Reliability and Predictive Validity of the Adaptive Health Behavior Inventory (AHBI): Adaptive Health Behavior Differences by Gender and Age

By

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Abstract

*Objective***:** Describe research demonstrating that the Adaptive Health Behavior Inventory (AHBI) can detect and predict a range of adaptive health behavior differences between men and women and as adults age. *Methodology*: A cross-sectional analysis of AHBI response data collected from four surveys of adults at different times and geographies (Sample 1: 2001 national telephone-mail survey, n = 20,685) and three online surveys conducted in 2017 and 2018 (Sample 2: Baltimore–Washington DC, n = 2,002; Sample 3: Atlanta, Georgia, n = 2,000); Sample 4: Cincinnati, Ohio, n = 2,000). *Analysis*: Logistic regression assessed AHBI predictive effects identifying male versus female status controlling for age. Multiple regression assessed the AHBI predictive effects in identifying adaptive health behavior differences associated with aging controlling for sex. *Results*: The overall R^2, χ^2, and odds ratios for all four logistic regression analyses were statistically significant predicting gender: Sample 1, $\chi^2(1, 21) = 183.7$, $p < .001$, $R^2 = .16$; Sample 2, $\chi^2(1, 21) = 42.4$, $p < .001$, $R^2 = .31$; Sample 3, $\chi^2(1, 21) = 28.7$, $p < .001$, $R^2 = .23$; Sample 4, $\chi^2(1, 21) = 28.7$, $p < .001$, $R^2 = .23$. The mean R^2 for gender across all four samples represents a mean effect size of $F^2 = .30$. Sixty percent (60%) of AHBI measures demonstrated some predictive reliability identifying gender differences. The overall R^2, F, and β coefficients for all four multiple regression analyses were statistically significant predicting age: Sample 1, $F(1, 21) = 183.7$, $p < .001$, $R^2 = .16$; Sample 2, $F(1, 21) = 42.4$, $p < .001$, $R^2 = .31$; Sample 3, $F(1, 21) = 28.7$, $p < .001$, $R^2 = .23$; Sample 4, $F(1, 21) = 38.5$, $p < .001$, $R^2 = .29$. The mean R^2 of Samples 2 through 4 was .26, represents a mean effect size of $F^2 = .35$. Like with gender, sixty percent (60%) of AHBI measures demonstrated predictive reliability identifying lower or higher age. *Discussion & Conclusions*: Multiple measures within the AHBI demonstrate good and excellent predictive reliability in discriminating between women and men as well as younger versus older adults based on differences in adaptive health behavior.

The paper has two purposes: first, to describe research demonstrating that the Adaptive Health Behavior Inventory (AHBI) can detect and predict a range of adaptive health behavior differences between men and women over time and across geographies; second, to describe research showing that the AHBI measures also capture consistent changes in a number of adaptive health behaviors over time and geography as adults age.

Adaptive Health Behavior

Adaptive health behavior is a person's behavioral response to health-related contexts, primarily driven by autonomous motivations (Hagger, Hardcastle, Chater, Mallett, & Chatzisarantis, 2014), consistent with the concept of contextual adaptation (Pollock, 2013). The adaptive nature of behavior is determined by the interaction of the individual and situation (Cutler & Glaeser, 2005) where short-term benefits may override potential long-term benefits in behavioral choices (Hall & Fong, 2007). While society may define certain behaviors as maladaptive to health (Sirois & Kitner, 2015; Conklin, Cassiello-Robbins, Brake, Sauer-Zavala, Farchione, Ciraulo et al., 2015; Gilmour & Williams, 2012) an individual may "choose" maladaptive behaviors as optimally adaptive based on temporal-situational factors, affective preferences, limitations of self-regulatory capacity, and habits (Hall & Fong, 2010).

