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STRENGTHENING SOCIAL AND
EMOTIONAL HEALTH

***Reliability and Validity of the Stage of Change Scale for Early
Education and Care 2.0: Mentor/Coach Form***

GUILLERMO MONTES, Ph.D.
SHIRA PETERSON, Ph.D.
MELISSA REYNOLDS WEBER, M.S.

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EXECUTIVE SUMMARY

The Stage of Change Scale for Early Education and Care 2.0: Mentor/Coach Form was developed as a simple method for assessing an early childhood educator or care provider's readiness to change her child care practices and/or program.

The results of the analyses described in this report demonstrate that the scale has high reliability and good person separation, fits the Rasch partial credit model well, and that all categories are properly ordered and contribute to the measure's overall information.

The measure has concurrent and predictive validity with the Child/Home Environmental Language and Literacy Observation (CHELLO).

This measure can be used as intended in early childhood settings.

DESCRIPTION OF THE SCALE

The Stage of Change Scale for Early Education and Care 2.0: Mentor/Coach Form consists of seven items, each with its own distinctive metric. It is completed by checking the phrase that best describes the learner's attitude toward each item on the scale:

1. Intention

Assesses the learner's intention to make a change

2. Awareness

Assesses the learner's awareness of the need to make a change

3. Seeking information

Assesses the learner's interest in learning new information about her practices

4. Effect on children

Assesses the learner's beliefs about the extent to which making a change would have an effect on children

5. Overcoming obstacles

Assesses the learner's beliefs in her ability to overcome obstacles to change

6. Social support

Assesses the extent to which the learner believes that she has social support

7. Professional identity

Assesses the extent to which the learner sees herself as a professional

PURPOSE AND USES OF THE SCALE

The purpose of the measure is to assess the readiness to change in the early childhood provider context both in groups and individually. The measure may be used to:

- ❖ Provide information about which professional development programs might best match an individual learner's stage of change.
- ❖ Enable a mentor/coach to choose intervention techniques that are tailored to the learner's stage of change.
- ❖ Design curriculum for a group of learners at the same stage of change.
- ❖ Provide an outcome measure that can detect effects of an intervention before changes in behavior can be observed.

COMPLETING THE SCALE

The scale may be completed by a mentor, coach, or other professional who offers training, education, professional development or support to early childhood educators and/or care providers (including center-based child care providers, home-based child care providers, preschool teachers, assistants, and paraprofessionals).

The mentor/coach should complete the scale only after she has had the opportunity to observe and talk with the educator or care provider and establish some rapport (more information about administering the scale is provided in the Professional Manual).

METHOD

SAMPLE

Partners in Family Child Care (PFCC) Home Visitors/Mentors completed the *Stage of Change Scale* for both lead and assistant family child care providers at the beginning and again at the end of the program (in the fall and the following spring) for two consecutive cohort years of PFCC implementation over the 2008-2009 and 2009-2010 school years. Each Home Visitor/Mentor had worked with children for over 10 years and had worked with family child care providers for over three years prior to being hired for the PFCC project. Home Visitors/Mentors participated in 30 hours of initial training for the PFCC project and received additional support during bi-monthly group meetings with the Program Coordinator and Director. Complete pre and post Stage of Change data was collected from 26 providers in 2008-2009, and 33 providers in 2009-2010. Overall, the Stage of Change pre and post data represents 38 separate group family child care sites. All of the sites operate in low-income City of Rochester neighborhoods. Nearly 100% of the families served qualify for subsidized care from Monroe County.

Group family child care sites must be staffed by at least two adults serving up to 12 children. Each PFCC site was staffed by a “lead” teacher, who is typically the family child care owner, and one or more assistant teachers who serve an average of eight children per site. 63% (37) of the providers from whom we collected complete Stage of Change data were leads and 37% (22) were assistants. A majority of the providers were female and identified their race as African American, non-Hispanic. The following tables illustrate the distribution of gender and race among providers:

Table 1.
Demographic Provider Characteristics by Role

	Provider Role	
	Lead	Assistant
Gender		
Female	58	33
Male	5	11
Missing	0	9
Race		
Bi- or multi-racial	4	0
Black or AA, non-Hispanic	37	15
Hispanic or Latino/a, Black	5	2
Hispanic or Latino/a, White	4	2
Other	1	0
Missing	5	15
Highest level of education		
Some high school	7	3
High school/GED	22	11
Some college	13	5
Associate's/2yr degree	10	1
Bachelor's/4yr degree	1	0
Master's degree	2	0

The most frequently reported “highest level of education” among providers was High School/GED. Total years of child care experience ranged from 2 to 32, and the average was 12. When broken out by provider role, the average years of child care experience was 14 for lead teachers and 8 for assistants. The overall average age of providers as of program participation was 42 years, and the range was 20 to 71 (missing n= 17). When broken out by provider role, the average age was 46 years for leads and 33 years for assistants.

ANALYSES

We conducted classical test theory (CTT) analyses first to ensure the unidimensionality of the construct and to rule out any items whose inclusion would negatively impact alpha reliability. We conducted principal components factor analysis determining the number of factors using the eigenvalue equal to one criterion. Factor loadings were rotated using varimax, and factor loadings smaller than .40 were identified. Alpha reliability was calculated and improvement or deterioration of alpha reliability as a result of item deletion was examined.

Then, we supplemented the CTT analyses with a Rasch partial credit model. The Rasch model is an item-based approach that maps the ordinal item raw responses to a linear scale in which both persons and items are placed. There are various versions of the Rasch model, and we estimated the partial credit model to the data because each item had different verbal anchors. Variable and person maps were inspected, items were retained if they had positive item-measure correlation, correct ordering in the observed scale points, and infit and outfit mean square statistics in the [.5, 1.5] range. Scale scores were computed with a mean of 50 and a standard deviation of 10. Norms were provided for the early childhood provider population.

Concurrent and predictive validity were computed against the Child/Home Environmental Language and Literacy Observation (CHELLO), a widely used measure of language and literacy environment of group home-based child care settings.

RESULTS

CLASSICAL TEST THEORY RESULTS

PCA identified one factor using the eigenvalue=1 criterion. All items had factor loadings greater than .40. The alpha reliability was 0.93. Deletion of any item did not increase alpha reliability.

RASCH MODEL

Unidimensionality of the Rasch dimension was confirmed by a principal component analysis of the residuals of the Rasch model. The Rasch factor explained 73.9% of the variance, all eigenvalues for contrasts were below 3, the first contrast explained 9.1% of variation compared to the 14.1% explained by the Rasch items. All items fit the partial credit model well. Thus, there was no evidence of a multidimensionality problem.

