

## *Original Paper*

# Testing the Psychometric Properties of the Habits of Health Scale for Children and Youth

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### **Abstract**

*This paper describes the validity testing we performed on one-half of the Habits of Health and Habits of Mind© model to increase research on the daily habits of children and youth and to substantiate the teaching and dissemination of the model with greater confidence. Child and adolescent health habits were tested with a new Habits of Health Scale (HHS). The study purpose was to test the construct and criterion validity of the habits of health measurement subscales which included physical activity, nutrition, relationships, safety, and hygiene behaviors. Two specific hypotheses were tested. The first hypothesis was that the HHS items would show acceptable factorial validity. The second hypothesis was the HHS factors would demonstrate high criterion validity, or the sensitivity of the scale to detect differences and associations that theoretically should exist. The HHS factors were expected to differ based on participants' gender, perceived health status, perceived academic success, Body Mass Index (BMI), and multiple health behaviors. Results showed that each subscale demonstrated acceptable internal consistency and criterion validity. Health patterns and routines of kids can now be measured by the Habits of Health Scale, which is a multi-behavioral assessment tool that assesses the health status of children and youth.*

### **Keywords**

*child health, adolescent health, health habits, psychometric properties, construct validity, criterion validity, habits of health scale*

## 1. Introduction

A need exists for psychometrically sound tools for the measurement of child health habits. A few tools (Cartland & Ruch-Ross, 2006; Landgraf, Maunsell, Nixon Speechley, Bullinger, Campbell, Abetz, & Ware, 1998) exist but a conceptual model of child and adolescent health habits has not been tested. Child and adolescent health status is investigated by exploring developmental changes in biological growth; health risk behaviors (Garrido, Weiler, & Taussig, 2017); declarative and procedural metacognitive knowledge (Gascione, Higgins, & Wall, 2017); motivations toward cognitive skill development (Kanfer & Ackerman, 1989); achievement motivations, school connectedness, and getting along with others (Lemberger, Selig, Bowers, & Rogers, 2015). Other adolescent health outcomes include salient beliefs to predict behavioral intentions (Yzer, 2012) and the functional role of health literacy (Broder et al., 2017) in preventive health behaviors (Zullig, Ubbes, & Mann, 2013). A variety of instruments are available for measuring the subjective impact of an injury or disease on a child's physical, emotional, and social wellbeing (McCarthy, 2007). Health status is the term used to describe how a person feels and functions within four categories: mental function, physical function, role function, and social function (Ward, 2009). Mental function includes the mood and ability to perform tasks requiring memory, thought, or concentration (Ward, 2009) and may be described as cognitive vitality. Physical function includes the different movements, activities, and abilities attributed by daily health routines and may be somatic, gestural, and procedural. Procedural memory allows for the acquisition, consolidation, and use of motor skills and cognitive routines (Magallón, Narbona, & Crespo-Eguilaz, 2016). Health-related habits are often described as cognitive-motor procedures that become automated through repeated practice.

The Habits of Health and Habits of Mind© model (Ubbes, 2008, p. 113) is used in health education to teach children and youth how to think about and do healthful behaviors on a daily basis. When young people have ongoing skill practice in cognitive thinking patterns, they are developmentally more capable to turn health behaviors into consistent health habits without as many social cues from significant others. Conversely, poor role models and negative media examples of adolescent and parental health can persuade children to try negative risk behaviors that significantly impact their health status. Hence, social functions help to define child health status through the relationships that are formed, changed, and maintained with daily practice in different settings and contexts (Ward, 2009). In addition, the functional roles that children and youth learn by performing their schoolwork, housework, and occupational work practices on a daily basis also contribute to one of the four functions of health status (Ward, 2009).

