Everyday Cognition, Control Beliefs, and Preventive Health Behaviors

Lisa C. McGuire, Heiner Maier, Sherry L. Willis, Paige E. Goodwin, & Joanne L. Tosti-Vasey

The Pennsylvania State University
Gerontology Center
105 Henderson Building South
University Park, PA 16802

Running Head: PREVENTIVE HEALTH BEHAVIORS

Abstract

The relation among cognitive abilities, everyday problem solving, control beliefs, and health behaviors was examined. Participants were 209 older adults (n=180 females and n=29 males) with a mean age of 79.34 years (SD=5.75) and a mean of 11.87 years of education (SD=2.79). In 1986, participants' cognitive abilities (Inductive Reasoning, Figural Relations, Verbal Ability, and Perceptual Speed) were measured, while control beliefs (*Personality-in-Intellectual-Aging Contexts Inventory*; PIC) were assessed in 1989. In 1991, participants' everyday cognitive competence was measured via the *Everyday Problem Solving Test* (EPT). In 1993, the *Penn State Health Behavior Questionnaire* (HBQ), a 44 item questionnaire that assesses self-perceptions of health status, self-reported health status, and self-reported health practices, was completed by participants. The present examination focused on the following four health behavior domains: Positive Nutritional Behaviors, Health Maintenance Activities, Medical Check-up Behaviors, and Substance Use. LISREL path models were calculated controlling for participants' Age, Education, and Health Status. The EPT positively predicted Positive Nutrition Behaviors and Health Maintenance Activities. Health Status negatively predicted Positive Nutritional Behaviors. Health Status and Inductive Reasoning predicted Medical Check-up Behaviors. Age and Anxiety beliefs were associated with lower Substance Use.

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For younger adults, health behaviors have been shown to effect health status by delaying the onset of illness and attenuating the trajectory of most chronic illnesses (Belloc & Breslow, 1979; Breslow & Engstrom, 1980). However, the relation between health behaviors and health status is less clear for older adults (Branch & Jette, 1984; Brown & McCreedy, 1986; Palmore, 1970; Wiley & Camacho, 1980). Positive health behaviors are intentional behaviors such as exercise, maintaining an optimal body weight, and not smoking, have been found to be related to positive health outcomes, including longevity, in older adults (Palmore, 1970). The association between health behavior and health status may be weaker in later life than in young adulthood (Branch & Jette, 1984; Brown & McCreedy, 1986) even though older adults tend to engage in more preventive health behaviors than younger adults (Belloc & Breslow, 1979; Harris & Guten, 1979; Steele & McBroom, 1972). Normative biological changes associated with aging undoubtedly complicate the relation between behavior and status. The present investigation examined cognitive abilities, everyday cognition, and control beliefs as predictors of health practices in older adults, while controlling for the effects of Age, Education, and Health Status.

Prior research and theoretical considerations led us to the assumption that predictor variables for health behaviors should be ordered in the following sequence: Personal Variables (Age, Education, & Health Status), cognitive abilities, everyday cognition, and control beliefs. Personal variables have been shown to be related to cognitive abilities. Research has consistently demonstrated that Age, Education, and Health Status predict performance on tasks of cognitive abilities (e.g., Marsiske, Willis, Goodwin, & Maier, 1992; Willis, Marsiske, & Diehl, 1991). Cognitive abilities have been shown to predict everyday cognitive competence, but the reverse relationship is not true (e.g., Ceci & Liker, 1986; Goodwin & Willis, 1992; Marsiske et al., 1992; Willis & Schaie, 1986; Willis, Jay, Diehl, & Marsiske, 1992; Willis et al., 1991). In addition, cognitive abilities predicted later control beliefs, but the reverse relationship also was not significant (Lachman & Leff, 1989; Willis et al., 1992). Everyday cognition has been found to predict subsequent control beliefs; however, control beliefs do not predict later performance on everyday cognition (e.g., Willis et al., 1992; Willis et al., 1991). The present investigation examined the relation among cognition (both everyday cognition and mental abilities), control beliefs, and health practices.

Relation Among Health Behaviors and Health Status, Cognition, and Control Beliefs

Mechanic and Cleary (1980) have proposed two competing hypotheses to explain concurrent association between health behaviors and health status. The selection hypothesis postulates that less healthy individuals are less likely to perform positive health behaviors due to their physical and psychological limitations. The effects hypothesis states that individuals with poor health practices increase their physical and psychological susceptibility to illness and disease. The majority of the research examining both health behaviors and health status have been conceptualized within the effects hypothesis (e.g., Mechanic & Cleary, 1980; Stephens, 1986). The present investigation conceptualizes the relation between health behavior and health status from the selection hypothesis framework with health status considered as a predictor of health behaviors.

Health status has provided a consistent explanation for age-related declines in cognitive functioning (e.g., Felton & Reverson, 1990; Perlmutter & Nyquist, 1990). Much of the research examining the relation between health and cognition has investigated health status and health behaviors as predictors of cognitive functioning (e.g., Field, Schaie, & Leino, 1988; Goodwin & Willis, 1992; Lawton, 1987; Perlmutter & Nyquist, 1990; Salthouse, Kausler, & Saults, 1990). However, cognition has been rarely examined as a predictor of health behaviors. We believe that a moderate level of everyday cognitive competence is a prerequisite for at least some health routines (e.g., understanding a nutritional food label) as they contain cognitive components. Knowledge about potential health hazards and beneficial health routines must be acquired, processed, and translated into appropriate preventive health behaviors. Thus, we expect that carrying out preventive health behaviors will be facilitated by cognitive functioning.

