Normative Analysis– The Ohio Scales (Problem Severity subscale and Functioning subscale)

Introduction to instrument Norms

Results from an assessment on an instrument such as the Ohio Scales usually come in a raw score reflecting the performance of the person completing the assessment. However, getting the raw score is just the first step in evaluating one's performance in the assessment. In order to evaluate an individual's performance, we need to compare the score against a standard so that we can evaluate the performance relative to a group we are interested in. For example, a person scoring 90 out of 100 on a test may not be doing very well when most of the people are scoring 95. Norms from an assessment provide quick information about one's performance with reference to a group.

Norms are usually constructed from a set of scores of candidates that are representative of the population we are measuring or comparing against. A person's scores can then be directly compared with the norm group, and the relative performance of an individual can be identified by how his/her performance falls in the distribution of scores on the norm table. In this way we can tell whether an individual is scoring from very poor or low, to average, to exceptional on an ability or a particular scale. Norms therefore provide a standard with reference to a population of interest. They describe the quality of one's performance by comparing one's score with the distribution of people similar to him/her.

There are various ways to construct norms for an assessment tool. The most popular ones are Percentile Rank and *T*-scores. The Percentile Rank associated with a raw score is a popular way of describing one's performance relative to the norm group. A raw score is checked against a percentile rank table to identify the percentile rank it falls in. The percentile rank tells us whether a raw score is higher or lower than that percentage of scores in the norm population. For example, a percentile rank of 60 on an assessment would mean that the raw score the person obtained shows that his/her performance is as good as or better than 60% of the population concerned.

Another common measurement for norms is the *T*-score. The *T*-score is a transformation of the raw score to a normalized score with a mean of 50 and a standard deviation of 10[1]. So for example a *T*-score of 40 means one's performance is one standard deviation below the mean of the group, while a T-score of 70 reflects a two standard deviations above the mean.

Method

This analysis used Ohio Mental Health Outcomes System Production Data on August 8, 2005 to obtain normative profiles for the Problem Severity subscale and Functioning subscale of the Ohio Scales. Individuals with Ohio Scales completed within 0 and 44 days between their admission date and the administration of the Ohio Scales were involved. If more than one assessment was completed within the 44 days criterion, the earliest assessment was selected for this analysis.

[1] The *T*-score is calculated as [[(Raw Score – Mean)/SD]x10]+ 50

Results

Both the percentile rank and *T*-scores are presented in the following tables. The norms are presented for the Problem Severity subscale and the Functioning subscale by instrument and by breaking down the sample into 4 major age groups, i.e. 5.0-8.9, 9.0-11.9, 12.0-14.9, and 15.0 or above.

Results from the norms distributions for the Problem Severity subscale with the three sources of assessment for Ohio scales (youth, parent, and agency worker) showed there are some differences in the norms distributions of the three assessments of Ohio scales, with the parent version and agency worker closer together while the youth version deviates more from the other two. For example, a raw score of 33 in the Problem Severity subscale will give a 75th percentile rank in the youth version, 65th percentile rank in the parent version, and about 68th percentile rank in the agency worker version.

When breaking down the results of the Problem Severity subscale by age groups, a raw score tended to have a higher percentile rank in older age groups (particularly the age group 15.0 or above). However, these differences were small.

Results from the Functioning subscale also showed differences from the three sources of assessments. The parent version and agency worker version also showed similar distribution pattern for the Functioning subscale and the youth indicated a significant skew towards the higher end. A raw score of 48 in the Functioning subscale will give a 25th percentile in the youth version, 55th percentile rank in the parent version, and about 63rd percentile rank in the agency worker version.

When breaking data down into various age groups, there are not many age differences from the two age groups of the youth version. For the parent and agency worker version, a score in the age groups 9.0-11.9 and 12.0-14.9 will show a higher percentile rank than the other two age groups, i.e. 5.0-8.9 and 15.0 or above.

1. Problem Severity

For the Problem Severity subscale, 34,503 youth assessments, 64,934 parent assessments, and 58,715 agency worker assessments were involved in this analysis.

Figure 1.1. Distribution of Problem Severity Scores of Ohio Scales – Youth, Parent, and Agency Worker Version.