Routine habits of health (Ubbes, 2008) have been hypothesized as five healthful behaviors that are known to increase health status: 1) physical activity, exercise, and play; 2) food, beverages, and nutrients; 3) sleep and quiet time; 4) relationships; 5) safety and hygiene. Routine habits of mind (Ubbes, 2008) have been hypothesized as five cognitive skills that lead to the practicing of healthful behaviors: 1) decision making, 2) goal setting, 3) communication, 4) conflict resolution, and 5) stress management. When the

Habits of Health and Habits of Mind© model (Ubbes, 2008) is practiced on a daily basis in an integrated and consistent way, an individual may increase one's health status. As a cognitive-behavioral curriculum, the Habits of Health and Habits of Mind© model (Ubbes, 2008) may lead to acquisition of procedural memory when children and youth practice one habit of health with one habit of mind through trial and error until automaticity is attained (Ubbes, 2008). Little is known about the level of cognitive effort and motivation needed when children and youth practice multiple health habits in tandem with and without environmental supports from school, home, and community. The literature is replete with high-risk behavior data for middle school and high school students (U.S. CDC, 2017). Few studies are available to promote the multiple health habits that collectively make up a healthy lifestyle for children and youth.

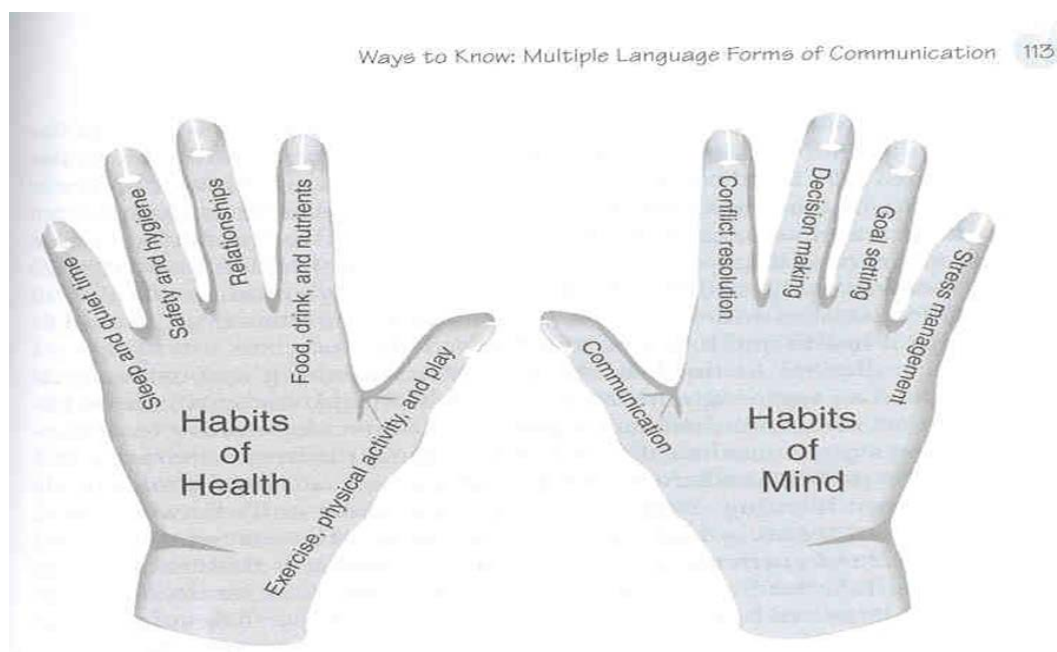


Figure 4.1 Habits of health and habits of mind.

### Figure 1. The Habits of Health and Habits of Mind© Model

The main purpose of the study was to validate the Habits of Health and Habits of Mind© model (Ubbes, 2008) to determine how one or more healthful behaviors can be used to characterize the daily routines of healthy youth. Through factor analyses, we investigated whether the different habit of health behaviors organized by subscales could detect differences among 7th grade youth from two different midwestern states. We hypothesized these associations should theoretically exist based on the literature, then sought to explore the robustness of the habits of health model. The habits of health model is one-half of the Habits of Health and Habits of Mind© model (Ubbes, 2008) with the former focused on health behaviors

and the latter focused on cognitive skills. We specifically examined differences and associations between habits of health and the participants' gender, perceived health, and multiple health behaviors.

This study provides an empirical test of the conceptual model outlined in Figure 1. The first hypothesis was that the Habits of Health Scale (HHS) items would show acceptable factorial validity. The second hypothesis was the habits of health factors would demonstrate high criterion validity, or the sensitivity of a measure to detect appropriate differences and associations that theoretically should exist. More specifically, the HHS factors were expected to differ based on participants' gender, perceived health, perceived academic success, Body Mass Index (BMI), and multiple health behaviors.

