Factor Analyses of Quality Measures

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Background

Studies have documented modest relations between global child care ratings on observational child care measures, teacher-child interaction, and children's development. However, newer studies have examined relations between factors created within the global measures and more targeted outcomes in children's development. Assessing the structure of global quality measures can help researchers, educators and policy makers determine which aspects of early childhood environments that matter for children's development should be targeted for quality improvement.

Factor Structures

ECERS-R: The Early Childhood Environment Rating Scale-Revised[1]
FDCRS: Family Day Care Rating Scale[2]
CIS: Caregiver Interaction Scale[3]
ITERS: The Infant/Toddler Environment Rating Scale[4]

Table 1. *Factor Structures to be examined for ECERS-R, FDCRS, ITERS, CIS*

Measure	Factor Num	Construct	Items	Source
ECERS-R	Factor 1	Interaction & Teaching	9,16,17,18,29,30,31,32,33,35,36	QUINCE report[5]
	Factor 2	Provisions	3,4,8,19,20,22,23,24,25,34,35,36	
FDCRS	Factor 1	Interaction & Teaching	1,3,14bc,15ac,17,18,20,21,22,23,29	QUINCE report
	Factor 2	Tone/Discipline	9,14ac,14bc,15ac,17,20,26,27,28	
	Factor 3	Provisions/Health	4,5,6ac,6bc,7,8,9,11,12,13,25	
ITERS	Factor 1	Language/Interaction	15,25,26,27,29	BABY FACES (ITERS-R)[6]
	Factor 2	Activities	17,21,22,24	
	Factor 3	Routines/Space	7,9,11	
	Factor 4	Furnishings	1,3,4	
CIS	Factor 1	Permissive	9,15,18	Original Subscales
	Factor 2	Detached	5,13,21,23	
	Factor 3	Sensitivity	1,3,6,7,8,11,14,16,19,25	
	Factor 4	Harsh	2,4,10,12,17,20,22,24,26	

References

1. Harms, T., & Clifford. (1989). *Family Day Care Rating Scale*. New York: Teachers College Press.
2. Harms, T., Clifford, & Cryer, D. (2005). *Early Childhood Environment Rating Scale- Revised.* New York: Teachers College Press.
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4. Harms, T., Clifford, & Cryer, D. (2006). *Infant/Toddler Environment Rating Scale.* New York: Teachers College Press
5. Bryand D., Wesley P., Burchinal P., Sideris J., Taylor K., etc. (2009). The QUINCE-PFI Study: An Evaluation of a Promising Model for Child Care Provider Training: Final Report.
6. Vogel C., Boller K.(2010). *Mathematica Policy Research*. Personal Communication.

Sample Information

Table 2. *Sample Size of the Three Scales at Different Time Points*

Program	Measure	Time Point	Sample Size
QUINCE	ECERS-R	Time 2	74
	FDCRS	Time 2	200
EHS	ECERS-R	36M	455
		60M	859
	FDCRS	14M	79
		24M	87
		36M	63
		60M	40
	ITERS	14M	352
		24M	387
	CIS	14M	483
		24M	515
		36M	575

Note. For QUINCE study, only Time 2 data were selected, as at that time point, providers had received full dose of intervention and the children had been with the providers for 6 months, which is comparable to EHS sample.

Purpose

Study 1

To determine if factor structures identified in ECERS-R and FDCRS in the QUINCE study (two-factor for ECERS-R and three-factor for FDCRS) hold true for QUINCE Time 2 data and the same measures used in EHS sample when children were age 14, 24, 36 and 60 months.

To examine the validity of four-factor structure of CIS in EHS sample when children were age 14,24 and 36 months.

To test if the four-factor structures identified in ITERS-R in BABY FACES study hold true for ITERS in EHS sample when children were age 14 and 24 months.

Study 2

If the CFA findings of Study 1 indicate the factor structures are not ideal, then run an exploratory factor analysis to find potential factor structures.

Method

Study 1

CFA under maximum likelihood estimation was used to evaluate a model.

Study 2

CIS data at 14m, 24m and 36m in EHS sample were used for analysis. Direct oblimin rotation was used to run EFA and if the factor loading is under .3, the item was excluded.

Key Findings

Study 1

Table 3 *Coefficient Alpha for Four Scales at Different Time Points*

Measure	Program	Cronbach's Alpha F1	F2	F3	F4
ECERS-R	QUINCE Time 2	.884	.881		
	EHS 36M	.934	.913		
	EHS 60M	.928	.899		
FDCRS	QUINCE Time 2	.789	.812	.870	
	EHS 14M	.873	.884	.831	
	EHS 24M	.929	.924	.908	
	EHS 36M	.907	.908	.903	
	EHS 60M	.909	.900	.909	
ITERS	EHS 14M	.882	.791	.643	.484
	EHS 24M	.921	.532	.717	.710
CIS	CIS 14M	.475	.792	.939	.814
	CIS 24M	.528	.826	.947	.845
	CIS 36M	.555	.816	.945	.824

Table 4. *Goodness of Fit Indexes for Alternative Confirmatory Factor Analysis Models*

Program	Time Point	Model	χ^2	*df*	RMSEA	CFI
QUINCE	Time 2	ECERS-R(2)	248.596	186	.067	.918
	Time 2	FDCRS(3)	583.077	316	.065	.848
EHS	36M	ECERS-R(2)	799.81	186	.085	.897
	60M	ECERS-R(2)	1182.00	186	.080	.90
	14M	FDCRS(3)	544.41	316	.096	.77
	24M	FDCRS(3)	593.66	316	.101	.838
	36M	FDCRS(3)	672.44	316	.135	.712
	60M	FDCRS(3)	602.73	316	.153	.850
	14M	ITERS(4)	394.812	84	.103	.877
	24M	ITERS(4)	217.415	84	.064	.960
	14M	CIS(4)	1489.151	293	.092	.856
	24M	CIS(4)	2138.932	293	.115	.808
	36M	CIS(4)	1674.928	293	.091	.870

Note. RMSEA root-mean-square error of approximation; CFI comparative fit index.

Study 2

Table 5. *Two-Factor Structure for CIS*

Scale	Factor	Construct	Items
CIS	Factor 1	Sensitivity	1,3,6,7,8,11,13,14,16,18,19,24
	Factor 2	Punitiveness and Detachment	2,4,5,9,10,12,15,17,20,21,22,23,24,26

Table 6. *Coefficient Alpha for CIS and Variance Explained by Factors*

Scale	Program	Time Point	Cronbach's Alpha F1	F2	Variance Explained By Two Factors
CIS	EHS	14M	.931	.883	54.52
		24M	.922	.899	58.80
		36M	.924	.892	57.56

Conclusion

Study 1

Using the well accepted cut-off standards, χ^2/df<5, RMSEA<.08, CFI>0.95, the factor structures found in the QUINCE study (two-factor structure for ECERS-R and three-factor structure for FDCRS) do not display good fit for both QUINCE Time 2 data and EHS 14, 24, 36 and 60 month data.

The four-factor structure for CIS does not display good fit for the EHS data on all three time points.

The four-factor structure of ITERS displays good fit for the EHS data for 24 month data., but not ideal for 14 month data (see Table 4, 24 month data are highlighted in red).

Study 2

Taking the scree plot, variance explained, comprehensibility and internal consistency coefficient together, a two-factor structure was the best fit for the CIS data in EHS study. No new reasonable factor structures were found for the other scales.

The new two-factor structure for CIS needs to be examined in the future by applying it to more datasets.

Acknowledgement

Funding: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research and Evaluation.
Grant #: 90YEO116/01.

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