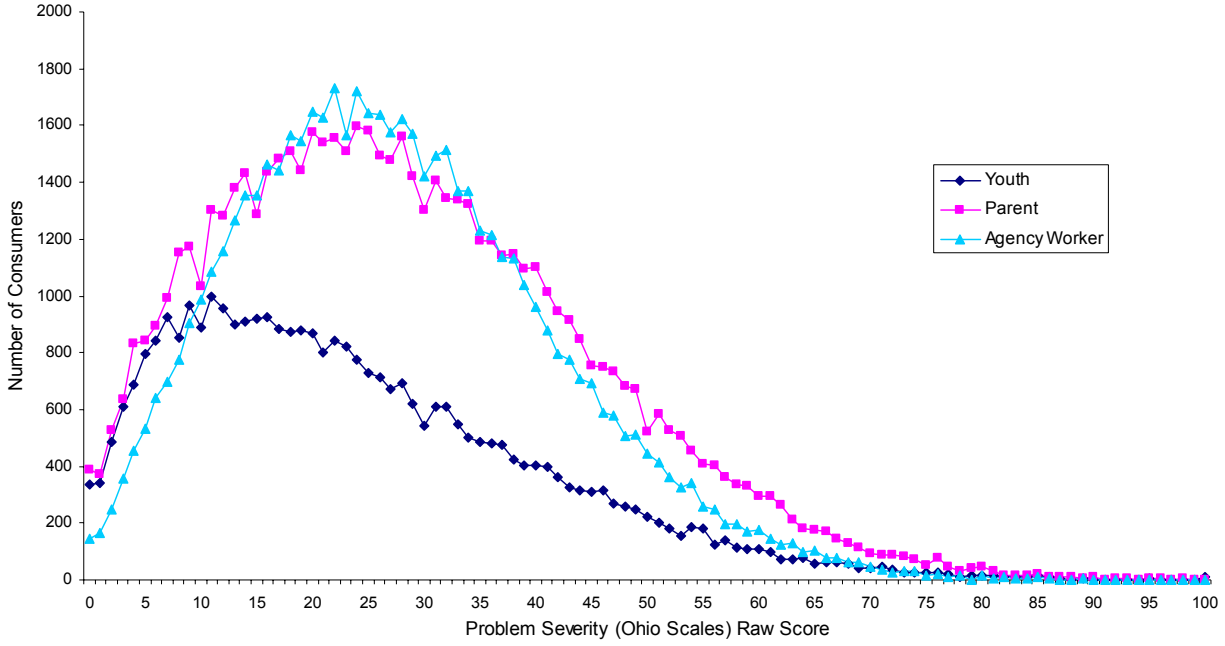


Table 1.1. Norms for the Problem Severity subscale - Ohio Scales (Range 0 -100): total subscale raw scores, percentiles, and *T*-scores. [a]

Ohio Scales – Youth version			Ohio Scales – Parent version			Ohio Scales – Agency Worker version		
Valid N		34,503	Valid N		64,934	Valid N		58,715
Mean		24.00	Mean		28.50	Mean		27.64
SD		16.13	SD		16.34	SD		14.03
Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score
1	1	36	1	1	33	3	1	32
3	5	37	5	5	36	7	5	35
6	10	39	8	10	37	10	10	37
8	15	40	11	15	39	13	15	40
10	20	41	14	20	41	15	20	41
11	25	42	16	25	42	17	25	42
13	30	43	18	30	44	19	30	44
15	35	44	20	35	45	21	35	45
17	40	46	22	40	46	23	40	47
19	45	47	25	45	48	24	45	47
21	50	48	27	50	49	26	50	49
23	55	49	29	55	50	28	55	50
25	60	51	31	60	52	30	60	52
28	65	52	34	65	53	32	65	53
31	70	54	36	70	55	34	70	55
34	75	56	39	75	56	36	75	56
37	80	58	42	80	58	39	80	58
41	85	61	46	85	61	42	85	60
47	90	64	51	90	64	47	90	64
55	95	69	58	95	68	53	95	68
71	99+	79	72	99+	77	65	99+	77

[a]1,115, 2,883, and 1,757 participants were discarded from the datasets of the youth, parent, and agency worker version respectively due to missing information in the Problem Severity subscale.

Table 1.2. Norms for the Problem Severity subscale - Ohio Scales Youth version (Range 0 - 100): total subscale raw scores, percentiles, and *T*-scores by Age groups.[b]

Age Group: 12.0-14.9			Age Group: 15.0 or above		
Valid N		18,418	Valid N		16,085
Mean		24.75	Mean		23.15
SD		15.94	SD		16.30
Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score
1	1	35	0	1	36
4	5	37	3	5	38
7	10	39	5	10	39
9	15	40	7	15	40
11	20	41	9	20	41
12	25	42	10	25	42
14	30	43	12	30	43
16	35	45	14	35	44
18	40	46	16	40	46
20	45	47	18	45	47
22	50	48	20	50	48
24	55	50	22	55	49
26	60	51	24	60	51
29	65	53	27	65	52
31	70	54	30	70	54
34	75	56	33	75	56
38	80	58	36	80	58
42	85	61	41	85	61
47	90	64	46	90	64
55	95	69	54	95	69
71	99+	79	71	99+	79

[b] 647 and 468 participants were discarded from the dataset of the age groups 12.0-14.9 and 15.0 or above respectively due to missing information in the Problem Severity subscale, youth version.

Figure 1.2. Distribution of Problem Severity Scores of Ohio Scales Youth Version by Age.