Maier, McGuire, and Willis (1994) investigated everyday competence as a predictor of health behaviors and health status. They reported that everyday cognitive competence was associated with more Positive Nutritional Behaviors and more positive Health Maintenance Activities. Cognitive abilities have also been shown to be related to the health outcome of mortality in older adults (Tosti-Vasey, Goodwin, & Willis, 1993).

Preventive health behaviors may be of particular value to older adults for maintaining health and a sense of control over their lives (Seeman & Seeman, 1983). Control beliefs were studied in addition to cognitive variables as potential factors that may affect personal health practices. Control beliefs about the effectiveness of

health practices may incline individuals to engage in those practices (Prohaska, Leventhal, Leventhal, & Keller, 1985; Rakowski, Julius, Hickey, & Halter, 1987; Royak-Schaler & Maloney Alt, 1994). Wallston and Wallston (1982) demonstrated that the belief that one has control over one's future health and illness was related to preventive health behaviors. Individuals who feel greater control may take greater responsibility for undertaking preventive health practices (Amir, 1987).

The purpose of the present investigation was two-fold. First, the relative influence of basic abilities, everyday cognition, and control beliefs as potential predictors of four health behaviors (Positive Nutritional Behaviors, Health Maintenance Activities, Medical Check-up Behaviors, & Substance Use) were investigated within the selection hypothesis framework. Second, the potential effects of Age, Education, Health Status thought to be related to everyday cognition (Marsiske et al., 1992), cognitive abilties (Marsiske et al., 1992), and health behaviors (Prohaska et al., 1985) were explored.

Several hypotheses were made. We hypothesized that Age, Education, and Health Status would be related to health practices (Belloc & Breslow, 1979; Harris & Guten, 1979; Steele & McBroom, 1972). It was hypothesized that individuals with higher levels of cognition would engage in more preventive health behaviors, after Age, Education, and Health Status were statistically controlled (Maier et al., 1994). Specifically, everyday cognition was hypothesized to be a better predictor of older adults' health practices than the cognitive abilties. After controlling for Age, Education, Health Status, Abilities, and everyday cognition, it was hypothesized that individuals with higher scores on the internal control beliefs subscales would participate in more health-promotive health behaviors (Amir, 1987; Prohaska et al., 1985; Rakowski et al., 1987; Royak-Schaler & Maloney Alt, 1994; Wallston & Wallston, 1982).

Method

Sample

Participants in this study were part of a larger on-going study of adult cognitive development, the Adult Development and Enrichment Project (ADEPT). Participants were 209 community-dwelling older adults, 180 females and 29 males, from the Central Pennsylvania Region. Their age range in 1993 was 66 to 94 years (M=79.34, SD=5.75), and their years of education ranged from 0 to 22 years (M=11.87, SD=8.76).

Materials and Procedure

Five categories of measures were administered in the present investigation. Participants' cognitive abilities were assessed in 1986, while control beliefs were measured in 1989. The personal background information and a measure of everyday cognitive competence were assessed in 1991; health behavior and health status measures were administered in 1993.

Cognitive Abilities were measured using an ability battery used in previous ADEPT research (e.g., Goodwin & Willis, 1992; Marsiske et al., 1992; Willis & Schaie, 1986; Willis et al., 1992; Willis et al., 1991). The abilities explored in the present investigation were inductive reasoning, figural relations, perceptual speed, and verbal ability. Inductive Reasoning (Induction) was examined by using the Letter Series test (Thurstone, 1962) and Word Series test (Schaie, 1985) in which participants identified patterns in novel arrays of letters and digits. Figural Relations (Figural) was measured using the Culture Fair Test (Scale 2, Form A Cattell & Cattell, 1961), Power Matrices (Scale 3, Form A Cattell & Cattell, 1963; Form B Cattell & Cattell, 1961), and ADEPT Figural Relations Diagnostic (Plemons, Willis, & Baltes, 1978) by having participants identify patterns of abstract figural stimuli. Perceptual Speed (Speed) is an index of an individual's ability to rapidly process and visually discriminate among figural and digital stimuli and was assessed using Findings As (Ekstrom, French, Harman, & Derman, 1976), Identical Pictures (Ekstrom et al., 1976), and Number Comparison (Ekstrom et al., 1976). Verbal ability (Verbal) was assessed using multiple-choice tests designed to measure recognition vocabulary (Ekstrom et al., 1976; Thurstone, 1962), in which participants selected the word that most closely means the same thing as the target word from a series of distractor words. Within each ability, factor scores were calculated and used in the subsequent analyses.

Personality-in-Intellectual-Aging Contexts Inventory (PIC; Lachman, 1983) was used to measure participants' domain specific control beliefs regarding their cognitive functioning. The PIC consists of six subscales. The Internal subscale examines the degree to which an individual believes that he/she can modify and/or maintain their intellectual capacities. The Powerful Others subscale assesses the degree to which an individual is dependent or reliant on other people when involved in an intellectual task due to the belief that others can carry out those tasks better. The Chance subscale measures an individual's reliance upon the belief

that nothing can be purposefully done to preserve and/or modify their intellectual functioning in later life. The Achievement Motivation subscale examines the perceived importance and meaning of intellectual competence. The Anxiety subscale measures negative affective reactions to intellectually demanding tasks. The Attitude Toward Own Aging subscale assesses the degree of perceived change in intellectual competence with age. Higher scores on internal and achievement scales are indicative of one's belief that their functioning can be maintained or improved throughout life and that they desire to remain competent. Higher scores on chance, powerful others, anxiety, and attitudes scales are indicative of perceived decline relative to past and higher concern and anxiety associated with decline.

