

# Chapter 7

## Reliability and Validity

### Validity of The Arc's Self-Determination Scale

#### Concurrent Criterion-related Validity

Criterion-related validity “refers to the extent to which a person’s score on a criterion measure can be estimated from that person’s test score. Concurrent criterion-related validity refers to how accurately a person’s current test score can be used to estimate the current criterion score” (Salvia & Ysseldyke, 1981, p. 105). This is accomplished by examining the relationship between the scale in question and conceptually related measures, the criterion, that are administered at the same time.

Students involved in the field-test of *The Arc's Self-Determination Scale* completed three conceptually-related measures at the same time; a global locus of control scale, a measure of academic achievement attributions, and a self-efficacy scale. Locus of control was measured using the Adult version of the Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974). This scale, described in detail in **Chapter 4**, is a global measure of the degree to which students ascribe reinforcement in their lives to internal or external control. Higher scores reflect more external, thus maladaptive, control orientations. Attributions of academic achievement were measured by the Intellectual Achievement Responsibility Questionnaire (IARQ) (Crandall, Katkovsky and Crandall, 1965). The IARQ is a 34 question, forced-choice scale which was constructed for use in educational settings. The scale yields a total internality score, as well as scores reflecting responsibility for success and responsibility for failure. The IARQ measures student beliefs in internal versus external reinforcement responsibility and yields not only a total score (Itot or self-responsibility), but separate subscale scores for beliefs in internal responsibility for successes (I+ score) and failures (I- score) (Crandall, Katkovsky and Crandall, 1965). Like the ANS-IE, the IARQ has been used to measure perceptions of control for youth with cognitive disabilities (Lewis and Lawrence-Patterson, 1989; Rogers and Saklofske, 1985). Higher scores reflect greater degrees of internality.

Self-Efficacy was measured using the Self-Efficacy Scale (SES) (Sherer, Maddux, Mercadante, Prentice-Dunn, Jacobs & Rogers, 1982). The SES is a 23-item self-report scale measuring a general

level of belief in one's own competence. Unlike many self-efficacy measures, the SES measures expectations that are not linked to specific situations. Respondents answer a series of statements about themselves using a likert-type response system ranging from disagree strongly to agree strongly. The SES has been shown to have good criterion-related validity, predicting differences in vocational and educational goal achievement, and adequate construct validity as shown by correlations with related scales. The instrument's internal stability has been measured at .86. Higher scores reflect more positive self-efficacy.

Total and domain scores from *The Arc's Self-Determination Scale* were correlated with students' scores from these measures. **Table 7.1** provides the correlation coefficients and levels of significance for these findings.

**Table 7.1: Correlation analysis for conceptually related scales**

	ANS-IE	IARQ I+	IARQ I-	IARQ Total	SES
<b>Autonomy</b>	r = -.16 p = .0001	r = .21 p = .0001	r = .17 p = .0001	r = .20 p = .0001	r = .26 p = .0001
<b>Self-Regulation</b>	r = -.32 p = .0001	r = .28 p = .0001	r = .29 p = .0001	r = .29 p = .0001	r = .28 p = .0001
<b>Psych. Empower.</b>	r = -.35 p = .0001	r = .45 p = .0001	r = .25 p = .0001	r = .36 p = .0001	r = .47 p = .0001
<b>Self-Real.</b>	r = -.27 p = .0001	r = .27 p = .0001	r = .30 p = .0001	r = .27 p = .0001	r = .37 p = .0001
<b>Total</b>	r = -.26 p = .0001	r = .32 p = .0001	r = .27 p = .0001	r = .29 p = .0001	r = .39 p = .0001

In and of themselves, significant relationships are not particularly meaningful given the sample size. However, most of the relationships are moderate to strong (.25 to .5) and relationships are strongest in areas one would predict. For example, the ANS-IE and SES should correlate most strongly with the Psychological Empowerment domain scores. This was the case for both domain measures. Another indicator of the strength of the measure was the difference in relationships between the negative and positive subscales of the IARQ. The I+ subscale indicates the degree to which students attribute success internally. The I- subscale indicates the degree to which students internalize academic failure. Conceptually, higher scores on the Psychological Empowerment domain indicate more internal orientations of success. Thus, the domain score should correlate strongly with I+ scores and less so with I- scores, as seen in **Table 7.1**.

These findings provide evidence of the concurrent criterion-related validity of *The Arc's Self-Determination Scale*.

## **Construct Validity**

### **Discriminative Validity**

A scale has discriminative validity if it adequately differentiates or does not differentiate between groups that should differ or not differ based on theoretical reasons or previous research. **Chapter 6** describes the results from analyses of the sample used to derive norms for differences according to age, gender, and type of disability. As would be predicted, the Scale differed in most skill measurement areas by chronological age, with older students doing better. Findings from the two domains examining student beliefs (e.g., *Psychological Empowerment* and *Self-Realization*) did not show the age-related trends predicted by the fact that students' perceptions of self-determination mature as they age.