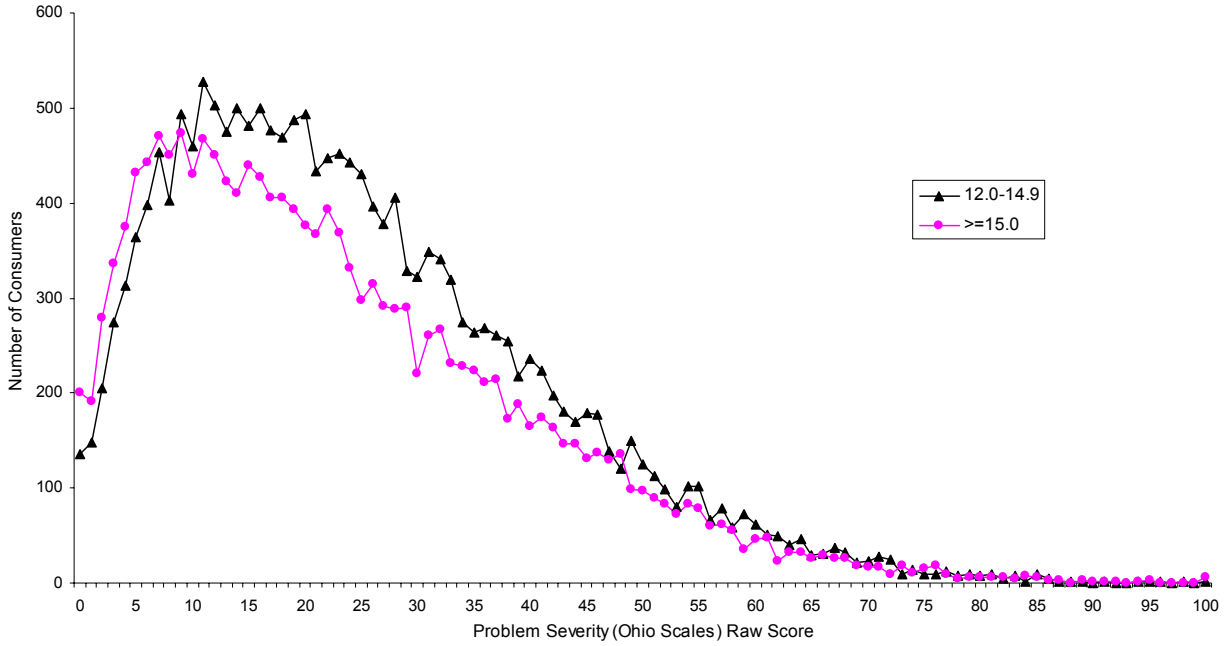


Table 1.3. Norms for the Problem Severity subscale - Ohio Scales Parent version (Range 0 - 100): total subscale raw scores, percentiles, and *T*-scores by Age groups. [c]

Age Group: 5.0-8.9			Age Group: 9.0-11.9			Age Group: 12.0-14.9			Age Group: 15.0 or above		
Valid N		17,083	Valid N		14,669	Valid N		18,045	Valid N		15,137
Mean		29.58	Mean		30.02	Mean		28.55	Mean		25.75
SD		15.72	SD		16.31	SD		16.30	SD		16.76
Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score
2	1	32	2	1	33	1	1	33	0	1	35
7	5	36	7	5	36	5	5	36	3	5	36
10	10	38	10	10	38	8	10	37	6	10	38
13	15	39	13	15	40	11	15	39	8	15	39
15	20	41	15	20	41	14	20	41	10	20	41
18	25	43	18	25	43	16	25	42	13	25	42
20	30	44	20	30	44	18	30	44	15	30	44
22	35	45	22	35	45	20	35	45	17	35	45
24	40	46	24	40	46	23	40	47	19	40	46
26	45	48	26	45	48	25	45	48	21	45	47
28	50	49	28	50	49	27	50	49	23	50	48
30	55	50	31	55	51	29	55	50	26	55	50
32	60	52	33	60	52	31	60	52	28	60	51
35	65	53	35	65	53	34	65	53	30	65	53
37	70	55	38	70	55	36	70	55	33	70	54
40	75	57	41	75	57	39	75	56	36	75	56
43	80	59	44	80	59	42	80	58	40	80	59
46	85	60	47	85	60	46	85	61	44	85	61
51	90	64	53	90	64	51	90	64	49	90	64
58	95	68	60	95	68	58	95	68	57	95	69
72	99+	77	73	99+	76	72	99+	77	71	99+	77

[c] 656, 570, 774, and 877 participants were excluded from the dataset of the age groups 5.0-8.9, 9.0-11.9, 12.0-14.9 and 15.0 or above respectively due to missing information in the Problem Severity subscale, parent version.

Figure 1.3. Distribution of Problem Severity Scores of Ohio Scales Parent Version by Age.