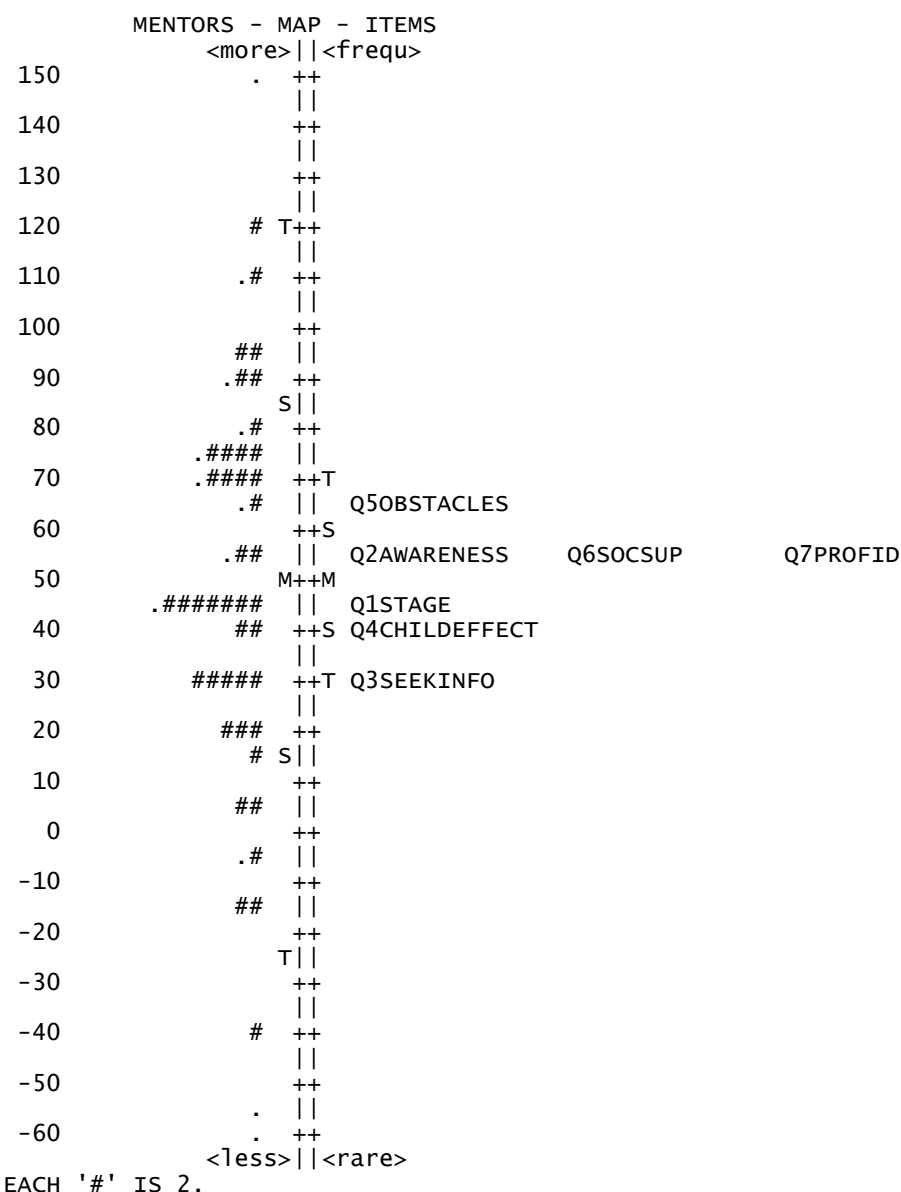


FIGURE 1. PERSON-ITEM MAP.

As can be readily seen, the items had good spacing with seeking information being the easiest and obstacles the hardest item. Awareness, social support, and professional identity have similar levels of difficulty.

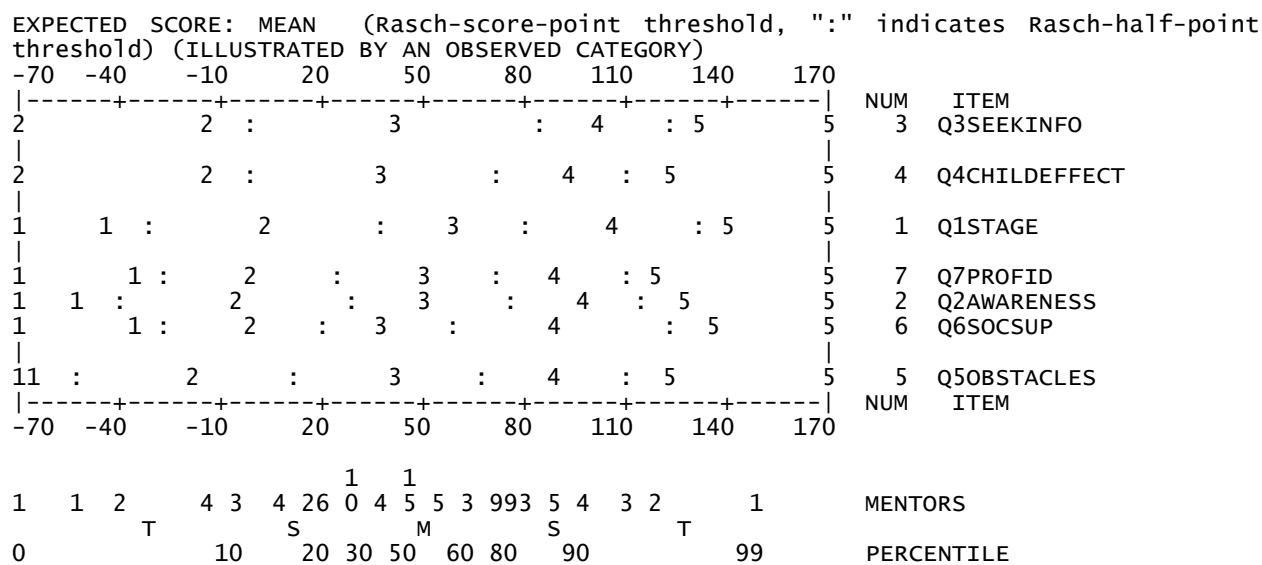


FIGURE 2. EXPECTED SCORES OF THE MODEL.

Figure 2 shows the general key form for the expected values. Note that there are no persons expected to have a score of 1 on seeking information or child effect.