Adaptive Health Behavior Inventory (AHBI)

The Adaptive Health Behavior Inventory (AHBI) (Navarro, 2006) is a language-based assessment of intrinsically motivated (Deci & Ryan, 2010) adult behavioral response to a number of different health-related contexts. Supported by semantics of action research (Cesario, Plaks, Hagiwara, Navarrete, & Higgins, 2010; Gennari, MacDonald, Postle, & Seidenberg, 2007; Lindemann, Stenneken, van Schie, & Bekkering, 2006; Lyons, Mattarella-Micke, Cieslak, Nusbaum, Small, & Beilock, 2010), response patterns to AHBI items represent goal-directed actions, behaviors, and beliefs around health and healthcare. These responses are shaped by differences in intrinsic motivation in accord with a person's preferences, dislikes, and their percep-

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tions of their own physical and mental capabilities relative to everyday health-related situations.

Gender and Adaptive Health Behavior

Gender differences, distinct from biological-driven sex differences, are those that are socially or culturally driven (APA, 2010). There are known gender differences, in some cases motivated by sex differences, in health-related behavior and how women and men adapt to health. Women seek healthcare at a higher rate than men (Thompson, Anisimowicz, Miedema, Hogg, Wodchis, & Aubrey-Bassler, 2016), have higher utilization of health care, generate higher medical expenditures compared to men (Bertakis, Azari, Helms, Callahan, & Robbins, 2000; NCHS-CDC, 2001; Tudiver & Talbot, 1999), are more likely to receive health care after seeking it (Li, Cai, Glance, & Mukamel, 2007) and influence more men to seek health care versus the reverse (Norcross, Ramirez, & Palinkas, 1996). Women engage in health information seeking at a higher rate than men (Hallyburton & Evarts, 2014; Manierre, 2015) and show more interest in nutritional information than men (Berning, Chouinard, Manning, McCluskey, & Sprott, 2010; Grunert, Fernández-Celemín, Wills, Genannt Bonsmann, & Nureeva, 2010). Women prefer and are more involved in health care decision-making for themselves (Arora & McHorney, 2000; Levinson, Kao, Kuby, & Thisted, 2005) and for their families (Matoff-Stepp, Applebaum, Pooler, & Kavanagh, 2014). Men, however, are more physically active than women (Pate, Ross, Liese, & Dowda, 2015; Troiano, Berrigan, Dodd, Mâsse, Tilert, & McDowell, 2008; Trost, Owen, Bauman, Sallis, & Brown, 2002).

Aging and Adaptive Health Behavior

Adult health-related behavior changes as adults age. Engagement in leisure time physical activity drops with increasing age (CDC, 2018; Milanović, Pantelić, Trajković, Sporiš, Kostić, & James, 2013). This contributes to reductions in health (Jackson, Sui, Hébert, Church, & Blair, 2009), increase in disease burden (Dall, Gallo, Chakrabarti, West, Semilla, & Storm, 2013) and increasing health care costs (Anderson & Hussey, 2000; Janssen, 2012). Among cancer patients, aging has been linked to decreased health information seeking from medical sources with no effects associated with health information seeking from non-medical sources (Turk-Charles, Meyerowitz, & Gatz, 1997). Increased frailty and disability associated with aging has been associated with greater malnutrition (Volkert, 2013). Finally, advancing age has been linked to deficits in decision-making (Finucane, Slovic, Hibbard, Peters, Mertz, & MacGregor, 2002) and the participation of and greater reliance on family members (Deimling, Smerglia, & Barresi, 1990; Prohaska & Glasser, 1996).

Hypotheses

Gender. Several AHBI measures were hypothesized to capture differences in adaptive health behavior between men and women:

Hypothesis 1- Health Care Seeking: Agreement with AHBI-8, "I only seek help from doctors or therapists when I am really sick because it is too expensive," and AHBI-12, "I do not seek help from doctors unless I am very sick or injured," are hypothesized to predict male versus female status.

Hypothesis 2 - Health Information Seeking: Agreement with AHBI-1, "I look for health information so that I can choose from different healthcare treatments," was hypothesized to predict female versus male status.

Hypothesis 3 - Health Care Decision-Making: Agreement with AHBI-6, "Someone else close to me makes health care decisions for the family," and AHBI-14, "When I get sick, I count on others close to me to tell me where I should go and who I should see," are hypothesized to predict male versus female status.