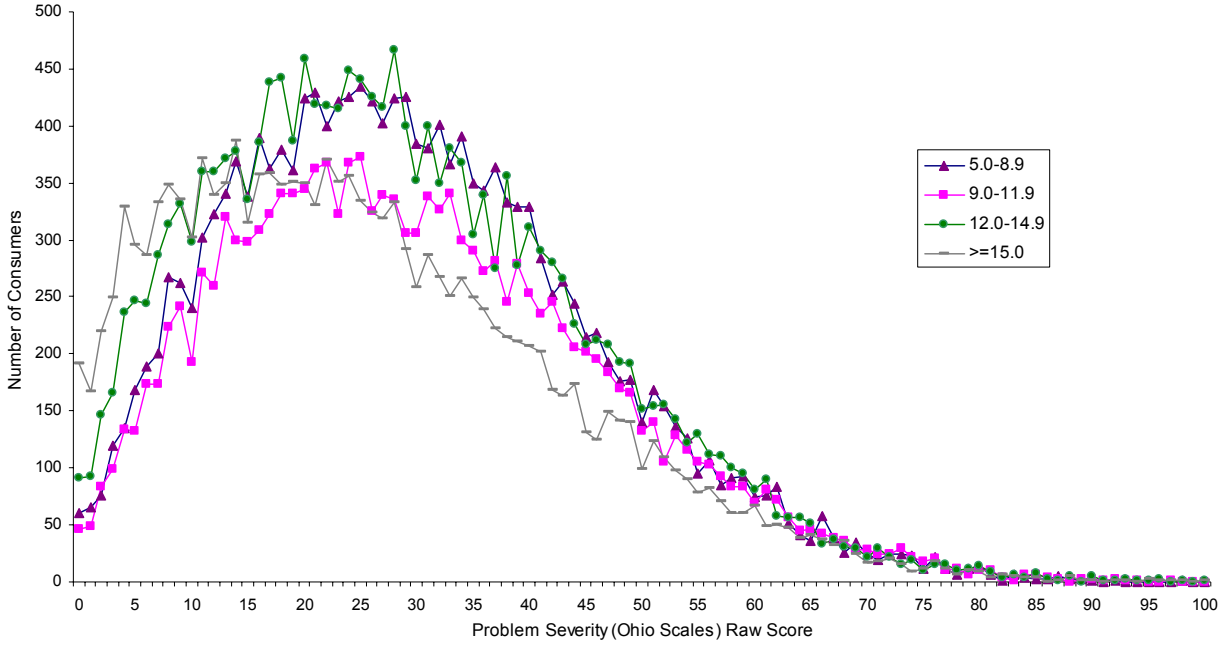
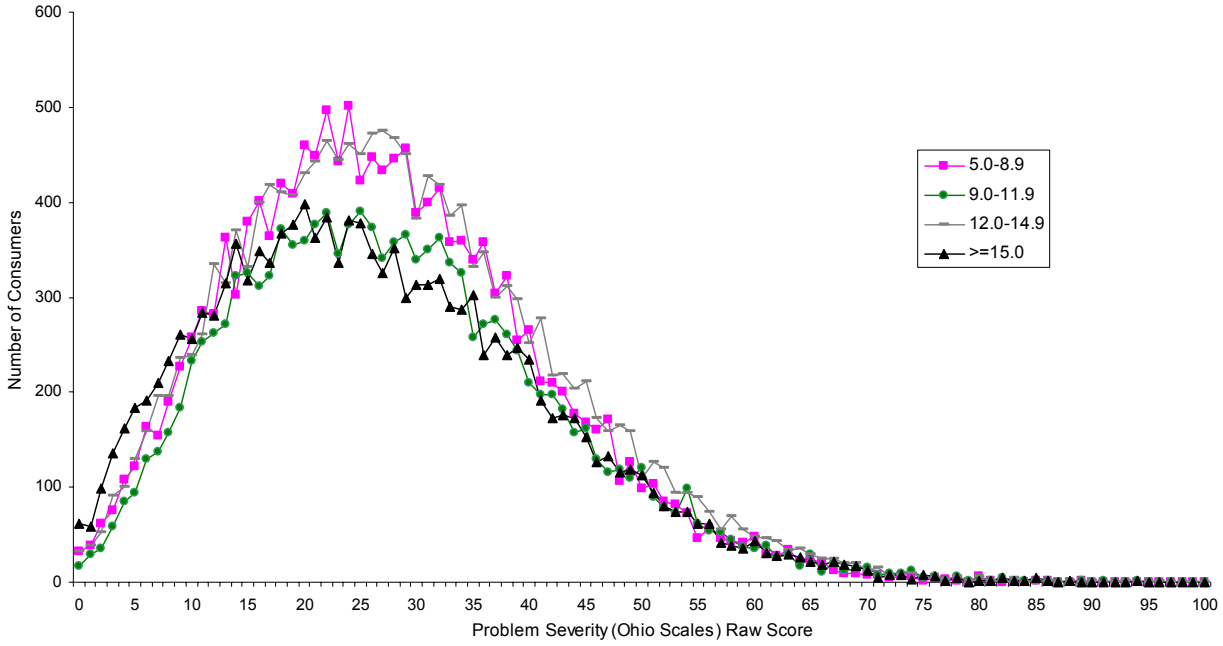


Table 1.4. Norms for the Problem Severity subscale - Ohio Scales Agency Worker version (Range 0 - 100): total subscale raw scores, percentiles, and *T*-scores by Age groups.[d]