## 2. Methods

### 2.1 Participants

Seventh graders (n=105) were recruited from two health education classrooms in Indiana and Ohio through teacher partnerships. All study procedures were approved by the Institutional Review Board of the university. Parental informed consent and youth assent were completed prior to all study procedures. Participating youth were asked to complete a 15-minute paper-and-pencil questionnaire targeting their health-related habits and lifestyle health behaviors. Incentives to the teachers included classroom and gymnasium enhancement gifts, such as sport equipment and stationary bicycles.

### 2.2 Instruments

Participating youth self-reported their age, gender, perceived academic performance, perceived health, and height and weight. Classroom teachers reported youth ethnicities and grade-levels. Perceived academic performance and perceived general health were assessed on a 6-point Likert scale, ranging from "Very poor" (1) to "Excellent" (6). Perceived academic performance was assessed by asking youth, "Overall, how well do you think you do in school?", and perceived health was measured by asking, "Overall, how would you rate your general health?". Height and weight scores were converted into body mass index (BMI;  $\text{weight (kg)/[height (m)]}^2$ ) by using BMI norm-referenced growth standards by age and gender. Youth were categorized as normal weight or at-risk for overweight (85th percentile) or obesity (95th percentile) (Kuczmarski et al., 2010).

The next two sections describe the assessments used to measure youth self-reported health behaviors and youth self-reported health habits.

#### Youth Self-Reported Health Behaviors

*Physical Activity and Sedentary Activity.* Physical activity was defined to youth as "Any activity that gets your arms and legs moving fast enough to increase your heart rate and make you sweat". Examples included "running, brisk walking, rollerblading, biking, skateboarding, dancing, swimming, soccer, basketball, football, volleyball, and other types of physically demanding activities, like mowing the lawn". Youth were then asked to report the number of days they perform 60 minutes of physical activity

during a typical week. Sedentary time was assessed by asking youth: “On average, how many hours per day do you watch television or movies?”, which was calculated into daily television minutes prior to statistical analyses. Finally, weekday sleep was assessed by asking youth, “How many hours do you usually sleep on school nights?”, which was calculated into daily minutes prior to analyses.

*Fruit and Vegetable and Soda Intake.* Based on recommendations outlined in the *Dietary Guidelines for Americans* (U.S. Department of Health and Human Services, 2005), youth were first asked to report their daily intake of fruit and vegetables in serving sizes. Youth responded to two separate questions regarding fruit and vegetable consumption: “How many servings of fruits and vegetables do you usually eat each day?” A serving of fruit was described to participants as “One medium piece of fresh fruit, ½ cup of fruit salad, ¼ cup of raisins, apricots, or other dried fruit, 6 ounces of 100% orange, apple, or grape juice (do not count fruit punch, lemonade, Gatorade, Sunny Delight or fruit drink)”. A serving of vegetable was described to participants as “One medium carrot or other fresh vegetable, 1 small bowl of green salad, ½ cup of fresh or cooked vegetables, or ¾ cup of vegetable soup (do not count French fries, onion rings, potato chips, fried tempura or fried okra)”. Youth also reported their daily intake of soda consumption with the question, “How many cans or bottles of soda pop do you usually drink each day?”.

*Alcohol and Smoking Tobacco.* In three separate questions, youth reported their previous experience with alcohol and cigarette smoking. Youth were asked “Have you ever consumed alcohol?”, and “Have you ever tried cigarette smoking, even one or two puffs?”. Participating youth responded either “Yes” or “No” to both questions.

#### Youth Self-Reported Health Habits.

Participating youth responded to 25 items that focused on five health habits: physical activity, nutrition, safety, hygiene, and relationships. For each question, youth were asked to “*please circle only one answer that agrees or disagrees with how you feel about your health*”. Youth then responded on a 5-point Likert scale, ranging from “*Strongly Disagree*”, (1) to “*Strongly Agree*”, (5). Table 1 provides the exploratory factor analysis of all scale items.