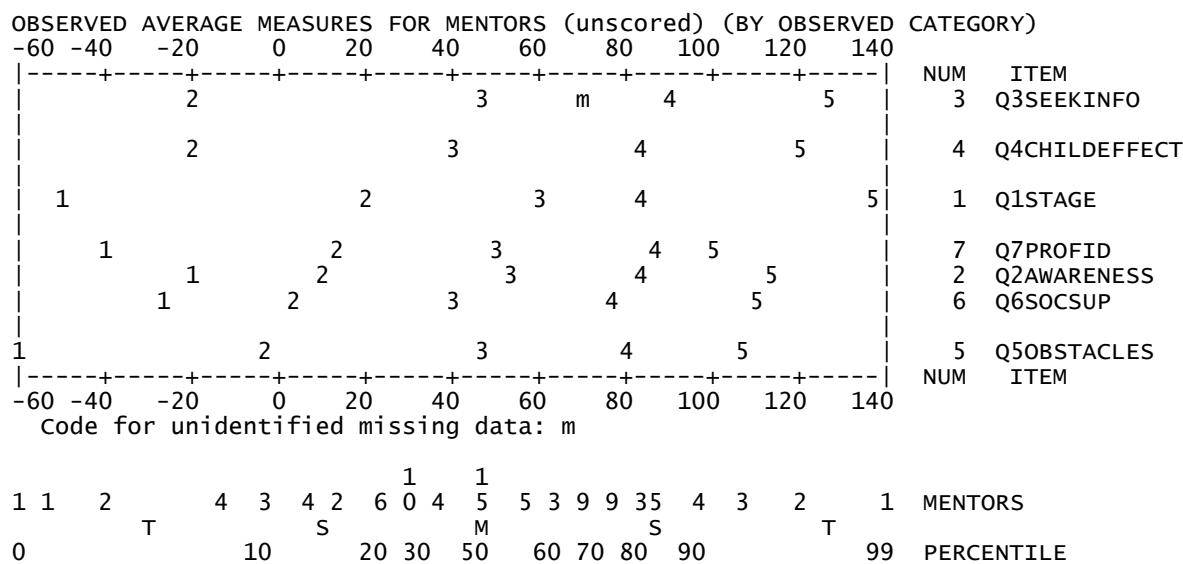


FIGURE 3. OBSERVED AVERAGE MEASURES.

Figure 3 shows the observed measures against the overall scale score. "m" represents missing data for that question. As can be seen, all anchors appear in the correct order for every item. In seekinfo and childefect items the first stage (precontemplation) was never shown. In general, the stages have even separation except for the last two levels of profid.

ENTRY NUMBER	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT		OUTFIT		PT-MEASURE		EXACT OBS%	MATCH EXP%	ITEM	G
					MNSQ	ZSTD	MNSQ	ZSTD	CORR.	EXP.				
3	294	95	68	3	.76	-1.4	.52	-1.3	.80	.77	84.9	82.4	Q3SEEKINFO	0
2	287	96	44	2	1.30	2.0	1.25	1.3	.81	.85	68.1	70.9	Q2AWARENESS	0
4	310	96	60	3	.71	-2.0	.67	-1.1	.84	.81	81.9	77.8	Q4CHILDEFFECT	0
1	272	96	54	2	1.05	.4	1.00	.1	.85	.85	75.5	72.7	Q1STAGE	0
6	306	96	44	2	1.03	.2	.99	.0	.86	.87	74.5	74.2	Q6SOC SUP	0
5	305	96	35	2	.91	-.6	.95	-.2	.87	.85	79.8	74.7	Q5OBSTACLES	0
7	290	96	45	2	.96	-.2	1.00	.1	.87	.86	77.7	70.4	Q7PROFID	0
MEAN	294.9	95.9	50	2	.96	-.2	.91	-.2			77.5	74.7		
S.D.	12.3	.3	10	0	.18	1.2	.22	.8			5.1	3.9		

FIGURE 4. ITEM STATISTICS.

The point-measure correlations are all positive and relatively close to expected values. The outfit and infit mean square errors are within [.5, 1.5] which indicates each item fits reasonably well the partial credit model and is productive for measurement.

SUMMARY OF 96 MEASURED (EXTREME AND NON-EXTREME) MENTORS

	RAW		MEASURE	MODEL ERROR	INFIT		OUTFIT	
	SCORE	COUNT			MNSQ	ZSTD	MNSQ	ZSTD
MEAN	21.5	7.0	48.27	9.02				
S.D.	4.9	.1	38.83	1.69				
MAX.	35.0	7.0	150.60	19.41				
MIN.	9.0	6.0	-68.46	7.69				
REAL RMSE	10.33	ADJ.SD	37.43	SEPARATION	3.62	MENTOR RELIABILITY	.93	
MODEL RMSE	9.18	ADJ.SD	37.73	SEPARATION	4.11	MENTOR RELIABILITY	.94	
S.E. OF MENTOR MEAN = 3.98								

MENTOR RAW SCORE-TO-MEASURE CORRELATION = .99 (approximate due to missing data)
CRONBACH ALPHA (KR-20) MENTOR RAW SCORE RELIABILITY = .93 (approximate due to missing data)

SUMMARY OF 7 MEASURED (NON-EXTREME) ITEMS

	RAW		MEASURE	MODEL ERROR	INFIT		OUTFIT	
	SCORE	COUNT			MNSQ	ZSTD	MNSQ	ZSTD
MEAN	294.9	95.9	50.00	2.40	.96	-.2	.91	-.2
S.D.	12.3	.3	10.49	.22	.18	1.2	.22	.8
MAX.	310.0	96.0	67.96	2.87	1.30	2.0	1.25	1.3
MIN.	272.0	95.0	34.84	2.18	.71	-2.0	.52	-1.3
REAL RMSE	2.47	ADJ.SD	10.20	SEPARATION	4.13	ITEM RELIABILITY	.94	
MODEL RMSE	2.41	ADJ.SD	10.21	SEPARATION	4.23	ITEM RELIABILITY	.95	
S.E. OF ITEM MEAN = 4.28								

UMEAN=50.000 USCALE=10.000
ITEM RAW SCORE-TO-MEASURE CORRELATION = -.11 (approximate due to missing data)
657 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 741.05 with 538 d.f. p=.0000

FIGURE 5. SUMMARY MEASURE INFORMATION.

Figure 5 shows that the test reliability was .93. The separation statistics show that the measure can only be effectively used to group early childhood providers into four groups. The item reliability was .95 indicating that the items were precisely located in the measure and we would not expect them to change.