Age Group: 5.0-8.9			Age Group: 9.0-11.9			Age Group: 12.0-14.9			Age Group: 15.0 or above		
Valid N		15,449	Valid N		13,259	Valid N		16,211	Valid N		13,796
Mean		27.41	Mean		28.11	Mean		28.34	Mean		26.64
SD		13.39	SD		13.97	SD		14.13	SD		14.59
Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score
3	1	32	3	1	32	3	1	32	2	1	33
8	5	36	8	5	36	8	5	36	5	5	35
11	10	38	11	10	38	11	10	38	9	10	38
13	15	39	14	15	40	14	15	40	11	15	39
16	20	41	16	20	41	16	20	41	14	20	41
18	25	43	18	25	43	18	25	43	16	25	43
19	30	44	20	30	44	20	30	44	18	30	44
21	35	45	21	35	45	21	35	45	19	35	45
23	40	47	23	40	46	23	40	46	21	40	46
24	45	47	25	45	48	25	45	48	23	45	48
26	50	49	27	50	49	27	50	49	25	50	49
28	55	50	29	55	51	29	55	50	27	55	50
30	60	52	30	60	51	31	60	52	29	60	52
32	65	53	32	65	53	33	65	53	31	65	53
34	70	55	34	70	54	35	70	55	34	70	55
36	75	56	37	75	56	37	75	56	36	75	56
38	80	58	39	80	58	40	80	58	39	80	58
41	85	60	43	85	61	43	85	60	42	85	61
45	90	63	47	90	64	48	90	64	46	90	63
51	95	68	54	95	69	54	95	68	53	95	68
63	99+	77	67	99+	78	66	99+	77	66	99+	77

[d] 495, 399, 488, and 375 participants were discarded from the dataset of the age groups 5.0-8.9, 9.0-11.9, 12.0-14.9 and 15.0 or above respectively due to missing information in the Problem Severity subscale, agency worker version.

Figure 1.4. Distribution of Problem Severity Scores of Ohio Scales Agency Worker Version by Age.



2. Functioning

For the Functioning subscale, 33,822 youth assessments, 63,824 parent assessments, and 57,819 agency worker assessments were involved in this analysis.

Figure 2.1. Distribution of Functioning Scores of Ohio Scales – Youth, Parent, and Agency Worker Version.

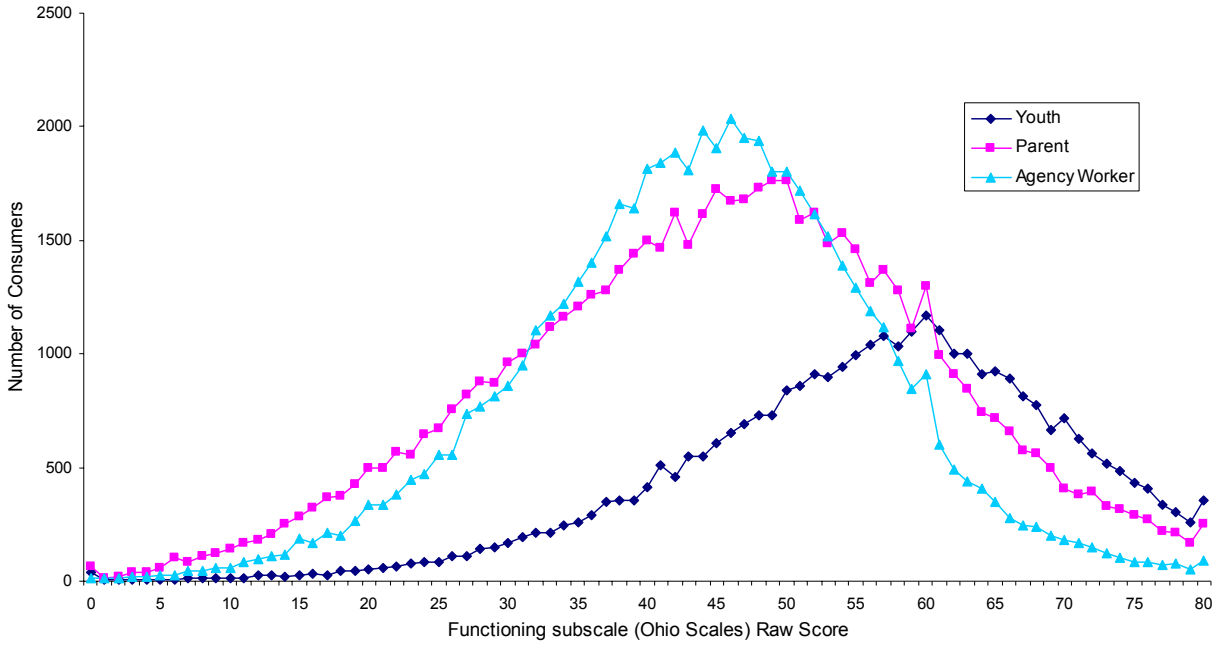


Table 2.1. Norms for the Functioning subscale – Ohio Scales (Range 0 – 80): total subscale raw scores, percentiles, and *T*-scores. [e]

