Predictors of Health Practices within Age-Sex Groups: National Survey of Personal Health Practices and Consequences, 1979

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Synopsis

Health promotion-disease prevention programs share with health behavior research the common objective of identifying population subgroups toward whom services can be targeted. For this report, six age-sex groups were examined to determine similarities and differences in the predictors of eight health practice indices. Data were from the 1979 National Survey of Personal Health Practices and Consequences.

Results showed very little similarity of predictors across the three age cohorts (20–34, 35–49, 50–64), between men and women, and among the six age-sex groups. No predictor achieved significance consistently for several health practices in any of the six groups, although years of education made the best showing. The lack of overlap among predictors helps to explain why health promotion messages and recruitment strategies may not appeal to as diverse an audience as initially intended. Possible explanations for the absence of similar predictors include differences in the nature of the various practices themselves, absence of data on intentions behind a person's behavior, and the "over-determined" character of an individual person's behavior.

RESEARCH ON HEALTH BEHAVIOR and the social marketing of health promotion-disease prevention programs have found fertile ground for collaboration. The proponents of health promotion and disease prevention adopt strategies which segment a large population into smaller subgroups, allowing the targeting of messages and materials to achieve more effective social marketing (*1,2*). Similarly, what are commonly called the "predictor" or "stratifying" variables in surveys of health behavior and in theory-building research have direct parallel and potential application as the characteristics used by social marketers to segment an audience.

Research suggests that no single variable, or even a small subset, can explain personal health practices. A variety of psychosocial and demographic factors each tend to account for a small portion of the variance, usually with none being clearly dominant in the population as a whole. An alternative procedure, therefore, would be to investigate the correlates of health behavior within subgroups of the population. The process of reviewing predictors of health practices across several strata of a population may then indicate similarities and differences that, in turn, lead to comparable or diverse social marketing approaches to those groups.

It is important to recognize, however, that health practices do not exist in isolation from one another. In some instances it may be appropriate to focus on a single behavior, especially for detailed refinements of theory construction and for dealing with high-risk groups who require immediate reduction of risk factors. But in other situations, such as interventions directed at multiple

behaviors or in long-term risk factor-behavior change programs, a more comprehensive view is desirable. One of the key elements to achieving lasting change is knowing where a targeted health practice fits into a person's overall pattern of preventive activity. Therefore, programs which attempt to change health practices and risk factor status of a population or community level (in contrast to those using a high-risk-only approach) should be especially attentive to trends observed across multiple health practices.

This report examines the predictors of several health practices, within and across six groups defined by age and sex, using data from the 1979 National Survey of Personal Health Practices and Consequences (NSPHPC; *3,4*). The question of primary interest involved the similarity (or dissimilarity) of predictors that would be observed. Patterns or trends for important predictors found in the survey results might then suggest groups of persons who are at greater risk of not following desired practices and who could be a special focus of marketing efforts. Other analyses of these NSPHPC data (*3–5*) showed that age and sex were two of the most consistent correlates across multiple health practices. Therefore, groups jointly defined by these two variables would be likely to represent meaningful subsets of the population. Age and sex are also two major characteristics used to define potential audiences for health promotion programs.

Strengths of the NSPHPC data set for this report lie in the number of health-related practices that are included, along with the national sample and the availability of psychosocial predictors to complement those of a sociodemographic nature. Only Wave 1 NSPHPC data are used for this paper, because the 1-year followup period used for Wave 2 was too short to allow an entire cohort to enter the next oldest age category and thereby allow within-cohort longitudinal analysis. The cross-sectional character of the Wave 1 data naturally prohibits inferring that any trends observed across age cohorts are associated with chronological aging. In addition, persons under age 20 and aged 65 and older were not included in the sample. Initial reports provided descriptive tabular breakdown of health practices by age group (15-year cohorts) and sex. However, there were no multivariate analyses or comparisons of the predictive significance of variables within the age-sex strata, even though age and sex individually appeared to be important for given practices (*3,4*).

Methods

Sample. Participants for this report are the 3,025 respondents of Wave 1 of the National Survey of Personal Health Practices and Consequences, which was conducted during the spring of 1979. A three-stage stratified cluster design was employed, proceeding from initial random selection of county telephone exchanges in the coterminus United States, then to a selection of a random sample of numbers within each exchange proportional to the numbers served by that exchange, and finally to a randomized selection of an eligible respondent within the sampled households.