#### *2.3 Factorial Validity*

All analyses were performed with IBM SPSS (Version 23.0). Factorial validity was examined with an Exploratory Factor Analysis (EFA). EFA outcomes were used to guide the determination of the number and manner of factors accounting for the variation or covariation among habits of health items (Brown, 2006). The EFA was performed using a Principal Axis Factor (PAF) extraction method followed by direct oblique (oblimin) rotation. This rotation method was used due to hypothesized correlations among the underlying factor structures of youth’s health habits. The number of components retained was estimated using three criteria: (1) Kaiser’s (Kaiser 1961) retention of factors with unrotated eigenvalues >1.0, (2) Cattell Screen Test (Cattell, 1966) and (3) factor loadings exceeding .40 (Gorsuch, 1983). Internal consistency reliability for each subscale was estimated using Cronbach’s alpha and split-half internal

consistency coefficients. Next, the criterion validity of the emerging Habits of Health latent factors was examined.

#### 2.4 Criterion Validity

Analyses were used to test the sensitivity of the habits of health factors revealed in the EFA. Specifically, we examined subgroup mean differences and associations based on youth demographics and health behaviors. ANOVA F-test was used to test subgroup differences. Due to low subgroup sample sizes, significance for mean difference tests was set at  $p < 0.10$ . When necessary, pairwise comparisons were completed using Tukey's HSD post hoc analyses with Bonferroni correction ( $0.10/n=3$ ;  $=P < 0.03$ ). Criterion validity was also examined via multiple linear regression with a significance level of  $p < 0.05$ . Following preliminary tests, only significant covariates were included in final analyses.

### 3. Result

#### 3.1 Description of the Sample

Participating youth ( $n=105$ ; 50% female) had a mean age of 13.38 ( $SD=0.55$ ), including 7th graders (95%) and 8th graders (5%) attending middle school in either Ohio (25%) or Indiana (75%). Youth included in analyses were predominantly Caucasian (>95%) and 39% were overweight/obese (BMI percentile>85). The Mean (M) and Standard Deviation (SD) of youth's perceived health was 4.47 ( $SD=1.06$ ). On average, youth reported their perceived academic success as 4.50 ( $SD=1.05$ ). The youth's average daily intake of fruits and vegetable servings was 5.96 ( $SD=4.93$ ), and the average daily intake of soda was 5.35 ( $SD=1.74$ ). Youth reported 120.00 minutes of physical activity weekly ( $SD=70.60$ ) and 466.86 ( $SD=89.61$ ) minutes of sleep during a typical week day.

#### 3.2 Factorial Validity

As hypothesized, habits of health were best explained as being multidimensional. The PAF analysis of the initially tested 24-item measurement model extracted 6 factors with eigenvalues  $> 1.0$ , paralleling both practical and theoretical reasoning. Five items were dropped due to factor loadings  $< 0.40$  on all identified factors. The items dropped included: "I can take a bath or shower every day to keep clean"; "I know to wash my hands throughout the day to avoid people's germs"; "I tend to eat packaged foods from the grocery store at lunch"; "I enjoy eating cereal with milk for breakfast or as a snack"; and, "I am happy with my body size". All other items had factor loadings exceeding 0.40 on only 1 of the 6 emerging factors, meeting all statistical criteria and accounting for approximately 59.38% of the variability among the final 19 items.

Table 1 shows results of the EFA. The first factor identified habits related to home relationships, which was captured with 6 items; overall, youth reported a Mean of 4.58 ( $SD=0.67$ ). Factor 2 was defined by habits that recognized youth's perception of their friendships by age and gender consisting of 3 items ( $M=4.11$ ,  $SD=0.81$ ). Factor 3 was identified by 2 items for habits related to fruit and vegetable

consumption ( $M=3.76$ ,  $SD=1.14$ ). Factor 4 was identified by 2 items for physical activity habits ( $M=4.15$ ,  $SD=0.98$ ). The fifth factor represented youth's perceptions of relationships within the school setting with 2 items ( $M=3.74$ ,  $SD=1.01$ ). Factor 6 was identified by 4 items, conceptualized as prevention habits for safety and hygiene ( $M=4.11$ ,  $SD=0.71$ ). Internal consistency was high for the entire 19-item questionnaire ( $\alpha=0.86$ ), ranging between 0.63 and 0.86 for the 6 subscales. Split-half internal consistency method was also employed to determine reliability, resulting in 0.72 for all 19-items (equal-length Spearman-Brown,  $n=105$ ); and coefficients were high among subscales, ranging between 0.61 and 0.82.

