

Psychometric Development of Child Gardening Surveys Aligned to Social Cognitive Theory

Valerie A. Ubbes, PhD, MCHES, Karly Geller, PhD, Judith Ausherman*, EdD, CHES, Beth Miller, RD, PhD, Katherine Blodgett, BS, & Amy Skeels Miami University, Oxford, OH & Cleveland State University*, Cleveland, OH



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 Ftests to determine the sensitivity of the measurement scales to identify expected differences among subgroups as shown in Table 2 to the right.

Chiles	*	*** (3	Sometimes.	Not really.	© E	
Cucumber	500	60 to	Sometimes.	Not really.	₫ 🛈	
Kale	A	****	Sometime.	Not really.	⊕ 8	
Yam	5	vesi (2)	Sometimes.	Not really.	⊕ §	
Beets	*	vesi (2)	Sometimes.	Not really.	<u>§</u>	

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

Table 1. Exploratory Fact	tor Analysis Res	sults					
	Factor	Eigenvalue		Skewness	Time 1	Time 2	Test-Retest
	Loadings Range	(% Variance Explained)	Cronbach's Alpha	(Standard Error)	Mean (SD)	Mean (SD)	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!

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

Table 2 Criterion Validity Results

Table 2. Criterion Validit	y Results											
	Environm	ent	Behavio	or	Expectano	ies	Incentiv Motivati		Expectation	ons	Literac	у
	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	0.03	2.70 (0.82) n=250	0.02	2.62 (0.95) n=250	0.01	3.26 (0.70) n=211	0.17	3.13 (0.80) n=211	0.20	2.47 (0.87) n=212	0.01
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	0.06	2.74 (0.78) n=327	0.10	2.65 (0.90) n=328	0.00	3.28 (0.62) n=274	0.50	3.12 (0.86) n=274	0.15	2.45 (0.80) n=275	0.00
Grade-level												
Kindergarten- 2 nd 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
3 rd – 4 th grade	3.01 (0.64) n=423	0.03	2.81 (0.73) n=420	0.75	2.67 (0.84) n=422	0.05	3.31 (0.64) n=307	0.30	3.15 (0.82) n=307	0.13	2.53 (0.79) n=308	0.01
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	0.07	2.94 (0.76) n=216	0.00	2.85 (0.83) n=216	0.00	3.42 (0.57) n=183	0.00	3.26 (0.85) n=183	0.12	2.63 (0.85) n=184	0.10
Do you have a garden at school?												
No	3.10 (0.64) n=71	0.22	2.82 (0.83) n=70	0.72	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	0.02
Yes	3.00 (0.66) n=513	0.23	2.79 (0.78) n=511	0.73	2.69 (0.88) n=512	0.08	3.34 (0.64) n=385		3.19 (0.81) n=385	0.41	2.60 (0.82) n=387	0.92

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

YES!	Sometimes. Not really. (2) NO!
2. I will talk to my f	riends about the foods I grow in the school garden.
YES! 😥	Sometimes. Not really. 10 NO!
3. I will make new f	riends when working in the garden at my school.
YES! 😥	Sometimes. Not really. 💇 NO! 🔞
 I will have fun he vegetables. 	lping in the school garden when we plant seeds to grow
YES! 😌	Sometimes. ONot really. ONO!
5. I will have fun h	elping in the school garden, because I get to be outside.
YES! 😝	Sometimes. ONot really. 😢 NO! 🛞
6. I Will have run no	iping in the school garden, because I can eat the food I grow.
YES! (2)	Sometimes. Not really.
YES! 😝	
YES! 😝	Sometimes (C) Not really. (E) NO! (B)
YESI (2) 7. I will feel better o	Sometimes. Not really. NO!
YES! (2) 7.1 will feel better to YES! (2) 8.1 will eat the feet	Sometimes () Not really, () NO1 () shee I call foods from the profits. Sometimes () Not really, () NO1 () Sometimes () Not really, () NO1 () Sometimes () Not really, () NO1 ()
YES! (2) 7.1 will feel better to YES! (2) 8.1 will eat the feet	Sometimes Not really, NO! NO! No really, NO! NO! No really, NO! NO! NO! NO! NO! NO! NO! NO
YES! (2) 7.1 will feel better to YES! (2) 8.1 will eat the feet	Sometimes () Not really, () NO1 () shee I call foods from the profits. Sometimes () Not really, () NO1 () Sometimes () Not really, () NO1 () Sometimes () Not really, () NO1 ()
YESI (2) 7. I will feel better in YESI (2) 8. I will eat the feet in YESI (2) 9. I will feel less str	Sometimes Not really, NO! NO! No really, NO! NO! No really, NO! NO! NO! NO! NO! NO! NO! NO