Hypothesis 4 - Attention to Nutrition and Diet. Agreement with AHBI-11, "I am always on the lookout for information about nutrition and healthy diet," is hypothesized to predict female vs. male status.

Hypothesis 5 - Physical Activity Level: Agreement with AHBI-5, "I often play in active or competitive sports," are hypothesized to predict male versus female status.

Age. Specific AHBI measures were hypothesized to capture difference in adaptive health behavior associated with aging.

Hypothesis 6 - Health Information Seeking: Agreement with AHBI-1, "I look for health information so that I can choose from different healthcare treatments," was hypothesized to not vary with age.

Hypothesis 7 - Health Care Decision-Making: Agreement with AHBI-6, "Someone else close to me makes health care decisions for the family," and AHBI-14, "When I get sick, I count on others close to me to tell me where I should go and who I should see," were hypothesized to predict older versus younger age.

Hypothesis 8 - Attention to Nutrition and Diet. Agreement with AHBI-11, "I am always on the lookout for information about nutrition and healthy diet," is hypothesized to predict younger versus older age.

Hypothesis 9 - Physical Activity Level: Agreement with AHBI-5, "I often play in active or competitive

sports," is hypothesized to younger versus older age.

Methodology

A cross-sectional analysis of data collected from several surveys of adults was used for this research. The use of multiple data sets permitted the evaluation of AHBI predictive effects on gender and age over time and across different adult populations.

Participants

The AHBI responses, gender, and age data came from four different data sets. The first data set (Sample 1) included responses from 20,685 adults from a national survey conducted in the year 2001 using a combined telephone-mail survey methodology. The next three datasets came from three different online surveys of adults conducted in 2017 and 2018 residing in the Baltimore–Washington DC (Sample 2, n = 2,002); Atlanta, Georgia (Sample 3, n = 2,000), and Cincinnati, Ohio (Sample 4, n = 2,000) metropolitan areas. The first data set was compiled by a national research company; the three more recent data sets were created by an online research firm and sponsored by three major health care systems serving the different geographic regions.

Measures

Gender and Age. Participant gender was based on self-reported responses to the question, "What is your sex?" In Samples 1 and 4 responses were coded as "1" equals "male" and "2" equals female." In Samples 2 and 3 responses were coded as "1" equals "females" and "2" equals "males." For all analyses, females were recoded as "1" and males were recoded as "0".

Age was measured two ways. In the 2001 national survey, respondents were asked, "What is your current age?" and read ranges from "18 to 20, 21 to 24, 25 to 29" and so on, and asked to identify the correct range. In the more recent online surveys, respondents were asked, "What is your current age?" and recorded as a two-digit number.

Adaptive Health Behavior Inventory (AHBI). The AHBI is an inventory of an adult's interpretation of his or her behavioral response to health-related contexts outside of any specific health condition or disease, and outside of any specific health care setting such as a hospital or doctor's office. The content of the AHBI is summarized in Figure 1. A five-point Likert scale (1 = strongly disagree, 2 = somewhat disagree, 3 = neutral or neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree) is used to assess the degree to which each AHBI statement reflects an adult's motivated action, behavior, attitude, or belief in relation to the described health-related context or situation. Responses to AHBI items are treated as reflecting the meaning and motivation of an adult's adaptive health behavior preferences or biases in the contexts described.

Figure 1
Adaptive Health Behavior Inventory (AHBI) Summary

Variables	Content Summary
AHBI1	I look for health information so that I can choose…
AHBI2	If doctors and hospitals advertised their prices, I would...price
AHBI3	When it comes to my health, I rarely plan ahead…
AHBI4	I have tried to save money…
AHBI5	I often play in active or competitive…
AHBI6	Someone else…makes health care decisions for family
AHBI7	I like being the one to decide...family health care
AHBI8	I only seek help from doctors or therapists...too expensive.
AHBI9	Members of my family…
AHBI10	If I had to be hospitalized, I would compare…
AHBI11	I am always on the look-out for information...nutrition
AHBI12	I do not seek help from doctors…
AHBI13	Most doctors and nurses are not as good…
AHBI14	When I get sick, I count on others…
AHBI15	If my family has average health...satisfied
AHBI16	I try...top physical shape
AHBI17	Doctors often try new drugs on their patients…
AHBI18	If doctors in my area charged different fees, I would never…
AHBI19	When I get sick, I do what my parents…
AHBI20	I make my own health care decisions