The Scale also differentiated between groups based on gender in areas that make theoretical sense (autonomy, self-regulation). However, there were no total score differences by gender. Finally, *The Arc's Self-Determination Scale* adequately differentiated between students with cognitive disabilities and students without disabilities.

### **Factorial Validity**

The factorial validity of *The Arc's Self-Determination Scale* was determined by conducting a series of factor analyses, described in **Chapter 3**. These analyses show that factors resulting from the Scale reflect the constructs they are intended to measure.

### **Other forms of Construct Validity**

*The Arc's Self-Determination Scale* incorporated questions from two unique measures, the *Autonomous Functioning Checklist* and the *Personality Orientation Inventory*, both described in **Chapter 3**. By using two extant measures, both with documentation of validity, the construct validity of *The Arc's Self-Determination Scale* is enhanced.

## **Reliability of The Arc's Self-Determination Scale**

### **Internal Consistency Reliability**

Internal consistency reliability was calculated using Chronbach alpha for the entire Scale, with the exception of the *Self-Regulation* subscale. The open ended answer format of this section does not lend itself to such analysis. Separate analyses were conducted by subscale as well. Coefficient alpha for the Scale as a whole was .90. Alpha for the *Autonomy* domain was .90, for the *Psychological Empowerment* domain was .73 and for the *Self-Realization* domain was .62. Although alpha levels for the last two domains were lower than the first, this is not unusual or unexpected for measurements examining beliefs and perceptions.

### **Item Statistics by Domain**

**Table 7.2** presents item statistics, including correlations among items, for items in the *Autonomy* domain. **Table 7.3** provides item total statistics for the *Autonomy* domain. **Table 7.4** provides item statistics and **Table 7.5** item-total information for the *Psychological Empowerment* domain and **Table 7.6** and **7.7** similar information for items in the *Self-Realization* domain.



**Table 7.2b Item statistics for Autonomy**

Item #	Correlations Among Items																	
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
16	--																	
17	.235	--																
18	.381	.268	--															
19	.318	.330	.461	--														
20	.327	.174	.370	.413	--													
21	-.015	.283	.217	.271	.212	--												
22	.122	.349	.261	.302	.254	.345	--											
23	.226	.263	.193	.198	.270	.200	.404	--										
24	.170	.257	.243	.552	.238	.171	.315	.408	--									
25	.285	.259	.297	.248	.190	.082	.204	.242	.308	--								
26	.095	.207	.200	.219	.177	.212	.308	.216	.245	.278	--							
27	.059	.273	.202	.290	.170	.271	.351	.290	.302	.324	.422	--						
28	.428	.211	.332	.293	.169	.006	.128	.201	.141	.289	.086	.086	--					
29	.502	.216	.431	.329	.272	.015	.150	.154	.236	.356	.148	.152	.589	--				
30	.410	.340	.380	.415	.315	.149	.234	.181	.192	.327	.116	.168	.377	.481	--			
31	.358	.159	.288	.242	.201	.035	.138	.138	.199	.252	.081	.189	.374	.459	.394	--		
32	.431	.259	.377	.276	.234	-.01	.116	.121	.194	.342	.102	.070	.532	.528	.451	.431	--	

**Table 7.3 Item-Total statistics for Autonomy**

<b>Item Number</b>	<b>Domain Mean if Item Deleted</b>	<b>Domain Variance if Item Deleted</b>	<b>Corrected Item-Total Correlation</b>	<b>Squared Multiple Correlation</b>	<b>Domain Alpha if Item Deleted</b>
1	60.619	237.020	.421	.244	.895
2	60.419	239.665	.303	.176	.897
3	60.576	238.823	.335	.211	.897
4	60.175	236.892	.437	.314	.895
5	60.655	237.776	.341	.183	.897
6	60.035	236.166	.487	.342	.895
7	60.457	236.260	.445	.283	.895
8	61.301	237.232	.362	.227	.896
9	60.602	234.366	.471	.288	.895
10	60.938	235.774	.386	.232	.896
11	60.290	235.326	.493	.325	.894
12	60.255	234.313	.507	.339	.894
13	61.098	238.978	.280	.246	.898
14	60.376	234.232	.503	.369	.894
15	60.337	234.310	.475	.306	.895
16	59.864	237.421	.493	.438	.895
17	60.597	233.754	.485	.299	.895
18	60.350	233.618	.559	.414	.894
19	60.485	232.314	.542	.429	.894
20	60.617	234.996	.449	.336	.895
21	61.285	237.456	.319	.283	.898
22	60.958	233.482	.478	.389	.895
23	60.679	235.652	.445	.341	.895
24	60.874	234.245	.458	.309	.895
25	60.322	234.335	.476	.304	.895
26	61.003	235.741	.355	.255	.897
27	60.920	234.409	.419	.363	.896
28	59.957	236.176	.487	.475	.895
29	59.920	234.676	.561	.553	.894
30	60.158	233.324	.578	.443	.893
31	60.130	235.676	.435	.343	.895
32	59.975	236.159	.499	.469	.895