Ohio Scales – Youth version			Ohio Scales – Parent version			Ohio Scales – Agency Worker version		
Valid N		33,822	Valid N		63,824	Valid N		57,819
Mean		55.63	Mean		45.12	Mean		43.82
SD		13.35	SD		15.09	SD		12.38
Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score
18	1	22	9	1	26	13	1	25
32	5	32	19	5	33	23	5	33
38	10	37	25	10	37	28	10	37
42	15	40	29	15	39	31	15	40
45	20	42	32	20	41	34	20	42
48	25	44	35	25	43	36	25	44
50	30	46	37	30	45	38	30	45
52	35	47	40	35	47	40	35	47
54	40	49	42	40	48	41	40	48
55	45	50	44	45	49	43	45	49
57	50	51	46	50	51	44	50	50
59	55	53	48	55	52	46	55	52
60	60	53	50	60	53	47	60	53
62	65	55	51	65	54	49	65	54
63	70	56	53	70	55	50	70	55
65	75	57	56	75	57	52	75	57
67	80	59	58	80	59	54	80	58
69	85	60	61	85	61	56	85	60
72	90	62	64	90	63	59	90	62
75	95	65	70	95	66	64	95	66
80	99+	68	77	99+	71	73	99+	74

[e] 1,796, 3,993, and 2,653 participants were discarded from the datasets of the youth, parent, and agency worker version respectively due to missing information in the Functioning subscale.

Table 2.2. Norms for the Functioning subscale - Ohio Scales Youth version (Range 0 - 80): total subscale raw scores, percentiles, and *T*-scores by Age groups.[f]

Age Group: 12.0-14.9			Age Group: 15.0 or above		
Valid N		18,011	Valid N		15,811
Mean		55.20	Mean		56.11
SD		13.42	SD		13.26
Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score
17	1	22	20	1	23
31	5	32	32	5	32
37	10	36	38	10	36
41	15	39	42	15	39
45	20	42	45	20	42
47	25	44	48	25	44
50	30	46	50	30	45
51	35	47	52	35	47
53	40	48	54	40	48
55	45	50	56	45	50
57	50	51	57	50	51
58	55	52	59	55	52
60	60	54	61	60	54
61	65	54	62	65	54
63	70	56	64	70	56
65	75	57	66	75	57
67	80	59	68	80	59
69	85	60	70	85	60
71	90	62	73	90	63
75	95	65	76	95	65
79	99+	68	80	99+	68

[f] 1,054 and 742 participants were discarded from the dataset of the age groups 12.0-14.9 and 15.0 or above respectively due to missing information in the Functioning subscale, youth version.

Figure 2.2. Distribution of Functioning Scores of Ohio Scales Youth Version by Age.

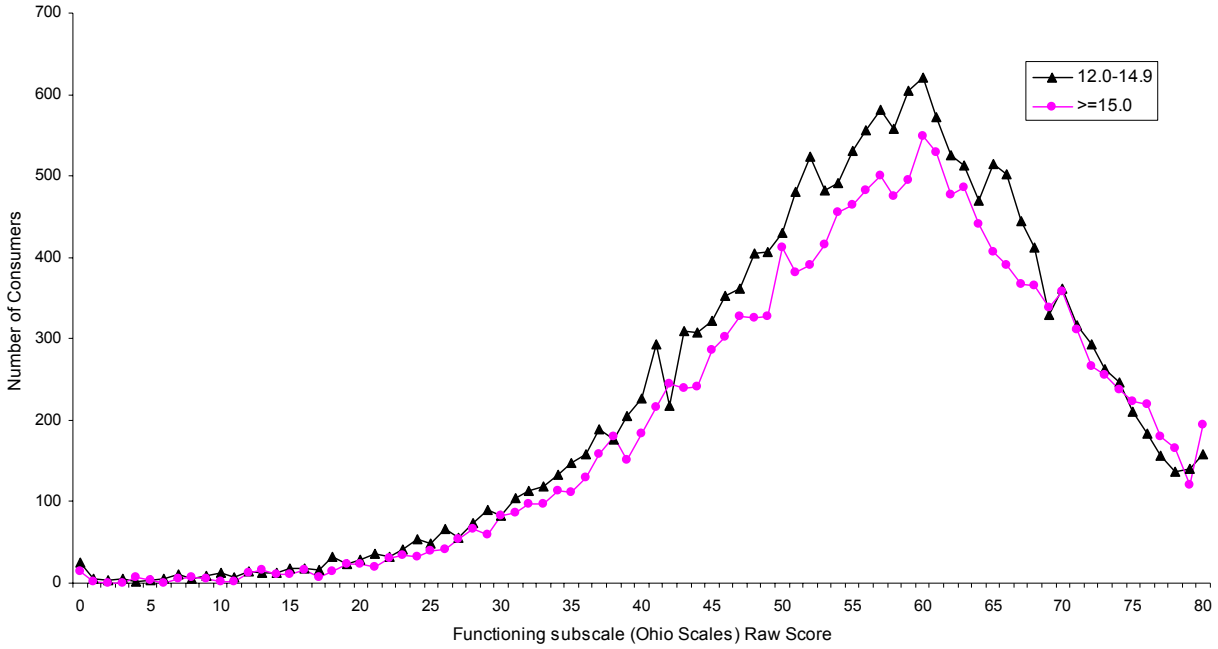


Table 2.3. Norms for the Functioning subscale - Ohio Scales Parent version (Range 0 - 80): total subscale raw scores, percentiles, and *T*-scores by Age groups. [9]

