Psychometric Development of Child Gardening Surveys Aligned to Social Cognitive Theory

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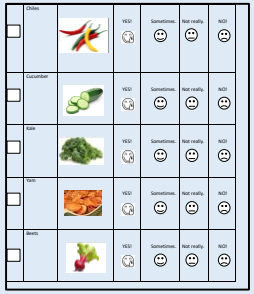
Purpose: The purpose of the project was to test the psychometric properties of the five measurement scales developed to assess constructs within Social Cognitive Theory (Bandura, 2001). We tested construct validity, reliability, & criterion validity.

Methods: Data were collected from K-5th grade participants attending 7 Ohio elementary schools. Three paper-pencil surveys were distributed: 1) Favorite Vegetables & Demographic Survey, 2) Vegetable Habits of Children, and 3) School Gardens and Health Literacy.

Statistical Analysis: An exploratory factor analysis (Table 1) assessed the construct validity of environment, behavior, individual, expectations, and health literacy measurement scales. Factor reliability was assessed with Cronbach's alpha ranging from .69 to .84. Test-Retest Pearson Correlation ranged from .65 to .81. Criterion validity of factors was examined with ANOVA F-tests to determine the sensitivity of the measurement scales to identify expected differences among subgroups as shown in Table 2 to the right.



Sample Questions from the "Favorite Vegetables and Demographic Survey" – A visual textual assessment tool

Table 1. Exploratory Factor Analysis Results

	Factor Loadings Range	Eigenvalue (% Variance Explained)	Cronbach's Alpha	Skewness (Standard Error)	Time 1 Mean (SD)	Time 2 Mean (SD)	Test-Retest Pearson Correlation (p-value)
Environment 6-items	0.46-0.69	2.64 (43.97%)	0.70	-0.72 (0.10)	3.02 (0.66) N=594	3.03 (0.74) N=80	0.75 (0.00)
Behavior 5-items	0.41-0.72	2.53 (50.50%)	0.73	-0.47 (0.10)	2.80 (0.78) N=591	2.94 (0.85) N=80	0.73 (0.00)
Individual							
Expectancies 3-items	0.51-0.98	3.06 (38.19%)	0.69	-0.24 (0.10)	2.72 (0.88) N=458	3.00 (0.86) N=80	0.77 (0.00)
Incentive Motivation 5-items	0.48-0.77	1.51 (18.93%)	0.72	-1.01 (0.11)	3.33 (0.64) N=458	3.36 (0.68) N=80	0.65 (0.00)
Expectations 5-items	0.54-0.69	2.46 (49.27%)	0.74	0.74 (0.11)	3.19 (0.79) N=458	3.16 (0.76) N=76	0.59 (0.00)
Health Literacy 7-items	0.46-0.77	3.63 (51.80%)	0.84	-0.02 (0.11)	2.60 (0.82) N=460	2.71 (0.86) N=73	0.81 (0.00)

Children responded to questions on a 4-point scale: 1=No!, 2= Not really., 3=Sometimes., 4=Yes!

Table 2. Criterion Validity Results

	Environment		Behavior		Expectancies		Incentive Motivation		Expectations		Literacy	
	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*	Mean (SD)	*p*
Gender												
Female	3.05 (0.59) n=259	0.03	2.86 (0.74) n=257	0.02	2.84 (0.82) n=259	0.01	3.35 (0.58) n=229	0.17	3.22 (0.78) n=229	0.26	2.66 (0.76) n=230	0.01
Male	2.92 (0.75) n=250		2.70 (0.82) n=250		2.62 (0.95) n=250		3.26 (0.70) n=211		3.13 (0.80) n=211		2.47 (0.87) n=212	
Ethnicity												
Non-White	3.07 (0.62) n=152	0.06	2.86 (0.79) n=151	0.10	2.90 (0.86) n=152	0.00	3.33 (0.70) n=137	0.50	3.25 (0.64) n=137	0.15	2.76 (0.81) n=137	0.00
White	2.95 (0.70) n=328		2.74 (0.78) n=327		2.65 (0.90) n=328		3.28 (0.62) n=274		3.12 (0.86) n=274		2.45 (0.80) n=275	
Grade-level												
Kindergarten- 2nd grade	3.02 (0.72) n=171	0.89	2.79 (0.90) n=171	0.79	2.85 (0.97) n=171	0.03	3.36 (0.64) n=151	0.50	3.26 (0.72) n=151	0.19	2.74 (0.87) n=152	0.01
3rd – 4th grade	3.01 (0.64) n=423		2.81 (0.73) n=420		2.67 (0.84) n=422		3.31 (0.64) n=307		3.15 (0.82) n=307		2.53 (0.79) n=308	
Do you have a FV garden at home?												
No	2.92 (0.70) n=258	0.07	2.62 (0.80) n=256	0.00	2.61 (0.95) N=258	0.00	3.23 (0.65) n=224	0.00	3.13 (0.76) n=224	0.12	2.52 (0.81) n=225	0.16
Yes	3.04 (0.66) n=216		2.94 (0.76) n=216		2.85 (0.83) n=216		3.42 (0.57) n=183		3.26 (0.85) n=183		2.63 (0.85) n=184	
Do you have a garden at school?												
No	3.10 (0.64) n=71	0.23	2.82 (0.83) n=70	0.73	2.89 (0.87) n=71	0.08	3.27 (0.67) n=68		3.18 (0.69) n=68	0.41	2.58 (0.89) n=68	0.92
Yes	3.00 (0.66) n=513		2.79 (0.78) n=511		2.69 (0.88) n=512		3.34 (0.64) n=385		3.19 (0.81) n=385		2.60 (0.82) n=387	

SD= standard deviation; FV= fruit and vegetable. Significant differences are bolded (p<0.05).

Results: Child participants (N=594) were 51% female with a mean age of 8.23 years and (SD)=1.08). Sixty-eight percent were Caucasian, 13% were mixed ethnicity, 5% Native American & Alaskan Native, 5% Hispanic/Latino, 4% African American, 2% Native Hawaiian, 2% Asian, and 1% Other. The majority of children were 4th graders (47%), followed by 3rd graders (25%), 2nd graders (21%), 1st graders (5%), and kindergarteners (3%). Six factors were significant via EFA with 41 items emerging.

Conclusions: An Exploratory Factor Analysis reduced 2 surveys with 37 Qs down to 32 Qs into 6 Social Cognitive Theory constructs. A revised survey called "Vegetable Gardening Health Literacy Scale" is now available for distribution and use. The visual-textual format of the survey makes this project practical for assessing children's vegetable habits through the lens of health literacy skills.

Sample Questions from the School Gardening and Health Literacy Survey