All respondents were civilian and not institutionalized. The age range of the sample was restricted to 20–64 years. The sex distribution of the sample was men 1,171 (38.7 percent), women 1,854 (61.3 percent). The ethnic-racial representation included white, non-Hispanic 2,478 (81.9 percent), black 282 (9.3 percent), Hispanic 172 (5.7 percent), and other groups 93 (3.1 percent); in regard to marital status, married 1,981 (65.5 percent), nonmarried 1,044 (34.5 percent). In addition, 12 or fewer years of education was reported by 58.2 percent, while 18.6 percent reported a bachelor's degree or beyond. A comparison of participant characteristics was conducted between the 1979 NSPHPC and the 1979 National Health Interview Survey, which had a larger national sample (*6*). Some discrepancies were noted, primarily a lower representation of men in the 50–64 group and a higher educational attainment in the NSPHPC. However, analyses indicated that these differences in proportional representation did not result in biases on other variables, so that the NSPHPC could be used with confidence that major biases would not be a problem.

Data collection procedure. Sampling, interviews, and data preparation were performed by Chilton Research Services of Radnor, PA, under guidelines established by the National Center for Health Statistics. The survey was co-sponsored by the Public Health Service's Office of Disease Prevention and Health Promotion and the Division of Environmental Epidemiology, National Center for Health Statistics.

All interviews were conducted by telephone and averaged one-half hour to complete. Information for analysis is therefore based on self-report. Response rate, including the use of multiple callbacks to reach persons not at home, was approximately 81 percent. The interview was designed to

cover a broad range of health-related practices. In addition, numerous questions on social support, health status, and psychological status were asked. Data from Wave 1 were used as a baseline for a followup interview 1 year later (Wave 2, 2,436 persons) with largely the same instrument, to assess stability of practices over that period. More detailed information on data collection has been provided elsewhere (*3,4,6*).

Variables for analysis. This report is based on a representative, although not exhaustive, set of indices from the NSPHPC survey. Health practices were selected to reflect a variety of types of behavior, as discussed subsequently. Predictor variables were chosen to include common sociodemographic indices and several psychosocial dimensions.

Health practice variables. A total of eight health practice indices were used as dependent variables, derived from the following information:

1. Recency of seeing a dentist and a physician and having an eye examination. A composite Health Service Visits Index was created based upon whether a physician and a dentist had been visited in the year before the Wave 1 interview, and whether an eye examination had been obtained within the last 2 years (range = 0–3).
2. Blood pressure check. Coding was based on recency of a blood pressure check before the Wave 1 interview: within the past year versus 1 to 2 years ago versus more than 2 years ago.

These questions comprising indices 1 and 2 were chosen to represent indicators of health service use commonly considered to have preventive health behavior connotations, although wording of the questions in the NSPHPC did not ask for preventive intentions behind the visits. Other questions were selected as practices that might be performed regularly if not necessarily daily. They included the following:

3. Limiting red meat intake for health reasons, asked in the NSPHPC and therefore coded as a yes-no dichotomy.
4. Use of seatbelts when riding in a car, coded as never versus seldom versus sometimes versus nearly always or always.
5. Use of dental floss or a water pick, coded as three times a week or more versus once or twice a week versus less than once a week versus never.
6. Regularity of eating breakfast, coded as rarely or never versus sometimes versus almost daily.

Finally, two indices were selected as summary measures.

7. The Alameda County 5-Habit Score, consisting of habits of smoking, drinking, hours of sleep, and physical activity, and weight relative to height. Classification and coding of the five habits were done by the NSPHPC on a 0–5 scale and recoded for this report as 0–1 versus 2 versus 3 versus 4 versus 5 practices, due to the relatively few persons in the 0–1 practice groups. Eating breakfast and snacking between meals were excluded, given the current preference to omit these habits from the original seven-item index (*7*). Eating breakfast was retained for separate analysis, however, because this habit exhibits an association with chronological age (*8–10*). In addition, a report of regularly eating breakfast denotes a more consistent day-to-day habit or time commitment than many other habits entail, even physical activity and use of dental floss. Therefore, it was used in the analysis as one type of health-related habit.
8. The number of free-time activities reported being done at least "sometimes" or "often" was summarized across the following areas: swimming in the summer, jogging or running, taking long walks, riding a bicycle, having a physically active hobby, doing calisthenics or exercises, or taking part in any other active sport not mentioned by the interviewer. This regular activities variable could therefore take on a range of values from 0–7. Coding was more strict than that used for the Alameda score's physical activity component; it was defined for this index as a *count* of activities done often or sometimes, in contrast to a dichotomous summary code of active or inactive used for the 5-habit index.