Age Group: 5.0-8.9			Age Group: 9.0-11.9			Age Group: 12.0-14.9			Age Group: 15.0 or above		
Valid N		16,334	Valid N		14,529	Valid N		17,934	Valid N		15,027
Mean		46.35	Mean		44.24	Mean		43.88	Mean		46.13
SD		14.10	SD		14.75	SD		15.36	SD		15.92
Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score
12	1	26	9	1	26	8	1	27	9	1	27
22	5	33	19	5	33	17	5	33	19	5	33
28	10	37	25	10	37	23	10	36	24	10	36
32	15	40	29	15	40	27	15	39	28	15	39
35	20	42	32	20	42	30	20	41	32	20	41
37	25	43	34	25	43	33	25	43	35	25	43
39	30	45	37	30	45	36	30	45	38	30	45
42	35	47	39	35	46	38	35	46	40	35	46
44	40	48	41	40	48	40	40	47	43	40	48
45	45	49	43	45	49	42	45	49	45	45	49
47	50	50	45	50	51	45	50	51	47	50	51
49	55	52	46	55	51	47	55	52	49	55	52
50	60	53	48	60	53	49	60	53	51	60	53
52	65	54	50	65	54	50	65	54	53	65	54
54	70	55	52	70	55	53	70	56	55	70	56
56	75	57	55	75	57	55	75	57	58	75	57
58	80	58	57	80	59	57	80	59	60	80	59
61	85	60	60	85	61	60	85	60	63	85	61
64	90	63	63	90	63	64	90	63	67	90	63
69	95	66	68	95	66	69	95	66	72	95	66
77	99+	72	77	99+	72	77	99+	72	78	99+	70

[9] 1,405, 716, 885, and 987 participants were discarded from the dataset of the age groups 5.0-8.9, 9.0-11.9, 12.0-14.9 and 15.0 or above respectively due to missing information in the Functioning subscale, parent version.

Figure 2.3. Distribution of Functioning Scores of Ohio Scales Parent Version by Age.

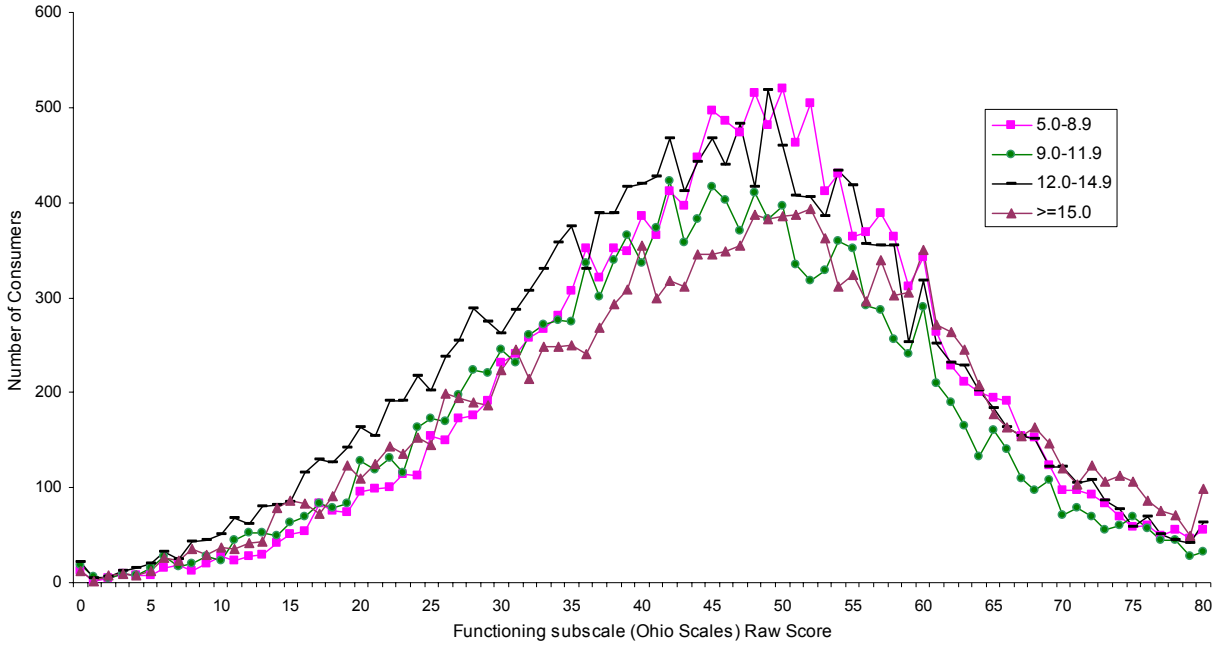


Table 2.4. Norms for the Functioning subscale - Ohio Scales Agency Worker version (Range 0 - 80): total subscale raw scores, percentiles, and *T*-scores by Age groups.[h]