Everyday Problems Test (EPT; Willis & Marsiske, 1993) was used to assess adults' cognitive competence to reason and to solve problems associated with daily living. The EPT assesses everyday problem solving with regard to the seven domains of instrumental activities of daily living (IADL; Lawton & Brody, 1969): Health and Medication Use, Meal Preparation, Phone Usage, Shopping and Consumerism, Financial Management, Household Management, and Transportation. For each domain, the participant is presented with a printed stimulus (e.g., prescription drug label, bus schedule) and two problems are posed related to the stimulus item. The version of the measure used in this study contained 84 items. The total score for the EPT was calculated as the sum of the items answered correctly.

Penn State Health Behavior Questionnaire (HBQ) is a new instrument developed to assess health behaviors and health-related issues in adults. The HBQ was mailed to participants and completed in their homes. The response rate for this survey was 75.5%. The HBQ is comprised of 86 items with different response formats (multiple-choice, open-ended, and rating scale formats). Prior research identified the following seven health factors (Maier, McGuire, & Willis, 1994): Substance Use, Positive Nutritional Behaviors, Medical Check-up Behaviors, Health Maintenance Activities, Positive Health Perception, Health Status, and High Blood Pressure. A confirmatory factor analysis approach (Jöreskog & Sörbom, 1989) was chosen to achieve simple structure in the factor pattern matrix (most items loading on only one factor) and to account for factor intercorrelations ($X^2[21]=234.01$, $p < 0.01$). A brief description of the HBQ items by factor are found in Table 1 with their corresponding factor loadings. Although some loadings are of low magnitude, all factor loadings were

significantly ($p < 0.01$) different from zero. A substantive interpretation of the hypothesized seven health factors is given in Table 2.

Insert Tables 1 & 2 about here

Health factor intercorrelations are displayed in Table 3. Inspection of Table 3 shows that only five of 21 correlations were not significantly ($p < 0.05$) different from zero. Although health factors were related, the correlations were on average moderate in magnitude (ranging from $r = 0.01$ to $r = 0.51$). This indicated that health factors were sufficiently distinct and that they should be treated as separate constructs.

Insert Table 3 about here

The present investigation examined predictors of the following "behavioral" health practices as the dependent variables: Positive Nutritional Behaviors, Health Maintenance Activities, Medical Check-up Behaviors, and Substance Use. In addition, the Health Status factor was used as predictor of these health practices. Orthonormalized factors scores were calculated for each of the "behavioral" health practices and for Health Status and were used in the following analyses.

Results

To examine the relation among the dependent health behavior variables and the predictor variables (Personal Variables, Abilities, EPT, & PIC), Pearson product-moment correlation coefficients were calculated. The correlation matrix is reported in Table 4.

Insert Table 4 about here

The analyses of the data were conducted in two steps. A series of hierarchical regression models were first calculated to examine Personal Variables (Age, Education, & Health Status), cognitive abilities, EPT, and

PIC, as predictors of the four dependent Health Behavior variables (Positive Nutritional Behaviors, Health Maintenance Activities, Medical Check-up Behaviors, and Substance Use). Significant predictors resulting from hierarchical regression analyses were retained, and path models were computed for each of the four health practice variables. The regression models will first be described, followed by the resulting path models.

Hierarchical Regression Analyses

Four regression models were conducted examining the relation between health behaviors and Personal Variables, Abilities, EPT, and PIC. In a first model (Model 1), Personal Variables were treated as predictors of four health behavior factors. In a second model (Model 2), the Personal Variables and Abilties were treated as predictors of the health behavior factors. In a third model (Model 3), Personal Variables, Abilities, and EPT, were examined as predictors of the four health behavior factors. In a fourth model (Model 4), Personal Variables, Abilities, EPT, and PIC were examined as predictors of the four health behavior factors. Standardized regression coefficients are reported below.

Positive Nutritional Behaviors. Hierarchical regression analyses indicated that in Models 1 and 2 Health Status negatively was related to Positive Nutritional Behaviors ($b = -.157$, $p < 0.05$; $b = -.167$, $p < 0.05$) as shown in Table 5. Health Status was a negative predictor of Positive Nutritional Behaviors, while EPT was a positive predictor of Positive Nutritional Behaviors in both Models 3 and 4 (Model 3: $b = -.172$, $p < 0.05$; $b = .257$, $p < 0.01$, respectively; Model 4: $b = -.181$, $p < 0.05$; $b = .230$, $p < 0.01$, respectively). The inclusion of Personal Variables, Abilities, EPT, and PIC as predictors slightly increased the amount of variance in Positive Nutritional Behaviors accounted for in Model 1 from 3% to 12% in Model 4.

Insert Table 5 about here

Health Maintenance Activities. Hierarchical regression analyses indicated that Age, Education, and Health Status were not significantly related to Health Maintenance Activities as shown in Table 6. The EPT was a positive predictor of Health Maintenance Activities in Model 3 ($b = .172$, $p < 0.05$). In Model 4, the PIC Attitudes toward aging subscale negatively predicted Health Maintenance Activities ($b = -.235$, $p < 0.05$), while

EPT was no longer a significant predictor. The inclusion of Personal Variables, Abilities, EPT, and PIC as predictors slightly increased the amount of variance in Health Maintenance Activities accounted for in Model 1 from 3% to 11% in Model 4.