Analytic Approach

Logistic regression analysis was used to assess predictive differences of AHBI responses based on participant's gender. Logistic regression highlights the probability of one outcome over another, where the outcome is a bivariate choice (Tabachnick & Fidell, 2007). The effects of the AHBI items and age in predicting female versus male status was expressed as odds ratios (Tabachnick & Fidell, 2007), where odds ratios less than 1.0 indicate "males" and odds ratios greater than 1.0 indicate "females".

Multiple regression analysis was used to assess the predictive differences in AHBI responses based on participant's age. Multiple regression seeks to ex-

plain the variance in a dependent variable accounted for by a set of predictors (Pedhazur, 1982; Tabachnick & Fidell, 2007). For the more recent online surveys, participant's stated raw age was used as the dependent variable. For the 2001 national study data, each age range was criterion scaled (Pedhazur, 1982) creating a new variable, *age-crit*. Both raw age and age-crit were the dependent variables regressed on the AHBI response data and self-reported gender. The effects of the AHBI items and gender were represented by beta coefficients (Pedhazur, 1982), where negative beta coefficients indicate lower age and positive beta coefficients indicate higher age.

Evaluating Predictive Reliability

The predictive reliability of AHBI items relative to gender differences was assessed using the following rules:

Excellent = Statistically significant and consistent odds ratios, either greater or less than 1.0, over time and across all geographies.
Good = Statistically significant and consistent odds ratios, either greater or less than 1.0, either over time, or across all geographies.
Fair = Statistically significant and consistent odds ratios, either greater or less than 1.0, either over time, or across at least two geographies.
Poor = Statistically significant odds ratios at one time or in one geography.
Fail = non-significant odds ratios across all four samples.

The predictive reliability of AHBI items in predicting age differences was assessed using the following rules:

Excellent = Statistically significant and consistent negative or positive beta coefficients over time and across all geographies.
Good = Statistically significant and consistent negative or positive beta coefficients either over time, or across all geographies.
Fair = Statistically significant and consistent negative or positive beta coefficients either over time, or across at least two geographies
Poor = Statistically significant negative or positive beta coefficients at one time or in one geography.
Fail = non-significant beta coefficients across all four samples.

All analyses were conducted using NCSS 12 Statistical Software (2018) at $p < .001$. In spite of this strict *p*-value, the large number of statistical tests needed to evaluate AHBI response data relationships to gender and age, potentially in excess of 180 separate tests, required a consideration of the family-wise error rate (Breheny, January 25).

Results

The age ranges of adults varied between the different samples. For Sample 1, the age ranges captured were from 18 to 84 or more; for Sample 2, the age range varied from 20 to 90 years old; for Sample 3 the ages varied from 35 to 89, and for Sample 4 the ages varied from 18 to 90 years old.

Descriptive Statistics

Mean scores for all AHBI items, age, and percentage of females across all four samples is shown in Table 1. Consistent with the lower age limit in Sample 3 of 35, the mean age in Sample 3 of participants was highest and the standard deviation was narrower. Within each sample differences in mean age between males and females were evaluated with *t*-tests and found to be statistically significant. This is reported in Table 2.

Differences between the percentages of males and females and mean age between the samples were not tested because AHBI relationships to age and gender were examined in each sample independent of the other samples.

Age and Gender Associations. With the exception of Sample 1, the association of age and gender showed statistically significant negative correlations: Sample 1, $t(20{,}638) = 8.12$, $p < .005$, $\rho_{(rho)} = .06$, Sample 2, $t(2{,}000) = 9.36$, $p < .005$, $\rho_{(rho)} = -.21$, Sample 3, $t(1{,}998) = 7.65$, $p < .005$, $\rho_{(rho)} = -.17$, Sample 4, $t(1{,}998) = 6.16$, $p < .005$, $\rho_{(rho)} = -.13$. Given these associations the effects of age and gender were controlled for when examining the relationship between AHBI items and either demographic dependent variable.