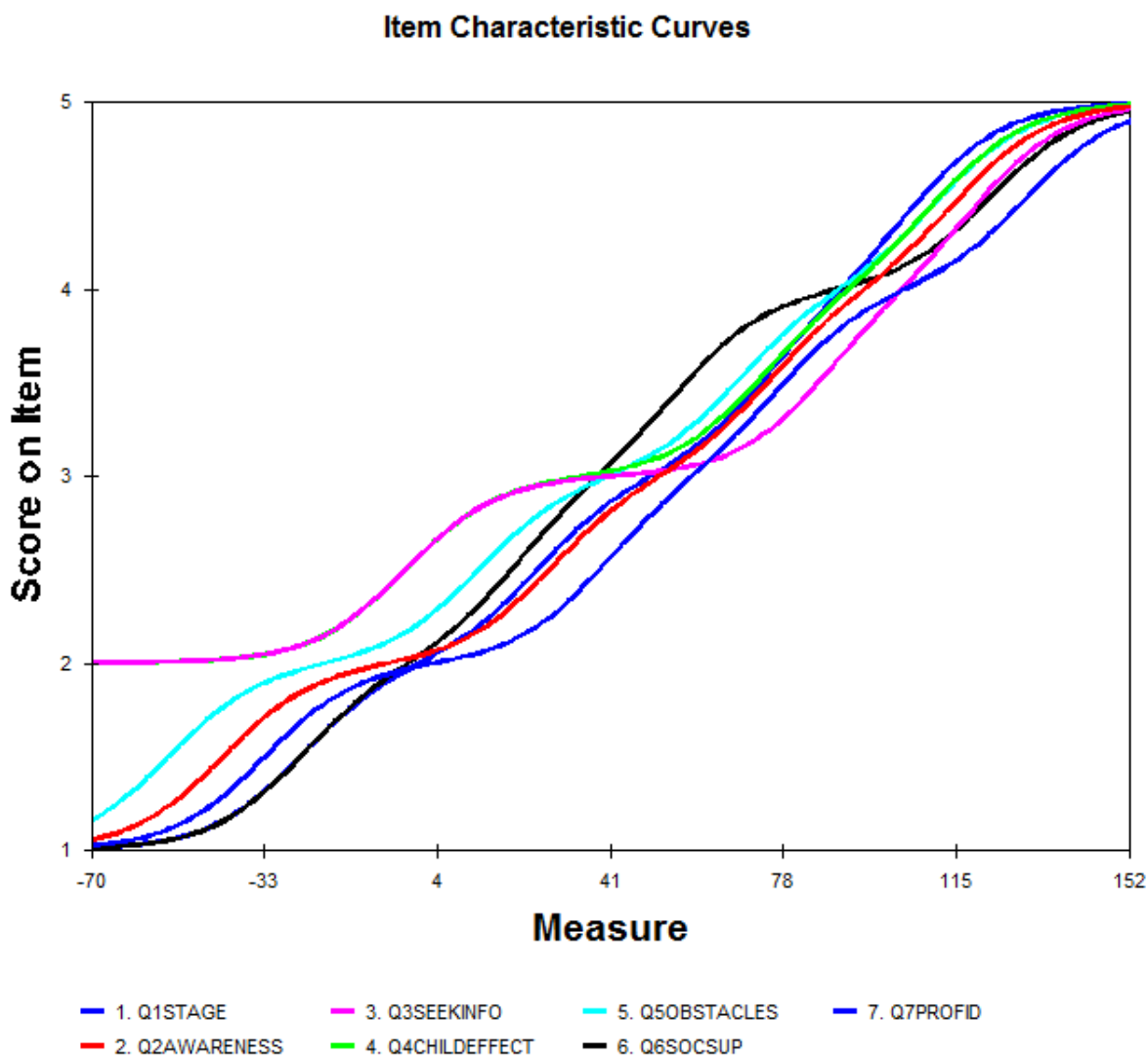
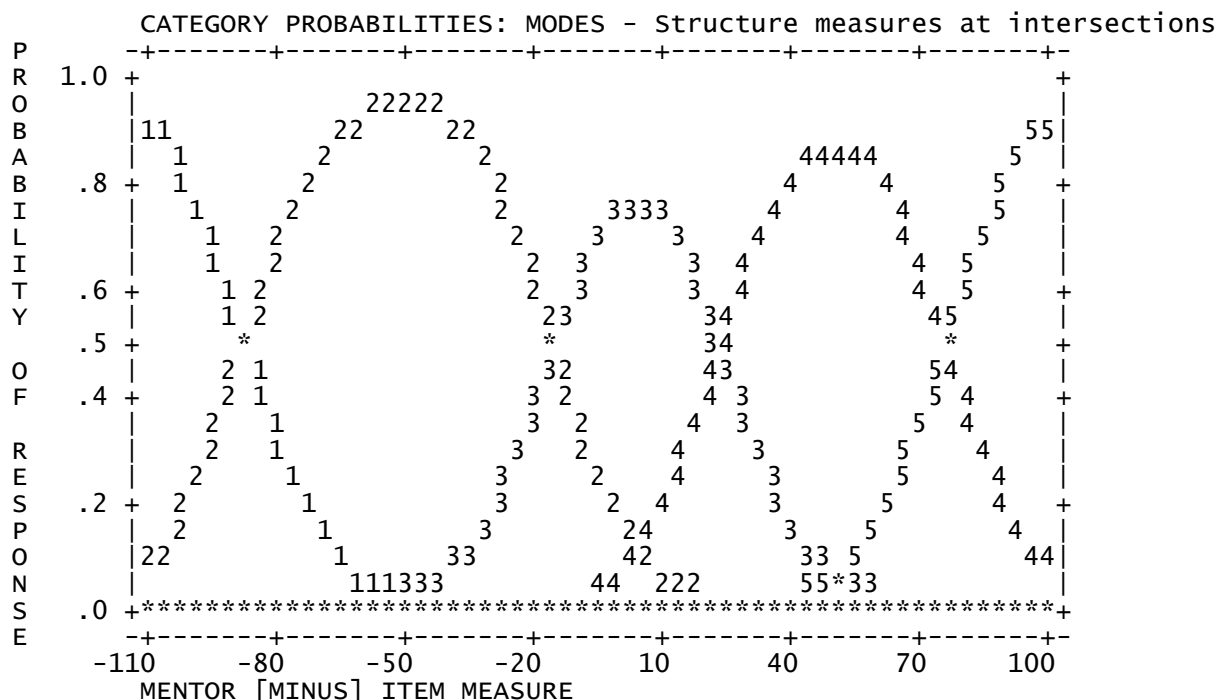


FIGURE 6. ITEM CHARACTERISTIC CURVES.