Predictor variables. A set of 18 variables was chosen to be broadly representative of psychosocial and demographic domains:

income
functional health status (based on limitations of regular activity)
ethnicity (Anglo, non-Hispanic versus all other)
employment status (full time versus all other)
highest educational level completed
metropolitan (SMSA) versus nonmetropolitan residence
regular source of health care (yes or no)

present health (coded as fair-poor-uncertain versus good versus excellent)
perceived control over future health (none-very little versus some versus a great deal)
change in activity level compared with 2 years before (less versus same versus more)
energy compared to age peers (less versus same or slightly more versus much more)
life events score, calculated by the NSPHPC, based on responses to 7 possibly stressful events that might have occurred over the past 5 years.
How Are You (HAY) Score, as calculated by the NSPHPC, of general feelings of malaise versus a favorable view of one's current life
church attendance (coded as never versus less than once a month versus 1 to 3 times a month versus once a week or more)
worry about health over the previous year (none-hardly any versus some versus a great deal)
marital status (married versus nonmarried)
sociability or social network, based on availability and contact with close friends and relatives, (coded as low versus medium versus high versus very high)
participation or member in group event over the previous 3 months (coded as none versus one versus two or more)

Age and sex groups. Six groups were defined by age and sex. Based upon the 45-year age range of the NSPHPC sample and the need to retain subgroups of at least moderate size, three age cohorts of 15 years each were established. Therefore, the six groups were women, ages 20–34 (786), ages 35–49 (537), and ages 50–64 (531) and men, ages 20–34 (516), ages 35–49 (380), and ages 50–64 (275).

Results

Regression analyses were conducted within each of the six age-sex groups, using each of the eight health practice indices in turn as the outcome variable. Ordinary least squares multiple regression was employed in all cases except for limiting red meat; logistic regression was used for this practice due to the dichotomous nature of coding. Results are presented in tables 1–8 and reviewed here in two ways: for the eight individual health practice indices and summatively across practices. Of primary interest were the similarities that might be observed across age groups, between men and women, and across the six age-sex groups.

As a preliminary step, age and sex were entered into regressions along with the other predictors described previously to determine for how many of the eight health practice indices each of the two was significant. Both sex and age achieved significance ($P < .05$) for six practices, and each was borderline for another ($.05 < P < .10$). Women tended to report more favorable practices for the Alameda 5-Habit Index, recent health visits, blood pressure check, flossing, and red meat intake; men reported more leisure time activities. Younger respondents tended to be higher on leisure time activities and the Alameda index; older respon-

Table 1. Summary of predictors for a greater number of regular leisure time activities in each of six age-sex groups[1]

Predictors for men	*P value <*	*Predictors for women*	*P value <*
		Ages 20–34 years	
Residence: metropolitan	.002	Energy versus peers: better	.0001
Group participation: more	.002	Group participation: more	.0008
Energy versus peers: better	.006	Marital status: not married	.002
Functional health: better	.009	Social network: larger	.008
Marital status: not married	.04	Regular care: yes	.04
		Functional health: better	.05
$F = 4.13$, df = 18,472		$F = 7.38$, df = 18,713	
$R^2 = .136$		$R^2 = .157$	
		Ages 35–49 years	
Group participation: more	.0004	Energy versus peers: better	.0001
Energy versus peers: better	.0008	Group participation: more	.0002
Future control: more	.03	Function health: better	.02
Regular care: yes	.04	Future control: more	.03
$F = 5.00$, df = 18,339		$F = 8.90$, df = 18,477	
$R^2 = .209$		$R^2 = .251$	
		Ages 50–64	
Church: more often	.0002	Energy versus peers: better	.0001
Energy versus peers: better	.005	Group participation: more	.0002
Income: higher	.03	Income: higher	.005
		2-year activity: more	.03
$F = 4.81$, df = 18,241		Functional health: better	.03
$R^2 = 264$		Health now: better	.05
		$F = 10.96$, df = 18,441	
		$R^2 = .309$	

[1] R^2 is the variance accounted for by the entire multiple regression, for which only predictors achieving a beta coefficient of $P \leq .05$ are listed in the table.

Table 2. Summary of predictors for a higher Alameda County 5-habit score in each of the six age-sex groups[1]

Predictors for men	P value <	Predictors for women	P value <
Ages 20–34 years			
Education: more	.002	Education: more	.0001
Health now: better	.002	Health now: better	.02
		Life events: less stress	.02
F = 362, df = 18,472		Church: more often	.02
R^2 = 121		F = 5.19, df = 18,713	
		R^2 = .116	
Ages 35–49 years			
Education: more	.0001	Health now: better	.008
Marital status: married	.005	Energy versus peers: better	.03
HAY: better	.006	Life events: less stress	.05
Residence: nonmetropolitan	.02	Ethnicity: anglo	.05
F = 3.78, df = 18,339			
R^2 = .167		F = 5.02, df = 18,477	
		R^2 = .159	
Ages 50–64 years			
Education: more	.004	Functional health: better	.004
Marital status: married	.02	Education: more	.004
Church: more often	.03	Ethnicity: anglo	.04
Functional health: better	.03		
Regular care: yes	.04	F = 4.26, df = 18,441	
F = 2.68, df = 18,241		R^2 = .148	
R^2 = .167			

