	0.665943208	1.030893448
St2	0.507949	0.024158	0.268902091	0.731097909	1.004523784
St5	0.473382	0.196837	0.341096055	0.658903945	1.335759193
St1	0.404816	0.146517	0.235159973	0.764840027	1.257572283
St3	0.379908	0.157418	0.219339969	0.780660031	1.333550932
St7	0.308201	-0.15567	0.07892435	0.92107565	1.479033034
I11	-0.00501	0.690759	0.474268463	0.525731537	1.00010511
I12	0.020979	0.632986	0.412264224	0.587735776	1.002196816
I16	0.130763	0.60275	0.44660494	0.55339506	1.09392105
I3	-0.16113	0.594258	0.29868244	0.70131756	1.146252763
I8	0.063956	0.549947	0.336073743	0.663926257	1.027043784
I17	0.078918	0.524239	0.315802919	0.684197081	1.045300702
I14	0.003839	0.518428	0.27045373	0.72954627	1.00010968
I13	0.026159	0.517288	0.279636661	0.720363339	1.005114576
I2	-0.04831	0.504408	0.236294588	0.763705412	1.018343951
I5	0.126745	0.440651	0.257146024	0.742853976	1.164338214
I4	0.25177	0.439851	0.349868885	0.650131115	1.591756151
I7	0.1124	0.417945	0.226767493	0.773232507	1.14390003
I15	0.072694	0.40895	0.197493457	0.802506543	1.063133178
I1	-0.07713	0.383031	0.127848611	0.872151389	1.080960488
I6	0.156861	0.378674	0.217888771	0.782111229	1.333368138
I18	-0.05757	0.290049	0.073418156	0.926581844	1.078667595
I10	-0.05195	0.252926	0.055634213	0.944365787	1.084229963
I9	-0.03704	0.125977	0.013322989	0.986677011	1.17165673

Table 1. Factor loadings sorted by factor and size. Bright yellow highlights indicate selected items. Orange highlight indicates factor loadings above 0.3. Yellow highlight indicates communialities above 0.4. Blue highlights indicate small uniqueness. Green highlight indicates complexities close to 1.0.

Step 4: Items used for assessing the dimensions based on the results of Step 1 & 2.

In Step 4, we identified items that could be used for the dimensions of integrity and stress tolerance. The items we chose are:

- Integrity: I1, I2, I8, I11, I12, I13, I14, I15, I16, I17
- Stress Tolerance: St2, St4, St6, St8, St9, St10, St12, St,13 St14, St15

Step 5: Estimate reliability (alpha & omega).

In this section we estimated the reliability of the items we selected. Reliability of above 0.7 is considered good. The raw alpha for integrity was 0.79, which is considered good. Figure 4 displays the reliability if an item was to be dropped. The raw alpha for integrity was 0.88, which is a good reliability as well. The reliability if an item were to be dropped is displayed in figure 5. We also calculated McDonald's omega to check for reliability. The omega for integrity was 0.84 and the omega for stress tolerance was 0.9. Both reliabilities are above .7 are very good. This means that the items are internally consistent with each other.

Cronbach's alpha (Raw Alpha) for Integrity: 0.79

Reliability if an item is dropped:

	raw_alpha	std.alpha	G6(smc)	average_r	S/N	alpha se	var.r	med.r
I1	0.80	0.81	0.80	0.32	4.3	0.020	0.0072	0.33
I2	0.78	0.79	0.79	0.30	3.8	0.023	0.0110	0.32
I8	0.77	0.78	0.78	0.29	3.6	0.024	0.0101	0.28
I11	0.75	0.77	0.76	0.27	3.3	0.026	0.0078	0.26
I12	0.75	0.77	0.76	0.27	3.4	0.026	0.0084	0.27
I13	0.77	0.79	0.78	0.29	3.8	0.024	0.0112	0.28
I14	0.77	0.79	0.78	0.29	3.7	0.024	0.0107	0.28
I15	0.78	0.80	0.79	0.30	3.9	0.023	0.0107	0.32
I16	0.77	0.78	0.78	0.28	3.6	0.024	0.0113	0.26
I17	0.76	0.78	0.78	0.29	3.6	0.025	0.0103	0.28

Figure 4. Cronbach's alpha (Raw Alpha) for Integrity; reliability if an item is dropped.

Cronbach's alpha (Raw Alpha) for Stress Tolerance: 0.88

Reliability if an item is dropped:

	raw_alpha	std.alpha	G6(smc)	average_r	S/N	alpha se	var.r	med.r
St2	0.87	0.88	0.88	0.44	7.2	0.013	0.0058	0.44
St4	0.86	0.87	0.87	0.42	6.6	0.014	0.0067	0.42
St6	0.86	0.87	0.86	0.42	6.4	0.015	0.0059	0.42
St8	0.87	0.88	0.87	0.44	7.1	0.013	0.0065	0.44
St9	0.86	0.87	0.86	0.42	6.5	0.014	0.0062	0.41
St10	0.87	0.88	0.87	0.44	7.0	0.014	0.0060	0.43
St12	0.86	0.86	0.86	0.41	6.4	0.015	0.0061	0.40
St13	0.86	0.87	0.86	0.42	6.6	0.014	0.0066	0.42
St14	0.86	0.87	0.86	0.42	6.5	0.015	0.0068	0.42
St15	0.86	0.87	0.87	0.43	6.7	0.014	0.0060	0.42

Figure 5. Cronbach's alpha (Raw Alpha) for Stress Tolerance; reliability if an item is dropped.

McDonald's omega (Omega Total) for Integrity: 0.84
McDonald's omega (Omega Total) for Stress Tolerance: 0.90

Step 6: List of items for each dimension

- Integrity (10 items): I1, I2, I8, I11, I12, I13, I14, I15, I16, I17
- Stress Tolerance (10 items): St2, St4, St6, St8, St9, St10, St12, St,13 St14, St15
- The results of mean and SD of each time are shown on figures 1 and 2.
- The results of EFA are listed on step 3 and table 1.
- The results of reliability (raw alpha, omega total, and table of "reliability if an item is dropped) are listed on step 5, as well as figures 4 and 5.