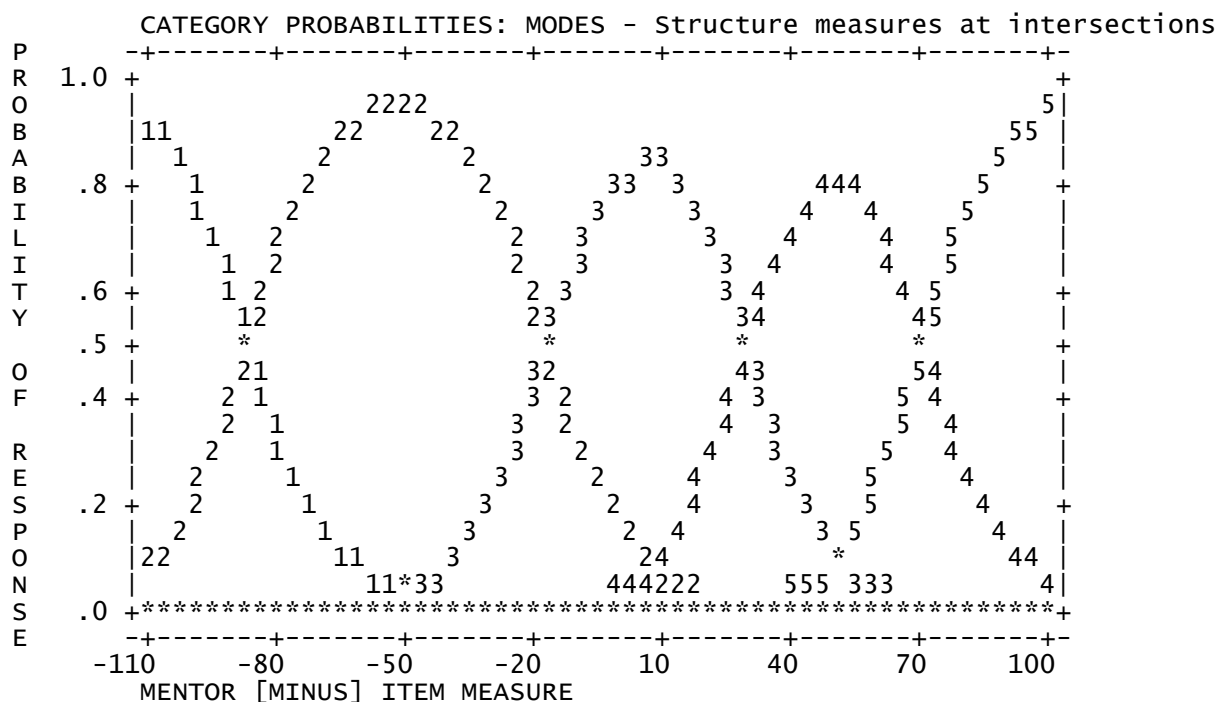
Figure 6 shows the item characteristic curves. They are relatively well-behaved. Note that seekinfo and childeffect items have no information at the precontemplation stage.

Figure 7, illustrating probability category curves – items 1 through 7, begins below.