**Table 7.4 Item statistics for Psychological Empowerment**

Item #	Avg	SD	Correlations Among Items															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	.736	.441	--															
2	.667	.471	.205	--														
3	.782	.412	.193	.148	--													
4	.685	.464	.137	.194	.125	--												
5	.887	.316	.081	.138	.165	.153	--											
6	.846	.361	.067	-.01	.073	.027	.162	--										
7	.825	.380	.042	.106	.074	.125	.248	.215	--									
8	.822	.382	.117	-.01	.166	.089	.159	.297	.186	--								
9	.866	.341	.027	.182	.134	.135	.257	.097	.243	.317	--							
10	.887	.316	.179	.069	.126	.142	.077	.252	.078	.272	.194	--						
11	.866	.340	.016	.054	.037	.199	.193	.139	.191	.251	.305	.209	--					
12	.860	.347	.127	.060	.157	.086	.135	.278	.099	.249	.175	.276	.160	--				
13	.861	.346	-.01	.169	.053	.175	.295	.075	.259	.214	.366	.107	.293	.137	--			
14	.805	.397	.127	.019	.148	.112	.042	.137	.046	.233	.098	.479	.162	.211	.127	--		
15	.875	.331	.067	.096	.051	.100	.225	.082	.167	.175	.216	.077	.369	.190	.283	.036	--	
16	.895	.306	.202	.080	.172	.118	.196	.195	.094	.206	.145	.196	.162	.297	.138	.142	.328	--

**Table 7.5 Item-Total statistics for Psychological Empowerment**

Item Number	Domain Mean if Item Deleted	Domain Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Domain Alpha if Item Deleted
1	12.431	6.523	.2352	.	.7324
2	12.500	6.490	.2228	.	.7352
3	12.385	6.511	.2685	.	.7278
4	12.482	6.373	.2803	.	.7281
5	12.280	6.555	.3648	.	.7187
6	12.321	6.582	.2886	.	.7250
7	12.342	6.506	.3078	.	.7233
8	12.345	6.302	.4157	.	.7123
9	12.301	6.413	.4168	.	.7134
10	12.280	6.497	.4025	.	.7155
11	12.301	6.461	.3875	.	.7167
12	12.308	6.464	.3750	.	.7171
13	12.306	6.453	.3842	.	.7163
14	12.363	6.485	.2995	.	.7243
15	12.292	6.557	.3428	.	.7203
16	12.272	6.551	.3844	.	.7174

**Table 7.6 Item statistics for Self-Realization**

Item #	Avg	SD	Correlations Among Items															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	.487	.500	--															
2	.688	.463	-.02	--														
3	.692	.461	.093	.109	--													
4	.779	.414	.009	.136	.053	--												
5	.477	.450	.011	.028	.032	.056	--											
6	.862	.345	-.04	.171	.128	.248	.017	--										
7	.880	.324	-.02	.098	.184	.089	.011	.153	--									
8	.834	.372	-.03	.065	.069	.151	.004	.228	.128	--								
9	.536	.450	-.06	-.07	-.03	-.08	.120	-.09	.027	.049	--							
10	.637	.481	-.01	.083	.063	.106	.191	.059	.146	.033	-.07	--						
11	.884	.321	-.06	.116	.161	.129	.031	.187	.234	.237	-.02	.153	--					
12	.621	.486	-.01	.065	.053	.117	.046	.053	.081	.051	-.02	.250	.179	--				
13	.795	.404	-.02	.099	.105	.141	.090	.061	.175	.182	-.08	.153	.253	.118	--			
14	.899	.301	-.04	.179	.139	.189	.056	.190	.299	.234	-.11	.085	.353	.083	.207	--		
15	.827	.378	.025	.128	.151	.167	.056	.204	.243	.265	-.11	.194	.313	.084	.349	.246	--	

**Table 7.7 Item-Total statistics for Self-Realization**

Item Number	Domain Mean if Item Deleted	Domain Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Domain Alpha if Item Deleted
1	10.415	5.4837	-.0257	.	.6000
2	10.215	5.0515	.1954	.	.5517
3	10.211	4.9968	.2246	.	.5456
4	10.123	5.0245	.2567	.	.5397
5	10.426	5.0964	.1451	.	.5637
6	10.041	5.1453	.2618	.	.5412
7	10.022	5.1342	.2954	.	.5371
8	10.068	5.0749	.2752	.	.5378
9	10.367	5.6201	-.0826	.	.6114
10	10.266	4.9153	.2470	.	.5408
11	10.019	5.0119	.3893	.	.5235
12	10.282	4.9750	.2137	.	.5481
13	10.108	4.9423	.3164	.	.5288
14	10.004	5.1011	.3538	.	.5306
15	10.076	4.864	.3994	.	.5155