Insert Table 6 about here

Medical Check-up Behaviors. Hierarchical regression analyses indicated that in Model 1 Health Status negatively was related to Medical Check-up Behaviors (b = -.235, p < 0.01) as shown in Table 7. Health Status was a negative predictor of Medical Check-up Behaviors, while Induction was a positive predictor of Medical Check-up Behaviors in both Models 3 and 4 (Model 3: b = -.243, p < 0.001; b = .254, p < 0.05, respectively; Model 4: b = -.243, p < 0.001; b = .259, p < 0.05, respectively). Health Status and Speed were negative predictors of Medical Check-up Behaviors (b = -.230, p < 0.01; b = -.168, p < 0.05, respectively), while Induction was positively related to Medical Check-up Behaviors (b = .253, p < 0.05). The inclusion of Personal Variables, Abilities, EPT, and PIC as predictors slightly increased the amount of variance in Medical Check-up Behaviors accounted for in Model 1 from 7% to 13% in Model 4.

Insert Table 7 about here

Substance Use. Hierarchical regression analyses indicated that in Model 1 Age negatively was related to Substance Use (b = -.199, p < 0.01) as shown in Table 8. Age was a negative predictor of Substance Use, while Induction was a positive predictor of Substance Use in both Models 2 and 3 (Model 2: b = -.224, p < 0.01; b = .244, p < 0.05, respectively; Model 3: b = -.242, p < 0.01; b = .260, p < 0.05, respectively). In Model 4, Age and PIC Anxiety subscale were negative predictors of Substance Use (b = -.227, p < 0.01; b = -.216, p < 0.05, respectively), while Induction was positively related to Substance Use (b = .252, p < 0.05). The inclusion of Personal Variables, Abilities, EPT, and PIC as predictors slightly increased the amount of variance in Substance Use accounted for in Model 1 from 7% to 15% in Model 4.

Insert Table 8 about here

Path Models

A series of LISREL models were investigated. Path models were developed to include significant predictors of health behaviors as identified in the hierarchical regression analyses. Path (*beta*) coefficients were estimated using LISREL VII (Jöreskog & Sörbom, 1989) allowing exogenous-endogenous and within-endogenous relationships to be specified simultaneously. The path models were estimated following two steps. First, a fully recursive model was estimated in which all exogenous variables were predictors for all endogenous variables. Second, the final model was estimated excluding nonsignificant paths (p > 0.05) from the fully recursive model.

Predictors of Positive Nutritional Behaviors. The first path model examined the relation of Health Status and EPT as predictors of Positive Nutritional Behaviors. As shown in Figure 1, both direct and indirect paths between Health Status and Positive Nutritional Behaviors were observed. Positive Nutritional Behavior was also directly and positively predicted by the EPT (b = .244, p < 0.001). The direct effect of Health Status on Positive Nutritional Behavior was negative (b = -.178, p < 0.01), while a nonsignificant indirect effect of Health Status was positive and mediated through EPT (b = .037, p > 0.05).

Insert Figure 1 about here

Predictors of Health Maintenance Activities. The second path model examined the relation of EPT and PIC Attitudes subscale as predictors of Health Maintenance Activities, as illustrated in Figure 2. A direct and positive path was found between EPT and Health Maintenance Activities (b = .183, p < 0.01). Higher EPT performance was predictive of more positive Attitudes toward intellectual aging (b = .305, p < 0.001), but Attitudes did not predict Health Maintenance Activities directly or indirectly.

Insert Figure 2 about here

Predictors of Medical Check-up Behaviors. The third path model examined the relation of Health Status and cognitive abilties as predictors of Medical Check-up Behaviors. As shown in Figure 3, Health Status was found to be both a direct and indirect predictor of Medical Check-up Behaviors. The direct effect of Health Status on Medical Check-up Behaviors was negative (b = -.243, $p < 0.001$), while a nonsignificant indirect effect of Health Status was mediated through Induction and was positive (b = .030, $p > 0.05$). In addition, Induction had a direct path to Medical Check-up Behaviors (b = .210, $p < 0.01$).

Insert Figure 3 about here

Predictors of Substance Use. The final path model involved Age, cognitive abilties, and PIC as predictors of Substance Use. As shown in Figure 4, Age showed a direct and negative path to Substance Use (b = -.192, $p < 0.05$). Substance Use was also negatively predicted by PIC Anxiety (b = -.189, $p < 0.01$). Substance Use was related to lower Anxiety, while the nonsigificant indirect effect of Induction on Substance Use was mediated through the PIC Anxiety subscale (b = .070, $p > 0.05$).

Insert Figure 4 about here

Discussion

The present investigation examined the effects of Personal Variables, Abilities, EPT, and PIC on four domains of health practices. The EPT predicted Positive Nutrition Behaviors, while Health Status negatively predicted Positive Nutritional Behaviors. Higher everyday cognitive competence was associated with more Health Maintenance Activities. Medical Check-up Behaviors were predicted by Health Status and Inductive Reasoning. Substance Use was negatively predicted by Age and PIC Anxiety. These findings remained valid

after age and educational level were statistically taken into account.