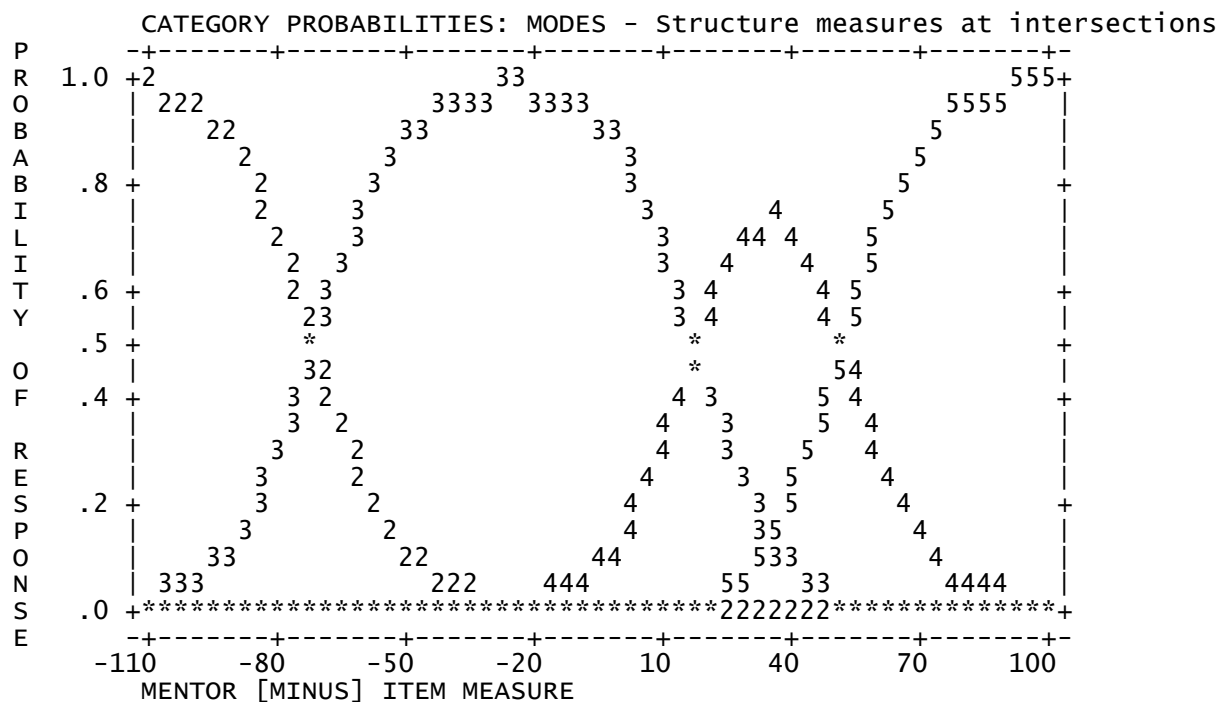
ITEM NUMBER: 1 Q1STAGE



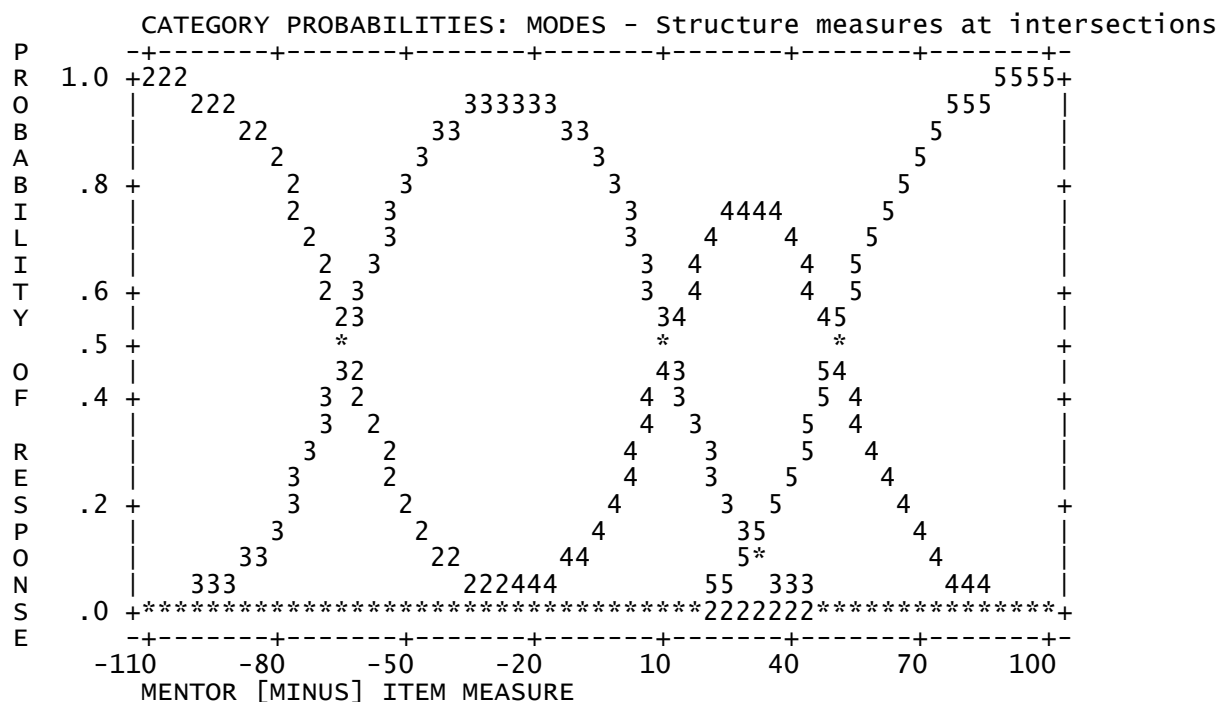
FOR GROUPING "0" ITEM NUMBER: 2 Q2AWARENESS



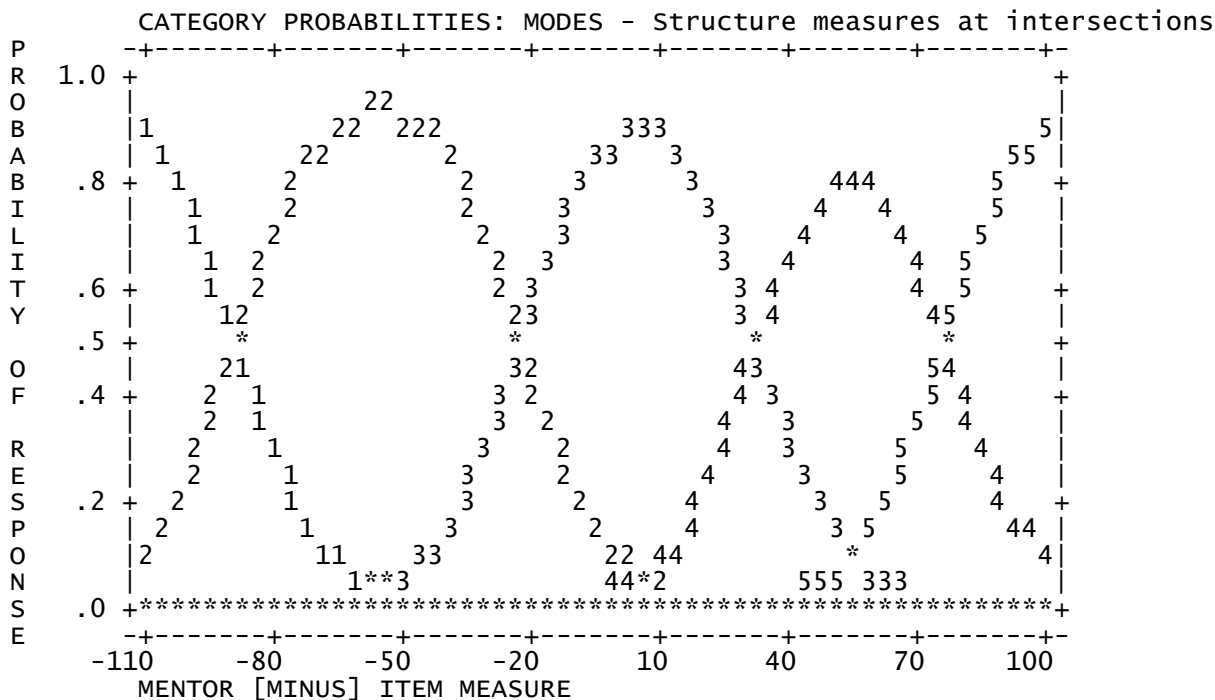
FOR GROUPING "0" ITEM NUMBER: 3 Q3SEEKINFO