[1] R^2 is the variance accounted for by the entire multiple regression, for which only predictors achieving a beta coefficient of $P \leq .05$ are listed in the table.

dents tended to be more favorable on health visits, red meat intake, eating breakfast, and seatbelt use. Sex was unrelated only to use of seatbelts and was of borderline significance for eating breakfast. Age was unrelated to use of dental floss or water pick, and was borderline for recency of a blood pressure check. The cross-tabulation strategy of this report therefore appeared to correspond to important subgroups in the sample.

Individual health practice indices. The predictor variables for each of the eight health practices are reviewed in the following section.

Leisure time activities. Review of table 1 indicated a set of three predictor variables that consistently appeared in all age groups for women, though not as consistently for men, particularly not in the 50–64 year old group. Reporting more energy compared to age peers, better functional health status, and more participation in group events were associated with more leisure time activities. In addition, although overlap was not total, the predictors in the six age and sex groups were more similar for this health practice index than for any of the others. Being not married was significant only in the 20–34 age group, perceived control over future health was significant only in the 35–49 group, and income was important only for persons aged 50–64. Overall, the positive direction of association between the predictors and more regular leisure activity produces an "upbeat" picture of persons higher on this index, which is consistent with the type of activities constituting this variable.

Alameda County 5-Habit Score. In five of the age-sex groups (except for women 35–49), greater formal education was associated with a more favorable Alameda 5-Habit Score (table 2). Among persons under age 50, there was a tendency for more favorable perceived health to be associated with better habit scores, while in the group aged 50–64 functional health (a more objective index) was significant for men and women. Perhaps the reason for this finding is that, by age 50, the longer term good health benefits of such practices would be more evident. Also, for men, being married was important for the 35–49 and 50–64 age groups. For women, fewer stressful life events were associated with more favorable Alameda 5-Habit scores for those ages 20–34 and 35–49. As with the leisure activities index, the predictors of a higher 5-habit score tended to reflect a "better off" group of persons.

Health service visits. Having a regular source of health care was the only predictor to achieve significance for both men and women ages 20–34 (table 3). Among men and women in the two other groups, higher income was the only predictor to show an association with more frequent use of the three services (visit to physician and dentist, having an eye exam). In addition, more extensive formal education and more energy compared with peers also achieved significance for three of these four age and sex groups (except women, 35–49). Among men, 50–64, a report of less energy compared with peers was associated with more recent visits. This association is understandable, given that perceived poor health often prompts medical visits. However, another aspect of perceived and objective health status will be discussed in a later section.

Blood pressure check. Not surprisingly, having a regular source of health care was consistently associated with having had a recent blood pressure check, appearing in five of the six groups (table 4). In addition, health service visits and blood pressure check were the only health practices other than leisure activities for which participation in group events achieved significance for men, suggesting that interpersonal (nonfamily) influences could be further investigated as a means to promote health service contacts among men. Worry about health status over the past year was important for men less than 50 years old, but only for women over age 50.

Dental floss or water pick. Greater formal education was the most consistent predictor of regular use, appearing in five of the six age-sex groups; women 20–34 were the exception (table 5). Higher income and anglo ethnicity were important for men and women in the age group 20–34. For men ages 35–49 and 50–64, greater health worry was associated with more frequent use. For women ages 20–34 and 35–49, there appeared to be a social network influence.

Red meat intake. Perception of more control over future health was associated with limited red meat eating in the 20–34 and 50–64 age groups for both men and women (table 6). For men over age 35, reporting better activity compared to 2 years ago was important; and for both men and women aged 20–34, more years of education achieved significance.

Eating breakfast and seatbelt use. These two practices were similar in the prominence with which regular religious attendance appeared as a predictor. It was absent for seatbelt use only among 35–49-year-old men and women (table 7), and for eating breakfast only among 50–64-year-old men (table 8).

For men and women ages 20–34, greater formal education and residing in metropolitan areas were associated with greater use of seatbelts. Education also achieved significance for men and women aged 35–49. Prediction of regularity of eating breakfast was limited for men. For women, an employment status of other than full time was significant in all three age groups. Interestingly, fewer stressful life events were associated with more regular breakfast eating for women ages 20–34 and 35–49. A parallel result was observed earlier with the Alameda index.