The path models for Positive Nutritional Behaviors and Medical Check-up Behaviors illustrate interesting relations with Health Status. Health Status was negatively and directly related to both Positive Nutritional Behaviors and Medical Check-up Behaviors. However, when Health Status was mediated through a cognitive variable, the indirect effect was positive. Individuals who were less healthy reported better nutritional behaviors, as assessed by sodium, fat, and caffeine consumption. Less healthy individuals sought more medical check-ups. In contrast, when the effect of Health Status was moderated by cognitive functioning (EPT and Induction) the effect was positive. Healthier individuals scored higher on cognitive tasks and engaged in better nutritional behaviors and sought more medical check-ups, supporting the hypothesized relation between cognition and health practices.

The path model for Health Maintenance Activities demonstrated the association between everyday cognitive problem solving and self-initiated health practices. Consistent with our hypothesis, individuals with higher cognitive function engage in behaviors that maintain their health longer, such as exercise and dental hygiene. Individuals with more ability to process printed materials related to everyday living may utilize these skills in initiating and maintaining health practices such as exercise and dental care.

The indirect effect of Induction on Substance Use through the PIC Anxiety subscale was interesting. Individuals with higher inductive reasoning ability tend to be less anxious with respect to the intellectual component of aging and engage in more substance use. This indirect effect of induction on Substance Use was inconsistent with our hypothesis that higher cognitive functioning would be associated with more health promotive behaviors. In addition, more anxiety was expected to be related to increased substance use, this hypothesis was not supported as individuals with high levels of anxiety tended to use less substance. The Substance Use factor is comprised of mainly questions regarding smoking behavior and the findings inconsistent with our hypotheses might be due to the extremely addictive nature of tobacco use.

The findings from the present investigation have two important implications for researchers and practitioners. First, our findings indicate that cognitive functioning (Abilities and Everyday Problem Solving) is related to the performance of health practices. Individuals at higher levels of cognitive functioning were found to

engage in more health promotive practices. Thus, maintaining cognitive functioning into later life may be an important factor in maintaining health promotive practices. Second, we hypothesized that the PIC would predict the performance of health practices. With the exception of the Anxiety scale predicting Substance Use, PIC was not a significant predictor of health practices. This is especially interesting given that the PIC is a domain-specific instrument designed to assess control beliefs related to cognitive aging. Our findings indicate that control beliefs regarding intellectual aging may not be relevant for older adults' health practices.

The amount of variance accounted for in the health variables was generally low, ranging from 11% to 15%. This result is consistent with other research examining health behaviors. Due to the heterogeneous nature of health behaviors and their multiple determinacy (Prohaska et al., 1985; Royak-Schaler & Maloney Alt, 1994), single individual difference variables, such as cognition and control, cannot be expected to explain a large proportion of variance in health. For example, older individuals with high cognitive abilities may be capable of performing a larger array of preventive health behaviors, but may choose not to do so for various motivational or emotional reasons.

The relationships among cognition and health behaviors found in this study were congruent with our hypotheses. However, different causal mechanisms may have led to the observed pattern of findings in the present investigation. EPT was a predictor of both Positive Nutritional Behaviors and Health Maintenance Activities, while the Abilities predicted Medical Check-up Behaviors and Substance Use. There were four measurement occasions in this study, but no repeated assessment was obtained. True longitudinal studies are necessary to disentangle uni- and bidirectional effects among Health Status, cognition, control beliefs, and health behaviors.

Future research should also investigate participants' financial status as a potential predictor of health practices. Health practices, such as Medical Check-up Behaviors, contain vision check-ups that are not traditionally covered by Medicare and other basic health insurance policies. Thus, one's financial resources may determine the frequency with which older adults utilize these services. In addition, Substance Use might also be related to financial status due to the considerable expense associated with the purchase of tobacco and alcohol items.

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Table 1
Measurement Model for Seven Health Factors

	Substance Use	Positive Nutritional Behaviors	Medical Check-up Behaviors	Health Maint. Behaviors	Positive Health Perception	Health Status	High Blood Pressure
Current smoker	.711						
Years smoked	.827						
Amount smoked present	.637						
Amount smoked past	.989						
Attempt to quit smoking (-)	.415						
Alcohol consumption	.195						
Read sodium labels		.802					
Buy low sodium		.798					
Cook low sodium		.459					
Read fat labels		.833					
Buy low fat		.805					
Eat butter (-)		.325					
Cook without butter		.352					
Drink caffeinated beverages (-)		.233					
Vision checked			.281				
Flu shots			.322				
Cholesterol checked			.633				
Medical check-up			.593				
Colon/rectal check-up			.449				
Mammogram or prostate exam			.543				
Regular exercise				.233			
Teeth brushing				.303			
Teeth flossing				.360			
Use of seat belts				.489			
Good vision (self-rating)					.578		
Good hearing (self-rating)					.405		
Decline in vision (self-rating) (-)					.638		
Decline in hearing					.522		
Health (self-rating)					.207	.486	
Decline in health (self-rating) (-)					.717		
Read without glasses						.206	
Blood pressure taken by medical						.414	
Number of doctor visits (-)						.471	
Days in hospital (-)						.366	
Diabetes diagnosed (-)						.206	
Bowel stimulant (-)						.269	
Sleep 7 or 8 hours						.175	
Need assistance for stairs (-)						.607	
Use walker (-)						.475	
Number falls last year (-)						.392	
Blood pressure taken - self							.188
High blood pressure diagnosed							.864
Blood pressure medication							.946
Body Mass Index				-.255			.151

Note. (-) indicates reverse scoring.
All factor loadings were significantly ($p < 0.01$) different from zero.