**Table 1. Habits of Health Scale: Exploratory Factor Analysis (EFA); N=105**

	<u>Habit of Health Identified Subscales</u>					
	<b>Home Relationships</b>	<b>Age &amp; Gender Friends</b>	<b>Fruit &amp; Vegetable Nutrition</b>	<b>Physical Activity</b>	<b>School Relationships</b>	<b>Safety Hygiene</b>
I feel close to at least one person in my life.	<b>.845</b>	.113	.109	.283	.004	.003
I know at least one person I can talk to.	<b>.765</b>	.077	.081	.363	.067	.038
I have friends I can trust.	<b>.642</b>	.394	.082	.052	-.031	.111
I can trust at least one person in my life with a secret.	<b>.578</b>	.223	-.104	-.071	.111	.076
I am close with at least one family member.	<b>.709</b>	.114	.235	.106	.336	-.008
I can count on my family to help me when I have a problem.	<b>.654</b>	.163	.194	.170	.374	.135
I have more friends than most kids my age.	.098	<b>.724</b>	-.035	.060	.252	.006
I have lots of friends who are girls and/or boys.	.234	<b>.631</b>	-.014	.241	.090	-.077
I like my social life.	.319	<b>.687</b>	.142	.026	.052	.173
I like to eat more than two fruits a day.	.135	.041	<b>.765</b>	.229	-.017	.227
I like to eat more than two vegetables a day.	.088	.042	<b>.809</b>	.186	.090	.144
I like to make time to play outside every day.	.188	.228	.211	<b>.815</b>	.145	.089
I prefer to move around and get lots of exercise.	.281	.069	.239	<b>.568</b>	.192	.044
I like the people I go to school with.	.117	.048	.038	.153	<b>.499</b>	.103
I think my classmates like what I share during class.	.169	.317	.020	.031	<b>.838</b>	.142
I know to wear a seatbelt when in the car.	-.043	.053	.032	-.014	.144	<b>.513</b>
I like to brush my teeth at least twice a day.	.161	.153	.103	.261	.226	<b>.414</b>
I know to wash my hands before I handle food.	.186	-.001	.197	.303	-.140	<b>.562</b>
I know I should wear my helmet every time I ride my bike, rollerblades, skateboard, or scooter.	.050	-.113	.394	-.185	.111	<b>.559</b>
<b>Eigenvalue</b>	6.125	2.286	1.650	1.338	1.238	1.018

<b>Percent Variance</b>	30.412	9.927	6.767	4.983	4.243	3.042
<b>Skewness (Standard Error)</b>	-2.419	-.734	-1.106	-.766	-.574	-.899
	(.236)	(.236)	(.240)	(.236)	(.237)	(.239)
<b>Kurtosis (Standard Error)</b>	7.137 (.467)	-.331	.730	-.275	-.326	1.169
		(.467)	(.476)	(.467)	(.469)	(.474)

### 3.3 Criterion Validity

The first tests of criterion validity examined potential mean differences in habits of health subscales based on weight status, perceived health, and perceived academic success. There were no significant covariates. Youth with a normal BMI reported higher physical activity habits than overweight or obese youth (Mean Difference (MD)=0.47,  $p=0.02$ ). Youth who perceived excellent health ( $n=21$ ) reported higher physical activity habits than youth with very poor to average health (MD=1.01,  $p=0.00$ ). Youth with excellent health also reported higher fruit and vegetable habits (MD=0.47,  $p=0.01$ ) ( $M=4.81$ ) compared to youth in good to very good health and youth in very poor to average health (MD=1.21,  $p=0.01$ ). Compared to youth with good to very good academic success, those reporting excellent academic success had higher fruit and vegetable habits (MD=0.84,  $p=0.01$ ) and higher safety and hygiene habits (MD=0.43,  $p=0.02$ ). Table 2 illustrates differences in health habits based on gender and whether or not youth reported previously trying alcohol or smoking tobacco. There were no differences based on gender. Compared to their counterparts, preventive safety and hygiene habits were higher among youth who never tried alcohol (MD=0.44,  $p=0.00$ ) and never tried smoking tobacco (MD=0.42,  $p=0.01$ ).