Table 3. Summary of predictors for more recent health service visits in each of the six age-sex groups[1]

Predictors for men	*P value <*	*Predictors for women*	*P value <*
		Ages 20–34 years	
Regular care: yes	.0009	Regular care: yes	.02
Group participation: more	.002	HAY: better	.02
Future control: more	.03	Employment: full time	.02
Marital status: not married	.03	Ethnicity: nonanglo	.03
$F = 3.38$, df = 18,472		$F = 3.19$, df = 18,713	
$R^2 = .114$		$R^2 = .074$	
		Ages 35–49 years	
Regular care: yes	.0006	Income: higher	.0002
Education: more	.003	Marital status: not married	.03
Health now: lower	.009		
Income: higher	.02		
Energy versus peers: better	.04	$F = 2.87$, df = 18,477	
Church: more often	.05	$R^2 = .098$	
$F = 4.23$, df = 18,339			
$R^2 = .183$			
		Ages 50–64 years	
Education: more	.02	Church: more often	.002
2-year activity: more	.03	Future control: more	.008
Income: higher	.03	Energy versus peers: better	.02
Energy versus peers: lower	.04	Ethnicity: anglo	.02
		Education: more	.03
$F = 2.64$, df = 18,241		Income: higher	.03
$R^2 = .165$		Social network: larger	.04
		Functional health: worse	.05
		$F = 5.78$, df = 18,441	
		$R^2 = .191$	

[1] R^2 is the variance accounted for by the entire multiple regression, for which only predictors achieving a beta coefficient of $P \leq .05$ are listed in the table.

Patterns across groups and practices. The results just presented for the individual health practices produced no surprising or internally inconsistent associations. On the other hand, neither were there a large number of dominant predictors. More interesting observations emerged when the eight practices were reviewed as a group, across the age and sex strata. This type of macro-level summarization is potentially useful for community-wide, multifaceted health promotion programs, in which messages are delivered to encourage change in several behaviors.

Predictors across age cohorts. Whether for men or for women, it was rare to find a predictor that achieved significance in all three age groups for

Table 4. Summary of predictors for a more recent blood pressure check in each of the six age-sex groups[1]

Predictors for men	P value <	Predictors for women	P value <
Ages 20–34 years			
Regular care: yes	.0001	Regular care: yes	.0001
Group participation: more	.03	Education: more	.04
Health worry: more	.04		
F = 2.47, df = 18,464		F = 2.11, df = 18,708	
R^2 = .087		R^2 = .051	
Ages 35–49 years			
Ethnicity: nonanglo	.02	Regular care: yes	.003
Health worry: more	.02		
Regular care: yes	.02	F = 2.11, df = 18,473	
2-year activity: more	.04	R^2 = .074	
F = 2.72, df = 18,335			
R^2 = .127			
Ages 50–64 years			
Group participation: more	.008	Regular care: yes	.0001
Future control: more	.05	Employment: full time	.02
		Health worry: more	.04
F = 2.07, df = 18,238		Life events: more stress	.05
R^2 = .135		F = 4.00, df = 18,439	
		R^2 = .141	

[1] R^2 is the variance accounted for by the entire multiple regression, for which only predictors achieving a beta coefficient of $P \leq .05$ are listed in the table.

Table 5. Summary of predictors for more regular use of dental floss or water pick in each of the six age-sex groups[1]

Predictors for men	P value <	Predictors for women	P value <
Ages 20–34 years			
Education: more	.03	Ethnicity: anglo	.02
Ethnicity: anglo	.03	Income: higher	.02
Income: higher	.03	Social network: larger	.05
F = 2.56, df = 18,471		F = 3.69, df = 18,713	
R^2 = .089		R^2 = .085	
Ages 35–49 years			
Education: more	.007	Residence: metropolitan	.0005
Residence: metropolitan	.01	Group participation: more	.02
Marital status: not married	.03	Education: more	.03
Health worry: more	.04		
F = 4.43, df = 18,338		F = 4.17, df = 18,475	
R^2 = .089		R^2 = .085	
Ages 50–64 years			
Education: more	.0008	Income: more	.0009
HAY: better	.002	Education: more	.006
Health worry: more	.006		
F = 3.04, df = 18,205		F = 3.91, df = 18,358	
R^2 = .201		R^2 = .164	

[1] R^2 is the variance accounted for by the entire multiple regression, for which only predictors achieving a beta coefficient of $P \leq .05$ are listed in the table.

even one of the eight health practice indices. This type of consistent outcome occurred only with six predictors for women; three of them were for regular leisure time activities index—energy compared with peers, group participation, functional health (table 1). The other three consistent predictors for women were regular sources of care for recency of blood pressure check (table 4) and employment status and religious service attendance for regularity of eating breakfast (table 8).