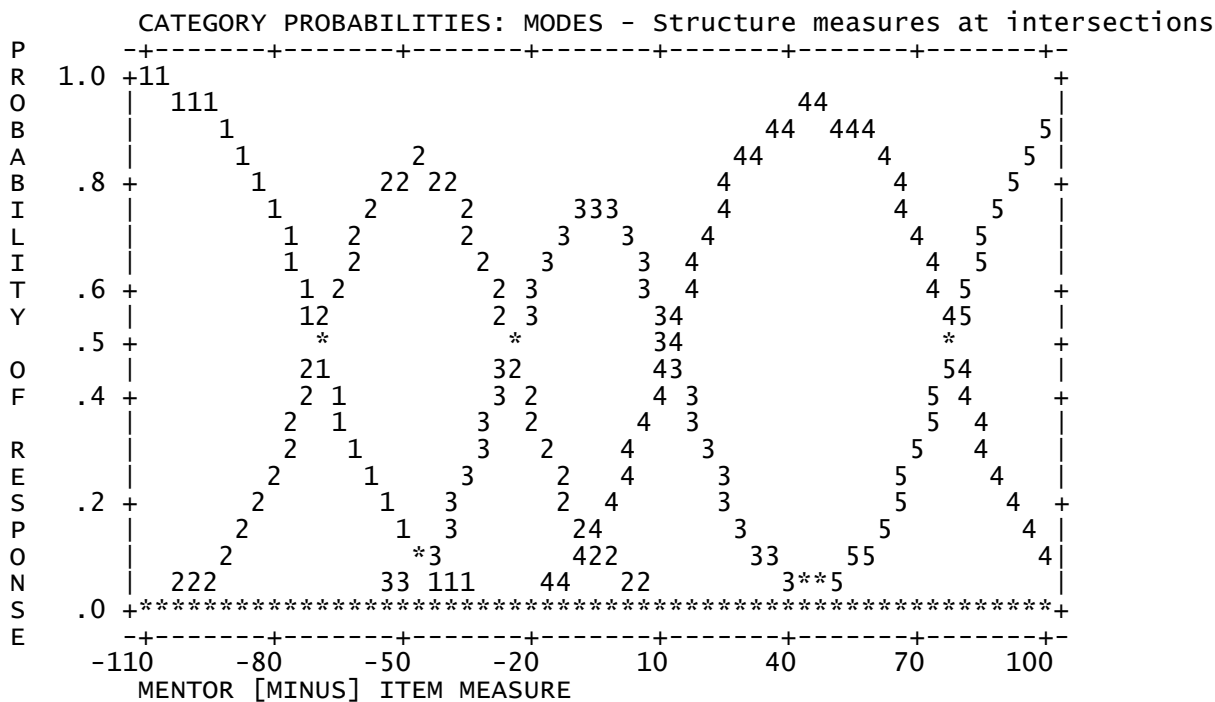
ITEM NUMBER: 4 Q4CHILDEFFECT



ITEM NUMBER: 5 Q5OBSTACLES



ITEM NUMBER: 6 Q6SOCSUP



ITEM NUMBER: 7 Q7PROFID

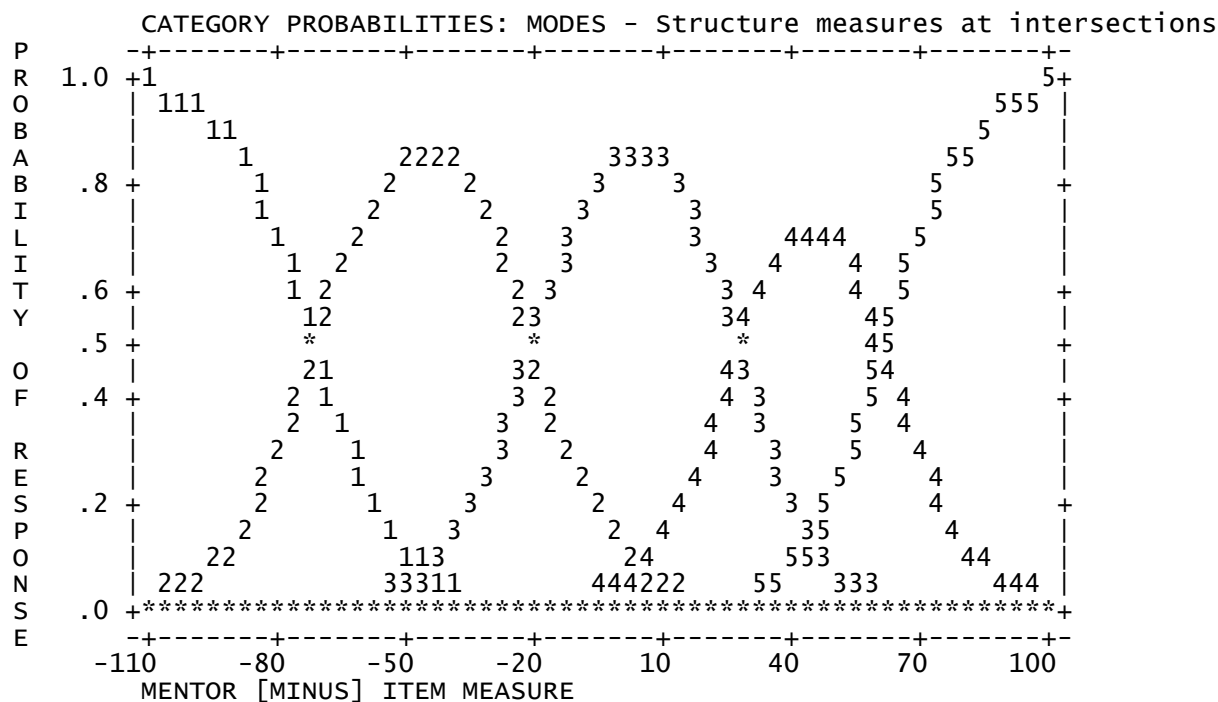


FIGURE 7. PROBABILITY CATEGORY CURVES.

Figure 7 shows each item's probability category curves. Except for seekinfo and childeffect having no persons in the precontemplation stage, the curves are reasonably well behaved.