Outcomes of criterion validity tests via multiple linear regression are shown in Table 3. The model to predict youth's BMI was significant ( $R^2_{adj}=0.12$ ,  $p=0.02$ ) with no significant covariates. Unique significant influences on youth's BMI included home relationship habit ( $\beta=0.28$ ,  $p=0.02$ ) and physical activity habit ( $\beta=0.38$ ,  $p=0.00$ ). The perceived health variable was significant ( $R^2_{adj}=0.14$ ,  $p=0.01$ ) with no significant covariates. Perceived health was significantly influenced by physical activity habit ( $\beta=0.35$ ,  $p=0.01$ ). The academic success model was also significant ( $R^2_{adj}=0.18$ ,  $p=0.00$ ), including significant influences from gender as a covariate ( $\beta=0.30$ ,  $p=0.00$ ) and youth's preventive health habit as measured by hygiene and safety ( $\beta=0.24$ ,  $p=0.03$ ).



**Table 2. Mean Differences in Health Habits by Gender and Behavioral Influences**

	n (%)	Home Relationship Habit		Age and Gender Friends Habit		Fruit and Vegetable Habit		Physical Activity Habit		School Relationship Habit		Safety and Hygiene Habit	
		Mean (SEM)	*p	Mean (SEM)	*p	Mean (SEM)	*p	Mean (SEM)	*p	Mean (SEM)	*p	Mean (SEM)	*p
<b>Gender</b>													
Female	47 (51%)	4.49 (.13)		3.84 (.16)		4.22 (.19)		3.92 (.24)		3.59 (.20)		4.32 (.14)	
Male	46 (49%)	4.67 (.11)	.72	4.39 (.13)	.18	4.36 (.16)	.94	3.98 (.20)	.78	3.96 (.17)	.79	4.15 (.12)	.13
<b>Tried Alcohol</b>													
No	69 (72%)	4.56 (.08)		4.04 (.10)		4.15 (.11)		3.71 (.14)		3.81 (.12)		4.25 (.08)	
Yes	27 (28%)	4.61 (.13)	.72	4.22 (.16)	.33	4.14 (.18)	.94	3.84 (.23)	.64	3.45 (.20)	.13	3.81 (.13)	<b>.00</b>
<b>Tried Smoking</b>													
No	78 (80%)	4.57 (.08)		4.06 (.09)		4.16 (.11)		3.79 (.13)		3.71 (.12)		4.21 (.07)	
Yes	19 (20%)	4.62 (.15)	.75	4.26 (.19)	.34	4.09 (.21)	.77	3.61 (.27)	.54	3.71 (.23)	.99	3.79 (.15)	<b>.01</b>

SEM=standard error of the mean. Bold indicates statistical significance at  $p\text{-value}\leq .10$ . Significant covariates included were perceived health (1 to 6 Likert scale).

**Table 3. Association of Youth Self-Reported Health Habits and Youth Self-Reported Health Behaviors**

	Home Relationship Habit		Age and Gender Friends Habit		Fruit and Vegetable Habit		Physical Activity Habit		School Relationship Habit		Safety and Hygiene Habit	
	$\beta$	* <i>p</i>	$\beta$	* <i>p</i>	$\beta$	* <i>p</i>	$\beta$	* <i>p</i>	$\beta$	* <i>p</i>	$\beta$	* <i>p</i>
n=105												
Body mass index	<b>.280</b>	<b>.024</b>	-.019	.871	.201	.100	<b>.375</b>	<b>.002</b>	-.142	.225	.172	.158
Health status	.002	.987	.098	.392	-.053	.646	<b>.351</b>	<b>.003</b>	-.011	.918	.120	.276
Academic success	-.051	.669	-.041	.713	.001	.990	.151	.189	-.059	.585	<b>.240</b>	<b>.027</b>
Daily FV Servings	-.110	.378	-.028	.813	<b>.382</b>	<b>.002</b>	.044	.711	-.058	.610	.010	.930
Daily Soda Can Intake	-.063	.592	.059	.596	.090	.427	-.219	.056	<b>.370</b>	<b>.001</b>	<b>-.366</b>	<b>.001</b>
Weekly PA Days	-.092	.403	.051	.624	<b>.245</b>	<b>.021</b>	<b>.341</b>	<b>.002</b>	<b>.241</b>	<b>.018</b>	-.161	.108
Daily TV Hours	<b>-.270</b>	<b>.032</b>	.036	.760	.098	.408	-.210	.082	.121	.288	-.138	.221
Weekday Sleep Minutes	.213	.102	-.011	.927	.115	.350	<b>-.260</b>	<b>.039</b>	.114	.334	.080	.490