In only three instances did a predictor achieve significance across the three male cohorts. More education was significant for the Alameda 5 habit score (table 2) and for regular use of dental floss or water pick (table 5). The third instance was more energy compared with peers for leisure time physical activity (table 1).

If one takes a less rigorous criterion and compares only contiguous age groups—20–34 versus 35–49 versus 50–64—the overlap of predictors was still only modest. For women, 11 pairs of predictors and practices that appeared in the group ages 20–34 also appeared in the 35–49 cohort; for men, only 9 associations were replicated between the two age groups. Comparing predictors for the older cohorts (35–49 and 50–64), women and men each had 9 associations that occurred in both of the age groups.

For women 20–34 versus 35–49, there was no overlap of predictors for health service use, use of dental floss or water pick, and limiting red meat. Between ages 35–49 and 50–64, there were no comparable predictors for use of seatbelts and limiting red meat. For men, the cohorts ages 20–34 versus 35–49 showed no overlap for limiting red meat. For the 35–49 and 50–64 cohorts, there were no comparable predictors for recency of a blood pressure examination, regularity of eating breakfast, or use of seatbelts. Overall then, variables that predicted health practices were not highly similar across the age groups, either for men or for women. Seatbelt use and limiting red meat intake showed the most discontinuity of predictors, perhaps indicating notable cohort shifts in these two behaviors.

Predictors between the sexes. The correspondence of predictors between men and women, in each of the three age cohorts, is probably also described most accurately as modest. The best

degree of correspondence occurred for the cohort ages 20–34, in which 17 predictor-health practice associations were the same for men and women. These were at least half of the total number of significant associations for that cohort (men, 17 of 28; women, 17 of 35). For the cohort ages 35–49 there were only 9 corresponding associations (men, 9 of 28; women, 9 of 21); and for persons 50–64, there were 11 similar predictor-practice relationships (men, 11 of 23; women 11 of 30). Across all three age cohorts, the correspondence of predictors between men and women appeared to be best for leisure time physical activities and the use of dental floss or water pick. Wearing seatbelts and eating breakfast also had somewhat comparable predictors for both sexes. In most cases, however, close similarity of predictors between men and women occurred only for selected behaviors, in individual cohorts (for example, leisure time activities, ages 35–49).

Predictors within age-sex groups. When the six individual age-sex groups were examined individually, there were few predictors that achieved significance within each age-sex group across several health practices. Only among women ages 20–34 was a predictor (for example, education) associated with five or more practices. Similarly, for men ages 20–34 and ages 35–49, education was the only predictor to be associated with even four of the eight health practices. Review of tables 1–8 shows only five of the eight health practice indices had even one or two predictors that achieved significance in five or six of the age-sex combinations (leisure activities—energy compared with peers, group participation; Alameda score—education; blood pressure check—regular source of care; dental floss or water pick—education; eating breakfast—attendance at religious services).

Social network and life events failed to achieve significance in any analysis for men, and employment status, the How-Are-You Index, and functional health were significant in no more than two analyses for men and never in the same age group. Among women, no predictors failed to achieve significance. However, marital status was significant in only two analyses, and both health worry and 2-year trend in activity level did not achieve significance in the two younger groups.

Other observations. Activity level compared to 2 years ago achieved significance only in the two older male age groups, and in the oldest female age group. Similarly, except for the leisure activities index, energy compared to that of age peers was also important only after age 35. These observations suggest that comparative judgments are important in mid-life (35–64 years), perhaps as the subtleties of one's own chronological aging become more noticeable, and also as individual differences in health status become more pronounced during these years. However, for men, worry about health in the past year was particularly important before age 50, and self-rated health had its strongest showing for men ages 20–34 and for women under age 50. Therefore, subjective health judgments figured in the results for all age cohorts, but the specific questions tended to differ.

In some instances, and especially for men, an unfavorable health-related judgment was associated with a particular behavior (for example, greater health worry and more recent blood pressure check). These associations are understandable, to the extent that health problems or concerns can prompt health-conscious actions as a logical response. They also raise the question of whether men tend to require more perceived need for

Table 6. Summary of predictors for limiting red meat intake in each of the six age-sex groups[1]