Logistic Regression and Gender Differences

The overall R^2, χ^2, and odds ratios for all four logistic regression analyses are reported in Table 3. All were statistically significant: Sample 1, $\chi^2(1, 21) = 183.7$, $p < .001$, $R^2 = .16$; Sample 2, $\chi^2(1, 21) = 42.4$, $p < .001$, $R^2 = .31$; Sample 3, $\chi^2(1, 21) = 28.7$, $p < .001$, $R^2 = .23$; Sample 4, $\chi^2(1, 21) = 28.7$, $p < .001$, $R^2 = .23$. The mean R^2 for gender across all four samples represents an average effect size of $F^2 = .30$, closer to a large versus a medium effect size

Table 1

Descriptive Statistics

Variables	Sample 1*		Sample 2		Sample 3		Sample 4	
AHBI	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
AHBI_1	3.27	1.01	3.58	1.06	3.60	1.05	3.59	1.02
AHBI_2	2.82	1.12	3.25	1.23	3.51	1.20	3.38	1.21
AHBI_3	3.09	1.19	2.58	1.23	2.75	1.29	2.89	1.26
AHBI_4	2.38	1.20	2.87	1.29	3.17	1.28	2.94	1.25
AHBI_5	2.52	1.27	2.16	1.29	2.03	1.32	2.07	1.27
AHBI_6	2.08	1.16	1.75	1.02	1.78	1.08	1.85	1.12
AHBI_7	3.46	1.05	3.68	1.02	3.83	1.05	3.82	1.02
AHBI_8	2.91	1.27	2.66	1.29	3.10	1.38	3.18	1.32
AHBI_9	3.51	1.18	3.30	1.19	3.52	1.21	3.40	1.21
AHBI_10	3.08	1.19	3.11	1.27	3.24	1.28	3.27	1.30
AHBI_11	3.46	1.12	3.57	1.08	3.62	1.10	3.57	1.07
AHBI_12	3.62	1.19	2.85	1.35	3.30	1.36	3.39	1.31
AHBI_13	2.64	0.95	2.45	1.08	2.62	1.14	2.54	1.13
AHBI_14	2.23	1.18	2.06	1.08	2.09	1.13	2.20	1.18
AHBI_15	3.27	1.16	2.79	1.11	2.94	1.16	3.09	1.13
AHBI_16	3.68	0.96	3.47	1.07	3.54	1.11	3.46	1.06
AHBI_17	2.85	1.07	2.86	1.16	3.39	1.17	3.18	1.19
AHBI_18	3.01	1.05	2.79	1.03	2.87	1.10	2.86	1.09
AHBI_19	2.87	1.14	2.87	1.14	3.02	1.19	3.20	1.13
AHBI_20	4.32	0.84	4.35	0.84	4.44	0.89	4.50	0.80
Age	44.0	16.1	50.0	16.1	56.1	11.8	51.1	15.3
Female %	54.5		62.7		57.8		66.3	
n	20,685		2,002		2,000		2,000	

*Age-crit

(Wuensch, 2015).

Sixty percent (60%) of AHBI measures demonstrated various levels of predictive reliability identifying gender differences. Six of the 20 AHBI measures (30%) demonstrated excellent or good predictive reliability; an additional six (30%) demonstrated fair predictive reliability. Two AHBI measures had excellent predictive reliability in identifying gender differences: AHBI -5, "I regularly play in active or competitive sports," consistently predicted lower odds of being female; AHBI-11, "I am always on the look-out for information about nutrition and healthy diet," consistently predicted statistically significant higher odds of being female. Three AHBI measures showed good predictive reliability: AHBI-6, "Someone else close to me makes health care decisions for the family," was associated with statistically significant lower odds of being female. In comparison, AHBI-17, "Doctors often try new drugs on their patients without knowing all the effects," and AHBI-19, "When I get sick, I do what my parents used to do for me," were associated with statistically significant greater odds of being female.