FV=fruit and vegetable intake; PA=physical activity; TV=television.

Bold indicates statistical significance at  $p$ -value<.10. All models were adjusted for gender, age, and school location.

Specific to youth's self-reported health behaviors, the physical activity model was significant ( $R^2$ adj=0.30,  $p$ =0.00) with no significant covariates. Significant predictors of participants' weekly physical activity included fruit and vegetable health habit ( $\beta$ =0.25  $p$ =0.02), physical activity habit ( $\beta$ =0.34,  $p$ =0.00) and school relationship habit ( $\beta$ =0.24,  $p$ =0.02). The fruit and vegetable model was also significant with no covariates ( $R^2$ adj=0.10,  $p$ =0.03), including youth's fruit and vegetable health habits as a significant predictor ( $\beta$ =0.38,  $p$ =0.00). The daily television model with no covariates was also significant ( $R^2$ adj=0.10,  $p$ =0.03), demonstrating youth's home relationship habits as having a significant,

inverse relationship ( $\beta=-0.27, p=0.03$ ). The weekday sleep minutes model with no covariates was not significant overall ( $R^2_{adj}=0.03, p=0.26$ ); however, youth's physical activity habit demonstrated a significant, inverse relationship ( $\beta=-0.26, p=0.04$ ) with their weekday sleep minutes. The model to predict participants' daily soda intake was significant ( $R^2_{adj}=0.21, p=0.00$ ), including positive influence from participants' age ( $\beta=0.28, p=0.00$ ) and school relationships habit ( $\beta=0.32, p=0.00$ ) and an inverse relationship with youth's safety and hygiene habits ( $\beta=-0.37, p=0.00$ ).

#### 4. Discussion

This is the first study to explore the validity of the Habits of Health and Habits of Mind© model (Ubbes, 2008) which focuses on multiple health behaviors and cognitive skills working together for daily routines of health. Results of this study lay the groundwork for future studies to identify how cognitive skills in the habits of mind model may co-join with health behaviors to form daily routines for health. Two types of daily health routines important to this study were safety and hygiene habits. In the current study, perceived academic performance was significantly associated with safety and hygiene habits. The mean differences in safety and hygiene habits were significant if youth reported ever trying alcohol or ever trying smoking. Therefore, the preventative habits of safety and hygiene are key behaviors to teach in school environments. Youth who practice safety and hygiene habits on a consistent basis are associated with not trying alcohol and tobacco substances and having a higher perceived academic performance. These current findings on academic performance are supported by previous literacy research showing that safety habits (e.g., wearing sunscreen) and hygiene habits (e.g., regular dental check-ups) were positively associated with reading attitudes and reading behaviors (Zullig, Ubbes, & Mann, 2013).

Health literacy is a key determinant of health and an indicator of educational status. Lower-than-average literacy among youth is related to more risk-taking behaviors (Dewalt & Hink, 2009). Fourteen-year-old youth with lower literacy levels are more likely to use alcohol and tobacco (Hawthorne, 1997) and for boys, smoke tobacco (Conwell, O'Callaghan, Andersen, Bor, Najman, & Williams, 2003), than those youth with higher literacy levels. For eight countries participating in the European Health Literacy Survey (Kickbusch, Pelikan, Apfel, & Tsouros, 2013), the higher the health literacy, the higher the frequency of physical exercise. Physical exercise was found to be the highest and most consistent indicator of health literacy when including smoking, alcohol, and body mass index as determinants of health.