Age Group: 5.0-8.9			Age Group: 9.0-11.9			Age Group: 12.0-14.9			Age Group: 15.0 or above		
Valid N		15,069	Valid N		13,062	Valid N		16,042	Valid N		13,646
Mean		44.54	Mean		43.37	Mean		42.97	Mean		44.47
SD		11.97	SD		12.32	SD		12.45	SD		12.72
Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score	Raw Score	Percentile	*T*-Score
15	1	25	13	1	25	12	1	25	13	1	25
24	5	33	22	5	33	21	5	32	23	5	33
29	10	37	27	10	37	27	10	37	28	10	37
32	15	40	31	15	40	30	15	40	31	15	39
35	20	42	33	20	42	33	20	42	34	20	42
37	25	44	36	25	44	35	25	44	36	25	43
39	30	45	37	30	45	37	30	45	38	30	45
41	35	47	39	35	46	39	35	47	40	35	46
42	40	48	41	40	48	40	40	48	42	40	48
44	45	50	42	45	49	42	45	49	43	45	49
45	50	50	44	50	51	43	50	50	45	50	50
46	55	51	45	55	51	45	55	52	46	55	51
48	60	53	47	60	53	46	60	52	48	60	53
49	65	54	48	65	54	48	65	54	50	65	54
51	70	55	50	70	55	49	70	55	51	70	55
52	75	56	51	75	56	51	75	56	53	75	57
54	80	58	53	80	58	53	80	58	55	80	58
56	85	60	55	85	59	55	85	60	57	85	60
59	90	62	58	90	62	58	90	62	60	90	62
63	95	65	63	95	66	63	95	66	65	95	66
74	99+	75	73	99+	74	72	99+	73	74	99+	73

[h] 875, 596, 657, and 525 participants were discarded from the dataset of the age groups 5.0-8.9, 9.0-11.9, 12.0-14.9 and 15.0 or above respectively due to missing information in the Functioning subscale, agency worker version.

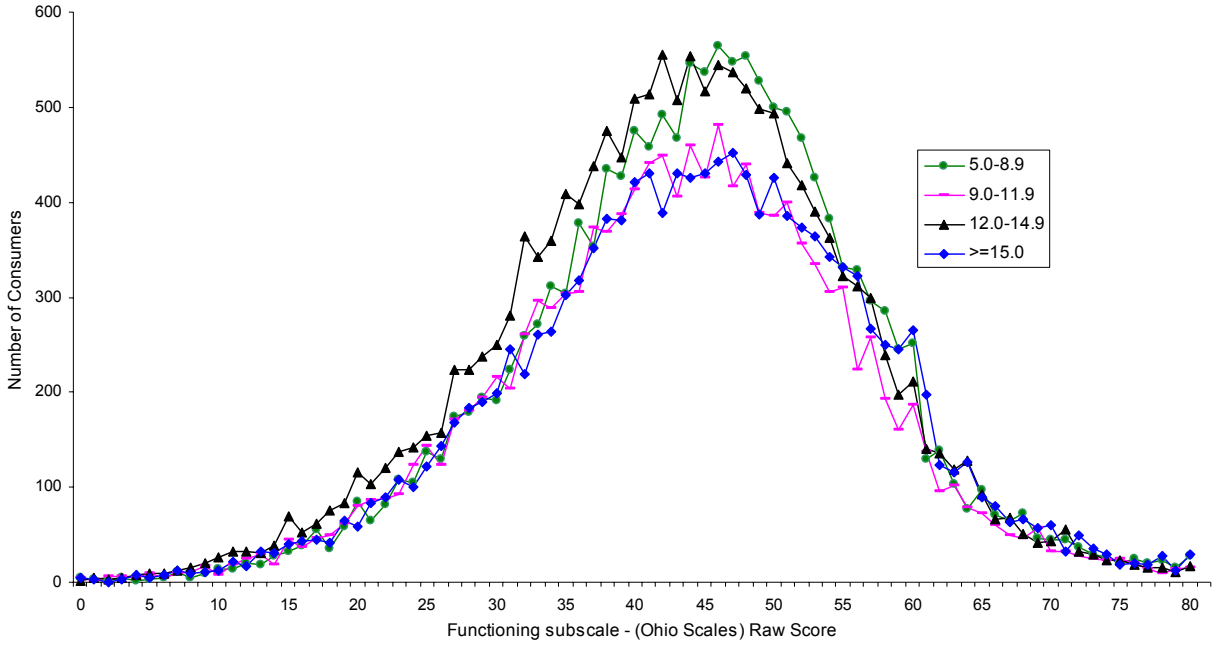



Figure 2.4. Distribution of Functioning Scores of Ohio Scales Agency Worker Version by Age