Table 2

Interpretation of Seven Health Factors

Factor	Interpretation
Substance Use	High values indicate current or past smoking (i.e., cigarette, pipe, cigar) and consumption of alcoholic beverages.
Positive Nutritional Behaviors	High values indicate adherence to a low fat and low sodium diet, and low consumption of caffeinated beverages.
Medical Check-up Behaviors	High values indicate frequent preventative medical examinations and treatments (e.g., cholesterol checks, mammograms or prostate exams, flu shots).
Health Maintenance Activities	High values indicate engagement in self-initiated behaviors that promote health (e.g., exercise) and avoid risks (e.g., use of seat belts).
Positive Health Perception	High values indicate a positive self-evaluation of sensory functioning (i.e., vision and hearing) and general health, both with regard to prior level of function and in comparison to other people of the same age.
Health Status	High values indicate a good general health status, as measured by fewer doctor visits due to medical problems, hospitalization, and the absence of frailty.
High Blood Pressure	High values indicate a diagnosed cardiovascular condition and the intake of cardiovascular medication.

Table 3

Correlations among Seven Health Factors

Factor	1	2	3	4	5	6	7
1. Substance Use	–						
2. Positive Nutritional Behaviors	-.17	–					
3. Medical Check-up Behaviors	-.15	.43	–				
4. Health Maintenance Activities	-.17	.41	.23	–			
5. Positive Health Perception	-.14	.18	*-.01*	.27	–		
6. Health Status	*.01*	*-.05*	-.26	.51	.49	–	
7. High Blood Pressure	*-.09*	.17	.30	*-.13*	-.17	-.24	–

Note.
Correlations in *italics* were not significantly ($p < 0.05$) different from zero.
$N = 430$ from Maier, McGuire, & Willis (1994).

Table 4

Correlations Among Personal Variables, Abilities, EPT, PIC, and Health Behaviors

	Positive Nutritional Behaviors	Health Maintenance Activities	Medical Check-up Behaviors	Substance Use
PERSONAL VARIABLES				
Age	.02	-.12	.01	-.22**
Education	.11	.10	.07	.14
Health Status	-.14*	.13	-.21**	.13
ABILITIES				
Induction	.07	.05	.18*	.19**
Figural	.01	.04	.09	.14*
Speed	.09	.11	-.04	.04
Verbal	.04	.03	.11	.09
EPT	.22**	.18**	.04	.05
PIC				
Internal	.14*	.11	.15*	.01
Chance	-.11	-.06	-.01	-.09
Powerful Others	-.12	-.13	-.04	-.09
Achievement	.14	.11	.08	-.04
Anxiety	-.04	.01	-.01	-.21**
Attitudes	.14*	-.05	.01	.09

Note.
* $p < .05$
** $p < .01$
*** $p < .001$

Table 5

Effects of Personal Variables, Abilities, EPT, and PIC on Positive Nutritional Behaviors

Independent Variables	Model 1: Personal Variables	Model 2: Personal Variables and Abilities	Model 3: Personal Variables, Abilities, and EPT	Model 4: Personal Variables, Abilities, EPT, and PIC
PERSONAL VARIABLES				
Age				
Education				
Health Status	-.157*	-.167*	-.172*	-.181*
ABILITIES				
Induction				
Figural				
Speed				
Verbal				
EPT			.257**	.230**
PIC				
Internal				
Chance				
Powerful Others				
Achievement				
Anxiety				
Attitudes				
Model R-square	.03	.05	.10**	.12*

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.
Standardized β coefficients were reported.
Coefficients not significantly ($p < 0.05$) different from zero were omitted.

Table 6

Effects of Personal Variables, Abilities, EPT, and PIC on Health Maintenance Activities

Independent Variables	Model 1: Personal Variables	Model 2: Personal Variables and Abilities	Model 3: Personal Variables, Abilities, and EPT	Model 4: Personal Variables, Abilities, EPT, and PIC
PERSONAL VARIABLES				
Age				
Education				
Health Status				
ABILITIES				
Induction				
Figural				
Speed				
Verbal				
EPT			.172*	
PIC				
Internal				
Chance				
Powerful Others				
Achievement				
Anxiety				
Attitudes				-.235*
Model R-square	.03	.04	.06	.11*

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.
Standardized β coefficients were reported.
Coefficients not significantly ($p < 0.05$) different from zero were omitted.

Table 7

Effects of Personal Variables, Abilities, EPT, and PIC on Medical Check-up Behaviors

Independent Variables	Model 1: Personal Variables	Model 2: Personal Variables and Abilities	Model 3: Personal Variables, Abilities, and EPT	Model 4: Personal Variables, Abilities, EPT, and PIC
PERSONAL VARIABLES				
Age				
Education				
Health Status	-.235**	-.243***	-.243***	-.230**
ABILITIES				
Induction		.254*	.259*	.253*
Figural				
Speed				-.168*
Verbal				
EPT				
PIC				
Internal				
Chance				
Powerful Others				
Achievement				
Anxiety				
Attitudes				
Model R-square	.07**	.11**	.11**	.13**

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.
Standardized β coefficients were reported.
Coefficients not significantly ($p < 0.05$) different from zero were omitted.