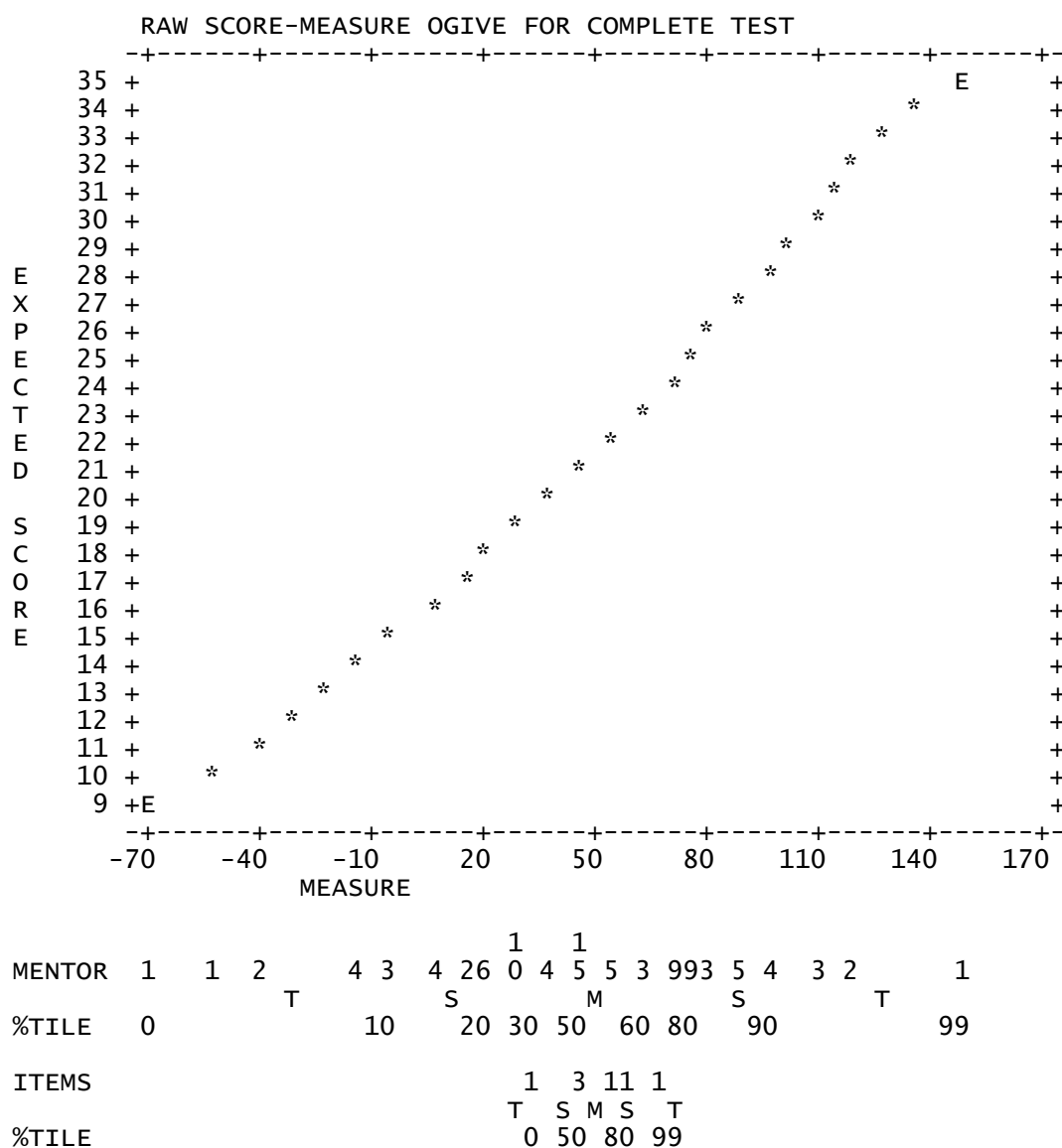


FIGURE 8. RAW SCORE-MEASURE OGIVE.

Figure 8 shows the cumulative distribution of the scale score.

TABLE OF MEASURES ON COMPLETE TEST

SCORE	MEASURE	S.E.	SCORE	MEASURE	S.E.	SCORE	MEASURE	S.E.
9	-69E	20	18	22	9	27	88	8
10	-53	12	19	30	9	28	95	8
11	-41	10	20	38	9	29	102	8
12	-31	9	21	47	10	30	108	8
13	-22	9	22	56	9	31	114	8
14	-13	10	23	63	8	32	120	8
15	-4	10	24	70	8	33	127	9
16	5	9	25	76	8	34	137	11
17	14	9	26	82	8	35	151E	19

FIGURE 9. TABLE OF SAMPLE NORMS.

Figure 9 shows the sample norms for the scaled score.

CONCURRENT AND PREDICTIVE VALIDITY

Concurrent and predictive validity were established through examining correlations between the Stage of Change (SOC) scale score and CHELLO scores collected both concurrently in the fall at time 1, and with CHELLO scores obtained the following spring at the end of the intervention (time 2).

The concurrent validity of the SOC scale was supported by moderate positive correlations with the CHELLO, a widely used tool for measuring the language and literacy environment of group home-based child care settings. The time 1 SOC scale score was significantly correlated with the total time 1 CHELLO score ($r = .30$). Significant relationships were also identified between the SOC scale score and elements the Literacy Environment Checklist, a subscale designed to examine the availability and condition of materials for children's language and literacy uses. Finally, two of the three Group/Family Observation subscales were significantly correlated with the SOC scale score: Physical Environment for Learning, and Adult Teaching Strategies ($r = .30$, and $.26$, respectively). The strongest relationship with the time 1 SOC scale score was Daily Schedule, a subset of the Physical Environment for Learning subscale ($r = .33$).

Predictive validity was supported by a significant correlation between the SOC time 1 scale score and the CHELLO time 2 Total score ($r = .35$). Overall, the strongest relationship was with the Physical Environment for Learning subscale ($r = .41$).

Table 2.

Correlations between Stage of Change Scale Scores at Time 1 and CHELLO Subscale Scores at Time 1 (n=99) and Time 2 (n=86)

CHELLO Scores	Concurrent Validity	Predictive Validity
Total score	.30**	.35**
Literacy Environment Checklist	.28**	.24*
Book Area	.29**	.30**
Book Use	.04	.09
Writing Materials	.03	.06
Toys	.26**	.16
Technology	.24*	.13
Group/Family Observation	.25*	.35*
Physical Environment for Learning	.30**	.41**
Organization of the Environment	.23*	.37**
Materials in the Environment	.19	.24*
Daily Schedule	.33**	.27*
Support for Learning	.10	.30**
Adult Affect	.20*	.33**
Adult-Child Language Interaction	.08	.17
Management Strategies	-.01	.30**
Adult Teaching Strategies	.26*	.28**
Vocabulary Building	.13	.19
Responsive Strategies	-.02	.16
Use of Print	.27**	.12
Storybook/Storytelling Activities	.18	.33**
Writing Activities	.21*	.06
Monitoring Children's Progress	.28**	.09
Family Support and Interaction	.17	.30**

* p<.01

** p<.05

CONCLUSION

The Stage of Change Scale for Early Education and Care 2.0: Mentor/Coach Form has sufficient reliability and construct validity for group analyses, which is its primary function, and it has sufficient person separation and reliability to be used at the individual level to determine improvement in readiness to change. The measure also has demonstrated concurrent and predictive validity, as supported by positive correlations with the CHELLO. The norms are only for family child care settings. Uses in other contexts must proceed with caution.

These findings suggest that the scale is appropriate for the following intended uses:

- ❖ Provide information about which professional development programs would best match an individual learner's stage of change.
- ❖ Enable a mentor/coach to choose intervention techniques that are tailored to the learner's stage of change.
- ❖ Design curriculum for a group of learners at the same stage of change.

Recommendation for improvements of the measure:

1. Establish concurrent and predictive validity against additional measures.
2. Collect data for SOC measures in other contexts.