Multiple Regression and Age Differences

The overall R^2, F, and β coefficients for all four multiple regression analyses are reported in Table 4. All were statistically significant: Sample 1, $F(1, 21) = 183.7$, $p < .001$, $R^2 = .16$; Sample 2, $F(1, 21) = 42.4$, $p < .001$, $R^2 = .31$; Sample 3, $F(1, 21) = 28.7$, $p < .001$, $R^2 = .23$; Sample 4, $F(1, 21) = 38.5$, $p < .001$, $R^2 = .29$. The smaller squared multiple correlation associated with Sample 1 could be accounted for by the reduced variance in age-crit. The mean R^2 of Samples 2 through 4. which used actual age. was .26, represents an average effect size of $F^2 = .35$, representing a large effect size (Wuensch, 2015).

As with gender, sixty percent (60%) of AHBI measures demonstrated various levels of predictive reliability identifying lower or higher age. Three AHBI measures demonstrated excellent predictive reliability indicating lower age: AHBI-2, "If doctors and hospitals advertised their prices, I would certain-

Table 2

T-Tests: Mean Age Differences by Gender Across Samples

	Sample 1			Sample 2			Sample 3			Sample 4		
	n	*M(SD)*	*p*	*n*	*M(SD)*	*p*	*n*	*M(SD)*	*p*	*n*	*M(SD)*	*p*
Gender												
Female	11,738	44.8(16.4)	***	1,255	47.5(15.7)	***	1,156	54.5(11.4)	***	1,325	49.7(15.1)	***
Male	8,947	42.9(15.7)		747	54.1(15.9)		844	58.4(11.9)		675	54.0(15.3)	
Total *n*	20,685			2,002			2,000			2,000		

***$p < .001$

Table 3
Logistic Regression: AHBI Items Predicting Gender Controlling for Age

	Sample 1[a]		Sample 2		Sample 3		Sample 4		Predictive
	Odds	*p*	Odds	*p*	Odds	*p*	Odds	*p*	Reliability
Constant	0.40	***	0.03	*ns*	0.74	*ns*	5.24	*ns*	
Age	1.00	*ns*	1.00	*ns*	0.97	***	0.96	***	Fair
AHBI_1	1.21	***	1.09	*ns*	1.15	*ns*	1.12	*ns*	Poor
AHBI_2	0.88	***	0.92	*ns*	0.80	***	0.90	*ns*	Fair
AHBI_3	0.95	***	0.95	*ns*	1.01	*ns*	0.85	***	Fair
AHBI_4	0.98	*ns*	0.98	*ns*	1.03	*ns*	0.94	*ns*	Fail
AHBI_5	0.66	***	0.75	***	0.66	***	0.58	***	Excellent
AHBI_6	0.79	***	0.87	*ns*	0.82	***	0.78	***	Good
AHBI_7	1.22	***	1.17	*ns*	1.03	*ns*	1.05	*ns*	Poor
AHBI_8	1.08	***	1.13	*ns*	1.09	*ns*	1.08	*ns*	Poor
AHBI_9	0.84	***	0.91	*ns*	1.00	*ns*	0.91	*ns*	Poor
AHBI_10	0.94	***	0.91	*ns*	0.98	*ns*	0.96	*ns*	Fail
AHBI_11	1.44	***	1.40	***	1.48	***	1.39	***	Excellent
AHBI_12	0.86	***	1.01	*ns*	0.92	*ns*	1.02	*ns*	Poor
AHBI_13	0.93	***	0.99	*ns*	1.03	*ns*	0.95	*ns*	Poor
AHBI_14	0.81	***	0.79	***	0.85	*ns*	0.91	*ns*	Fair
AHBI_15	1.09	***	1.01	*ns*	1.00	*ns*	0.97	*ns*	Poor
AHBI_16	1.01	*ns*	1.04	*ns*	1.00	*ns*	0.99	*ns*	Fail
AHBI_17	1.17	***	1.08	*ns*	1.22	***	1.19	***	Good
AHBI_18	1.00	*ns*	0.96	*ns*	1.04	*ns*	1.04	*ns*	Fail
AHBI_19	1.23	***	1.27	***	1.11	*ns*	1.18	***	Good
AHBI_20	1.25	***	1.14	*ns*	1.27	***	1.19	*ns*	Fair
R^2	0.15		0.09		0.13		0.15		
χ^2	4328.7	***	234.1	***	313.2	***	394.9	***	
% correctly classified	68.9		64.5		67.2		69.9		