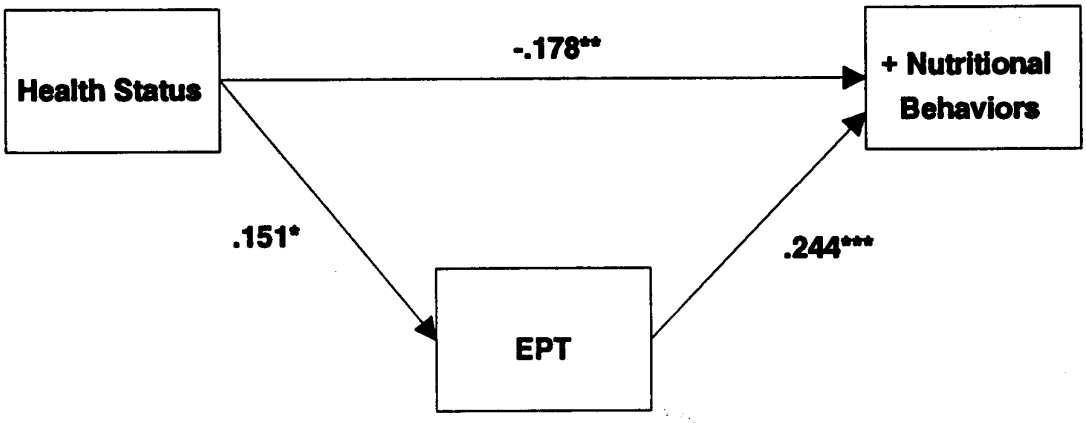
Table 8

Effects of Personal Variables, Abilities, EPT, and PIC on Substance Use

Independent Variables	Model 1: Personal variables as predictors	Model 2: Personal variables and Abilities	Model 3: Personal variables, Abilities, and EPT	Model 4: Personal variables, Abilities, EPT, and PIC
PERSONAL VARIABLES				
Age	-.199**	-.224**	-.242**	-.227**
Education				
Health Status				
ABILITIES				
Induction		.244*	.260*	.252*
Figural				
Speed				
Verbal				
EPT				
PIC				
Internal				
Chance				
Powerful Others				
Achievement				
Anxiety				-.216*
Attitudes				
Model R-square	.07**	.10**	.11**	.15**

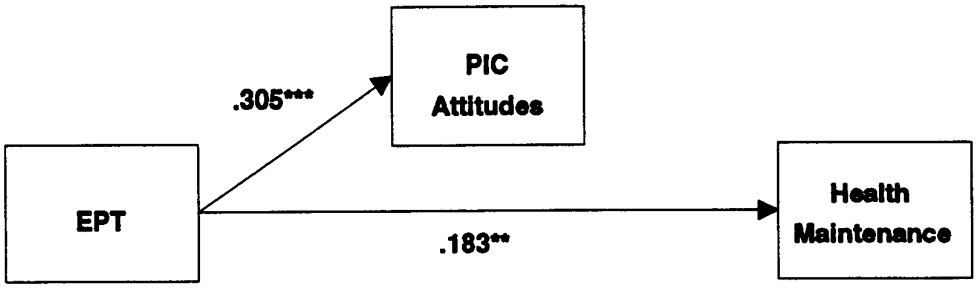
Note. * $p < .05$; ** $p < .01$; *** $p < .001$.
Standardized β coefficients were reported.
Coefficients not significantly ($p < 0.05$) different from zero were omitted.

Figure 1. Correlates of Positive Nutritional Behaviors



Note: * $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Figure 2. Correlates of Health Maintenance Activities



Note: * $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Figure 3. Correlates of Medical Check-up Behaviors