Predictors for men	P value <	Predictors for women	P value <
Ages 20–34 years			
Education: more.....	.01	Education: more	.01
Future control: better .	.05	Ethnicity: non anglo ..	.01
Health worry: more ...	.05	Future control: better .	.05
Church: never.....	.05	Social network: moderately large	.05
Chi square = 68.83, df = 36			
Improvement = 11.4 percent		Chi square = 84.33, df = 36	
		Improvement = 7.4 percent	
Ages 35–49 years			
Ethnicity: non-anglo ..	.01	Employment: not full time	.05
2-year activity: more ..	.05	Residence: metropolitan	.05
Chi square = 63.17, df = 36		Chi square = 61.02, df = 36	
Improvement = 14.0 percent		Improvement = 7.7 percent	
Ages 50–64 years			
Future control: better .	.05	Future control: better .	.01
Health now: lower	.05		
2-year activity: more ..	.05	Chi square = 47.56, df = 36	
		Improvement = 12.9 percent	
Chi square = 42.19, df = 36			
Improvement = 6.0 percent			

[1] Limiting red meat intake has no R^2 value, due to the absence of this particular statistic in logistic regression. The value listed in the table gives a similar but not identical indicator, that is, the percent improvement predicting the placement of a person in the desired practice category, relative to basic marginal probabilities.

Table 7. Summary of predictors for regular seatbelt use in each of the six age-sex groups[1]

Predictors for men	P value <	Predictors for women	P value <
Ages 20–34 years			
Education: more	.0002	Education: more	.0001
Residence: metropolitan	.009	HAY: better	.004
Church: more often	.02	Life events: lower stress	.02
Health now: better	.02	Church: more often	.02
		Future control: more	.02
$F = 3.85$, df = 18,472		Employment: not full time	.03
$R^2 = .128$		Residence: metropolitan	.04
		$F = 5.99$, df = 18,712	
		$R^2 = .132$	
Ages 35–49 years			
Future control: more	.02	Education: more	.009
Marital status: married	.05	Employment: not full time	.05
Education: more	.05		
$F = 1.46$, df = 18,338		$F = 2.86$, df = 18,477	
$R^2 = .072$		$R^2 = .097$	
Ages 50–64 years			
2-year activity: more	.0008	Church: more often	.02
Church: more often	.02	Health worry: more	.05
$F = 2.12$, df = 18,241		$F = 2.18$, df = 18,440	
$R^2 = .137$		$R^2 = .081$	

[1] R^2 is the variance accounted for by the entire multiple regression, for which only predictors achieving a beta coefficient of $P \leq .05$ are listed in the table.

'The question of primary interest involved the similarity (or dissimilarity) of predictors that would be observed. Patterns or trends for important predictors found in the survey results might then suggest groups of persons who are at greater risk of not following desired practices, and who could be a special focus of marketing efforts.'

action, while women's health practices are somewhat less dependent on a sense of urgency. Further examination also reveals, however, that in most instances where an unfavorable health judgment was predictive for men, a favorable assessment on another self-rating index also achieved significance (7 of 9 instances). This observation suggests that, although a negative health assessment can help prompt action, people may also need to retain a belief that their health is still basically all right or under their control. For health service visits, for example (table 3), this occurred for men ages 35 and over, and for women ages 50–64. Therefore, while the Health Service Visits Index was not exclusively preventive in nature and reflected poor health status, a favorable health orientation was also evident in the results for this variable.

Employment status was significant relatively more often for women than men, as was ethnicity in the 20–34 and 50–64 age cohorts. Stressful life events achieved significance exclusively for women. Marital status was a more visible predictor for men, as was worry about health over the past year. Finally, explained variance (R^2) seemed to be similar for men and women, with neither sex having a consistent advantage in accounting for larger percentages.

Discussion

For the most part, it appears that the six age-sex groups were more different than alike in regard to the predictors of personal health practices. There was no pronounced similarity of predictors between contiguous age cohorts for men or women; even within the six groups, there were no clearly dominant predictors, with the possible exception of education. On a more positive note, no variables had associations that diverged widely from what might be expected (for example, no instances where lack of control over future health, or not having a regular source of health care were associated with health practices).

In light of these results, approaching different age or sex groups in the community with health promotion initiatives may be a complex task. The relative absence of similar predictors among the three age cohorts for men and women and among the six individual age-sex subgroups suggests that program planners devote some attention to identifying any special characteristics of each group in their communities. Although the lack of correspondence of predictors is somewhat disappointing from one standpoint, the present investigation does provide some empirical insight into why health messages and recruitment strategies may not appeal to a diverse group of participants, as was originally intended. The relatively low explained variance tends to soften the implication of a minimal overlap of predictors, but the absence of

any clear patterns of similarity does need to be considered.

Another potential issue is that the present data cannot point to characteristics that would consistently define persons at especially high risk of reporting undesired status on the several health practices examined here, again with the possible exception of persons with less formal education. In effect, with age and sex removed from the prediction equation through stratification, virtually no dominant predictors emerged in any of the six subgroups. This outcome may reflect the actual situation with the age-sex groups, or it may be attributable at least in part to the reduction in sample size due to creation of the six subgroups. Using larger planned samples of age-sex groups that are also more closely equal in size would provide a more adequate replication than the type of post-hoc stratification that was necessary in this study.