***$p < .001$

[a] = Age-crit

ly shop more by price," AHBI-5, "I often participate in active or competitive types of exercise," and AHBI-19, "When I get sick, I do what my parents used to do for me," were consistently associated with statistically significant negative beta coefficients over time and across all geographies. One additional AHBI measure, AHBI-9, "Members of my family take care of their own health," showed excellent predictive reliability in predicting higher age demonstrated by statistically significant positive beta coefficients over time and across all geographic samples.

Two AHBI measures demonstrated good predictive reliability indicating lower age: AHBI-8, "I only seek help from doctors or therapists when I am really sick because it is too expensive," had statistically significant negative beta coefficients over time and across two geographies. AHBI-14, "When I get sick, I count on others close to me to tell me where I should go and who I should see," demonstrated statistically significant negative beta coefficients across the three geographic samples but not over time.

Six additional AHBI measures demonstrated fair predictive reliability relative to age.

Family-Wise Error

The large total number of tests, $c = 188$, yielded a family-wise error rate of $p_{family} = .17$, meaning that there was a 17% chance of at least one Type I error among all the tests.

Discussion

Consistent with prior research, several AHBI items identified significant differences in adaptive health behavior between women and men and associated with aging. After controlling for gender and age, several hypotheses were supported. Looking first at the prediction of gender, Hypothesis 1 Health Care Seeking was supported. Agreement with AHBI-8, "I only seek help from doctors or therapists when I am really sick because it is too expensive," and AHBI-12, "I do not seek help from doctors unless I am very sick or injured," showed good and fair reliability, respectively, in predicting men vs. women, con-

Table 4

Multiple Regression: AHBI Items Predicting Age Controlling for Gender

	Sample 1[a]		Sample 2		Sample 3		Sample 4		Predictive
	β	*p*	*β*	*p*	*β*	*p*	*β*	*p*	Reliability
Constant	0.00	***	0.00	***	0.00	***	0.00	***	
Gender (female)	0.00	*ns*	-0.25	***	-0.20	***	-0.20	***	
AHBI_1	0.01	*ns*	0.04	*ns*	0.04	*ns*	0.00	*ns*	Fail
AHBI_2	-0.07	***	-0.12	***	-0.18	***	-0.09	***	Excellent
AHBI_3	0.02	*ns*	-0.06	**	-0.03	*ns*	-0.10	***	Fair
AHBI_4	0.08	***	0.01	*ns*	0.05	*ns*	0.05	*ns*	Poor
AHBI_5	-0.22	***	-0.20	***	-0.19	***	-0.22	***	Excellent
AHBI_6	-0.02	*ns*	-0.06	*ns*	-0.06	*ns*	-0.07	*ns*	Fail
AHBI_7	-0.03	***	0.03	***	-0.06	*ns*	-0.05	*ns*	Fair
AHBI_8	-0.07	***	-0.14	***	-0.06	*ns*	-0.11	***	Good
AHBI_9	0.11	***	0.10	***	0.14	***	0.14	***	Excellent
AHBI_10	0.03	***	0.00	*ns*	-0.02	*ns*	-0.03	*ns*	Poor
AHBI_11	0.03	***	-0.02	*ns*	-0.01	*ns*	-0.04	***	Fail
AHBI_12	-0.05	***	-0.07	*ns*	-0.08	***	-0.05	*ns*	Fair
AHBI_13	-0.01	*ns*	-0.02	*ns*	0.01	*ns*	-0.10	***	Poor
AHBI_14	-0.02	*ns*	-0.10	***	-0.12	***	-0.11	***	Good
AHBI_15	0.08	***	0.02	*ns*	0.03	*ns*	-0.04	*ns*	Poor
AHBI_16	0.14	***	0.04	*ns*	0.06	*ns*	0.08	***	Fair
AHBI_17	0.02	*ns*	0.01	*ns*	-0.05	*ns*	0.04	*ns*	Fail
AHBI_18	0.09	***	0.04	*ns*	0.08	***	0.04	*ns*	Fair
AHBI_19	-0.19	***	-0.17	***	-0.12	***	-0.14	***	Excellent
AHBI_20	-0.03	***	-0.01	*ns*	-0.04	*ns*	0.00	*ns*	Poor
R^2	0.16		0.31		0.23		0.29		
F	183.7	***	42.4	***	28.7	***	38.5	***	