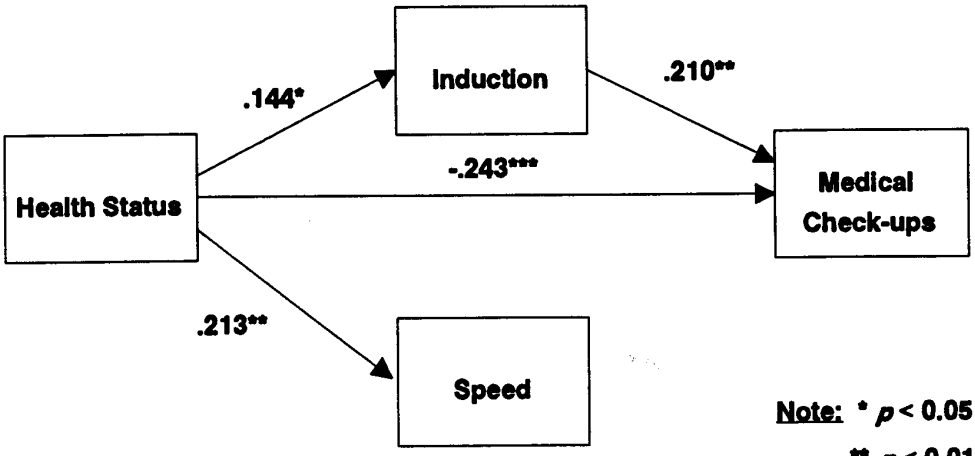


Figure 4. Correlates of Substance Use

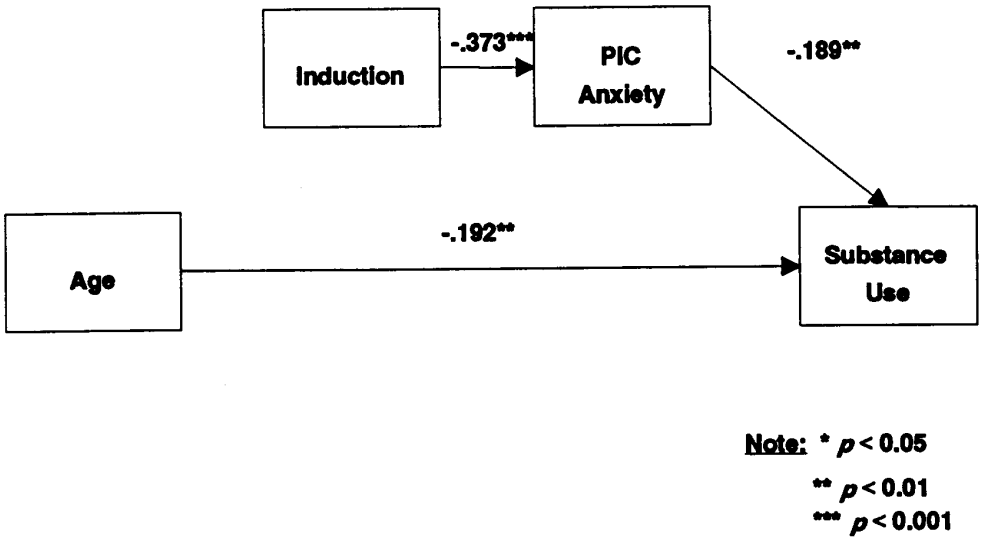
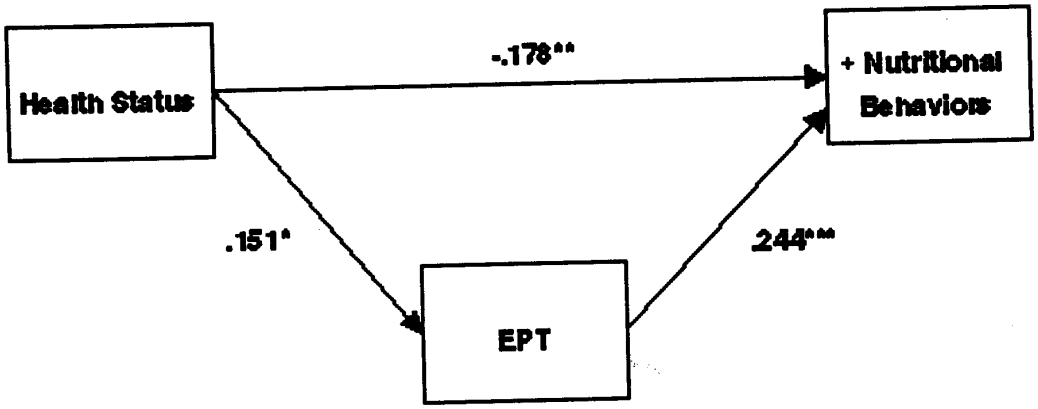
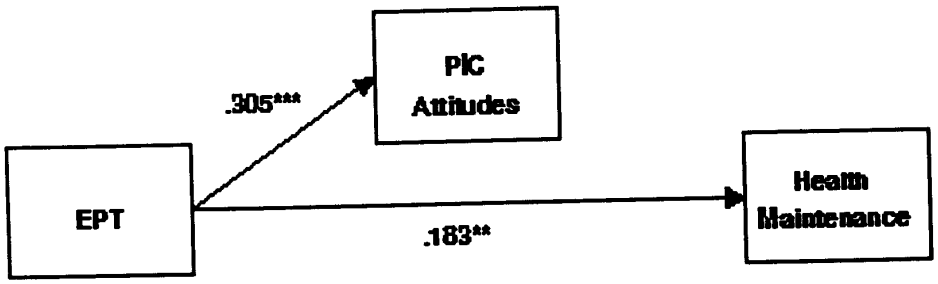


Figure 1. Correlates of Positive Nutritional Behaviors



Note: * $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Figure 2. Correlates of Health Maintenance Activities



Note: * $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Figure 3. Correlates of Medical Checkup Behaviors

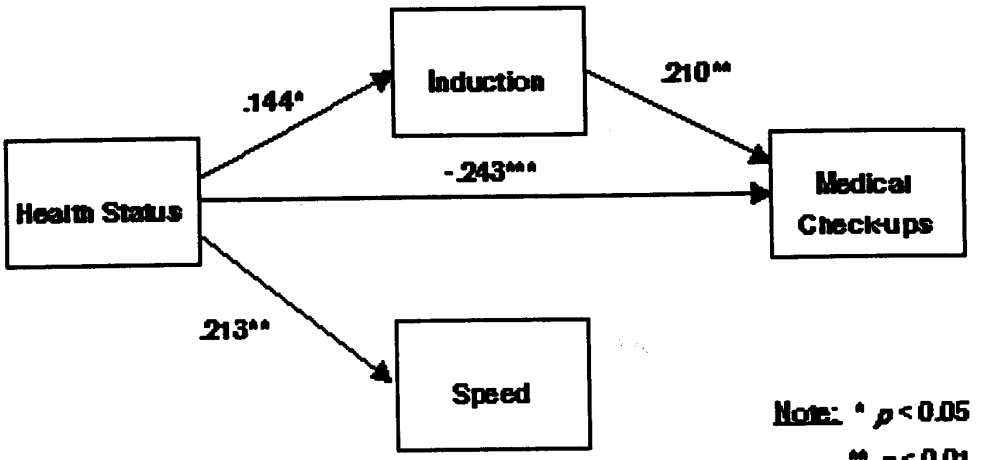


Figure 4. Correlates of Substance Use