In the current study, youth's perceived health status was significantly influenced by the physical activity habit and body mass index. Youth who indicated weekly physical activity days had significantly associated intakes of daily fruit and vegetable servings. Youth's physical activity habits were inversely associated with weekday sleep minutes. Because physical activity is associated with several health behaviors in the habits of health model, youth should be encouraged to be physically active as a key

indicator of their health status.

Results of the exploratory factor analysis also showed that social relationships had three dimensions, including a home relationship habit, a school relationship habit, and an age and gender friendship habit. Youth who reported “feeling close to at least one person in my life” resulted in the highest exploratory factor of .845. Also for the home relationship habit, “knowing at least one person I can talk to” and “being close with at least one family member” loaded as .765 (second highest exploratory factor) and .709 (third highest exploratory factor), respectively. For the school relationship factor, youth who reported “I think my classmates like what I share during class” resulted in an equally high exploratory factor of .838 (second highest exploratory factor in the whole EFA model). These findings are significant toward social support models and the value of family and school involvement in youth development (Foster, Horwitz, Thomas, Opperman, Gipson, Burnside, Stone, & King, 2017).

Parent caregiving behaviors, both positive and negative, are known to influence health and literacy of teenagers (Kennedy-Hendricks, Schwarts, Thornton, Griffin, Green, Kennedy, Burkhauser, Pollack, 2015) by playing “a critical role in their children’s health by providing food, shelter and care; teaching children about healthy eating; creating opportunities for physical activity; and molding children’s understanding of health and related behavioral norms”. Other studies (Zullig, Ubbes, & Mann, 2013) have shown that youth practice fewer preventative health habits, e.g., regular dental check-ups and wearing sunscreen, when they indicate difficulties reading a survey, exhibit negative attitudes toward reading, do not read outside of school, or do not see a parent or caregiver reading every day or one day of the past two days.

Several limitations can be highlighted with this study. Subjects were mostly Caucasian from two health education classrooms in two midwestern schools from two different states. Due to the small sample size, Type II errors may exist in our analysis. A larger sample size is needed to show differences between groups and increase our variability.

## **5. Conclusions**

Continuous development of robust measurement scales will enhance the understanding of how children and youth practice healthy habits and daily health routines on a consistent basis. This study investigated construct validity and criterion validity of the Habits of Health Scale (Ubbes, 2008) among seventh grade youth who self-reported their health behaviors. More validation studies are needed to quantify and conceptualize the cognitive skills outlined in the habits of mind model which is the other component of the Habits of Health and Habits of Mind© model. Models are inherently linked to measurement of health behavior (Redding, Rossi, Rossi, Velicer, & Prochaska, 2000, p. 180). Future research should include structural equation modeling and be longitudinal in scope to determine how health behaviors and cognitive skills form an integrative curriculum model for children and youth of different ages.

Implications for school health are warranted. This study sought to conceptualize and measure five daily health habits of youth. Multiple health habits were associated with perceived general health (e.g., physical activity), perceived academic performance (e.g., safety and hygiene), school relationships (e.g., daily soda can intake, physical activity), fruit and vegetable intake (e.g., weekly physical activity days), and safety and hygiene (e.g., daily can of soda intake, ever tried tobacco, ever tried alcohol). School health education curricula should focus yearly instruction on multiple health behaviors and not reduce learning time on the preventive habits of hygiene and safety since those behaviors mediated whether youth had ever tried tobacco, ever tried alcohol, or drank a daily soda in this study—which are all negative behaviors for this age group. Focusing on multiple prevention behaviors by comparing habits by time and frequency may help youth build upon and sustain daily health routines and patterns. For example, physical activity showed a high association with perceived general health and other health habits (e.g., fruit and vegetable intake), so physical activity behavior remains a critical action for youth when establishing and practicing lifestyle patterns. Teachers need to show the interrelationships of healthy habits in routines of daily living rather than focusing on one instructional unit at a time. Habits of health were all significant in the current conceptual model, which now strengthens the need for validation of the cognitive skills that make up the habits of mind model. In the future, a psychometric study focusing on the habits of mind model (e.g., decision making, goal setting, communication, conflict resolution, and stress management) should be conducted to determine if these specific cognitive skills are significantly associated with youth's perceived general health status and perceived academic performance.

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