****p* < .001

[a] = Age-crit

sistent the literature identifying women as more frequent users of health care (Thompson et al., 2016; Bertakis et al., 2000; NCHS-CDC, 2001). Hypothesis 2 Health Information Seeking was also weakly supported. Agreement with AHBI-1, "I look for health information so that I can choose from different healthcare treatments," predicted women over men but demonstrated poor reliability across samples. Hypothesis 4 Attention to Nutrition and Diet, however, was firmly supported. AHBI-11, "I am always on the lookout for information about nutrition and healthy diet," demonstrated excellent reliability in predicting women over men also consistent with the literature (Berning et al., 2010; Grunert et al., 2010). Hypothesis 3 Health Care Decision-Making was also sustained. AHBI-6, "Someone else close to me makes health care decisions for the family," showed good reliability in predicting men over women in line with the literature identifying women as the primary healthcare decision makers for the family (Matoff-Stepp et al., 2014). In addition, AHBI-14, "When I get sick, I count on others close to me to tell me where I should go and who I should see," demonstrated fair reliability in predicting men over women, consistent with prior research showing greater female involvement in health-related decisions (Arora & McHorney, 2000; Levinson et al., 2005). Finally, Hypothesis 4 Physical Activity Level was also supported. Agreement with AHBI-5, "I often play in active or competitive sports," had excellent reliability in predicting men over women in line with past research (Pate et al., 2015; Troiano et al., 2008; Trost et al., 2002).

Considering adaptive health behavior differences associated with aging some of the hypothesized relationships were supported while others were not. Hy-

pothesis 6 predicting no relationship between Health Information Seeking and aging was supported. Agreement with AHBI-1, "I look for health information so that I can choose from different healthcare treatments," failed to identify differences by age consistent with the literature (Turk-Charles et al., 1997). Hypothesis 7 Health Care Decision-Making was not supported. Agreement with AHBI-6, "Someone else close to me makes health care decisions for the family," failed to discriminate between younger versus older adults. Also, agreement with AHBI-14, "When I get sick, I count on others close to me to tell me where I should go and who I should see," contrary to predicting older versus younger adults, demonstrated good reliability in predicting younger versus older adults. While not consistent with the research showing the greater reliance on others and family among the extreme elder (Deimling et al., 1990; Prohaska & Glasser, 1996), it is consistent with research showing young adult interdependence with parents relative to important emotional and societal issues (Lahelma & Gordon, 2008), certainly applicable to health-related decisions when ill. Relative to aging, Hypothesis 8 Attention to Nutrition and Diet was not supported. Agreement with AHBI-11, "I am always on the lookout for information about nutrition and healthy diet," failed to consistently predict older versus younger adults. In Sample 1 agreement with AHBI-11 predicted older adults while in Sample 4 it predicted younger adults. Finally, Hypothesis 9 Physical Activity Level was strongly supported. Agreement with AHBI-5, "I often play in active or competitive sports," showed excellent reliability in predicting younger compared to older adults over time and across geographies in line with prior research (CDC, 2018; Milanović et al., 2013).

Conclusions

Multiple measures within the AHBI demonstrate good and excellent predictive reliability in discriminating between women and men based on differences in reported adaptive health behavior. Likewise, multiple measures of the AHBI demonstrate good and excellent predictive reliability in identifying younger versus older adults based on changes in adaptive health behavior associated with aging.

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