It will be useful to review predictors of other health practices in the NSPHPC, or to try more elaborate analyses than the linear model used here, including possible interaction terms. Other health practice surveys of larger and more contemporary samples have recently been reported (*8,11,12*). Surveys designed around specific health practices (for example, oral health, home safety, exercise) may identify greater overlap of predictors among strata, because they cover a more homogenous set of behaviors (*13*). However, it is also important that surveys have sufficient diversity of demographic, social, health, and psychological predictor variables. And, with any post-hoc analysis, there is the risk of unintentional bias that accompanies an a posteriori stratification that disaggregates the original total sample distributions and variance.

Why was such a nonpattern of results observed in this analysis? Several reasons can be offered. First, personal health practices tend to be correlated only modestly (*14,15*). Therefore, it is very likely that the predictors of those practices will not correlate highly. Also, if health practices are not purposely advocated as a package to the general population, there is no reason to expect that they will be viewed as such spontaneously. This type of coordinated health behavior message has certainly not yet occurred on a national level, so that the absence of comparable predictors could be expected. Another possible reason for the results of this investigation is that "preventive practices" is a label that we as professionals tend to apply to behaviors. "Personal health practices" is a more neutral term, but it is still a simple label. What is usually missing in large surveys is information about the *intention* or reason behind following (or not following) a given practice. Unless we know whether or not persons define a practice as "preventive," it is not realistic to expect strong correlations between predictors and what is essentially only a "behavior" that may be performed for any of a variety of reasons, and only a few of these may bear on prevention.

Another paper from the NSPHPC (*16*) suggests a great deal of consistency in personal health practices over the 1-year period between Waves 1 and 2. There may, therefore, be a longitudinal consistency in behavior whether we measure it or not, and that factor statistically will account for a large portion of variance. As a result, in a cross-sectional survey two phenomena may result. First, the cross-sectional point-in-time assessment of behavior may contain a large consistency element from previous behavior, so that standard demographic and psychosocial prediction variables have less ability to explain variance. Second, there

Table 8. Summary of predictors for more regularly eating breakfast in each of the six age-sex groups[1]

Predictors for men	*P value <*	*Predictors for women*	*P value <*
		Ages 20–34 years	
Health now: better	.003	Employment: not full time	.0001
Church: more often	.007	Church: more often	.007
Health worry: more	.02	Health now: better	.007
		Education: more	.02
$F = 1.92$, df = 18,471		Life events: less stress	.04
$R^2 = .068$			
		$F = 3.56$, df = 18,712	
		$R^2 = .082$	
		Ages 35–49 years	
Church: more often	.02	Church: more often	.003
		Life events: less stress	.009
$F = 1.74$, df = 18,339		Employment: not full time	.02
$R^2 = .084$			
		$F = 2.51$, df = 18,477	
		$R^2 = .086$	
		Ages 50–64 years	
Employment: full time	.05	Church: more often	.0002
		2-year activity: more	.004
$F = 1.16$, df = 18,241		Employment: not full time	.03
$R^2 = .08$		Regular care: yes	.05
		$F = 3.88$, df = 18,441	
		$R^2 = .137$	

[1] R^2 = is the variance accounted for by the entire multiple regression, for which only predictors achieving a beta coefficient of $P \leq .05$ are listed in the table.

may not be sufficient behavioral change occurring over time for other predictor variables to make a strong showing. Essentially, all of the variance is not "free" to be explained, because so much is attributable to behavioral consistency, however the behavior originally developed.

Another possible explanation is that personal behaviors, including health practices, are notoriously overdetermined. A basic message from research is that any given predictor variable will be important for someone, but no one predictor will be important for everyone—or even a large majority. Added to this is the logic of strategies such as path analysis, where direct and indirect effects must be distinguished. Therefore, even an "important" variable may be directly so for some persons but indirectly for others, representing different levels of decision-making, and tending to attenuate the results of omnibus analyses such as ordinary least squares regression.

Finally, it is certainly possible that the search for patterns of predictors across practices and the strategy of stratifying a sample for subgroup analysis may not be productive beyond a given point. Because health practices themselves differ along various dimensions (for example, cost, new learning necessary, time commitment, energy expenditure) there is probably a limit to the commonality that exists among their predictors. Progressively more detailed stratification of a sample may eventually result in having rather unique subsets of predictors, due to the numerous population subgroups. At that point, it may then become more appropriate to study health practices individually and within each subgroup, rather than collectively.

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