Psychiatric Ther 19: 101–109 (1980).
34. Sausser, G., Fishburne, S., and Everett, V.: Outpatient detoxification of the alcoholic. J Fam Pract 14: 863–867 (1982).
35. Young, D., and Sadd, S.: Medical vs. nonmedical alcohol detoxification: are they equally safe? Vera Institute of Justice, New York, 1986.
36. Ogborne, A., and Adrian, M.: The use of hospital beds for the treatment of excessive drinkers without serious medical complication. Br J Addict 82: 193–196 (1987).
37. Tennant, F.: Ambulatory alcohol withdrawal. J Fam Pract 8: 621-623 (1979).
38. Hore, B., and Rossall, C.: The incidence of alcohol withdrawal symptoms in admissions to the Withington hospital detoxification unit. Alcohol Alcohol 20: 53–56 (1985).
39. Hayashida, M., et al.: Is inpatient medical alcohol detoxification justified: results of a randomized controlled study. *In* Problems of drug dependence, edited by L. S. Harris. Research Monograph 81. National Institute of Drug Abuse, Rockville, MD, 1988.
40. Whitfield, C.: Outpatient management of alcoholic patient. Psychiatr Ann 12: 447–458 (1982).
41. Whitfield, C., et al.: Detoxification of 1,024 alcoholic patients without psychoactive drugs. JAMA 329: 1409–1410, (1978).
42. Hayashida, M., et al.: Comparative effectiveness and costs of inpatient and outpatient detoxification of patients with mild to moderate alcohol withdrawal syndrome. N Engl J Med 320: 358–365, Feb. 9, 1989.
43. Sadd, S., and Young, D.: Nonmedical treatment of indigent alcoholics. Alcohol Health Res World: 48–53, spring 1978.
44. Shen, W., Chavez, C. Fishburne, S., and Huang, T.: Which detoxified alcoholic keeps the first clinic appointment. Drug Alcohol Depend 11: 353–358 (1983).
45. O'Briant, R., Petersen, N., and Heacock, D.: How safe is social setting detoxification? Alcohol Health Res World: 22–27, winter 1976/1977.
46. Hillbom, M., and Hjelm-Jager, M.: Should alcohol withdrawal seizures be treated with anti-epileptic drugs? Acta Neurol Scand 69: 39–42 (1984).
47. Ng, S., Hanser, W., Brust, J., and Susser, M.: Alcohol consumption and withdrawal in new-onset seizures. N Engl J Med 319: 666-673, Sept. 15, 1988.
48. Bowen, O.: Raising public awareness about the extent of alcohol-related problems: An overview. Public Health Rep 103: 559–563 November-December 1988.

Health Practice Correlates in Three Adult Age Groups: Results from Two Community Surveys

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Synopsis

Independently done surveys of a target population can make an important contribution to knowledge about the determinants of personal health behavior by highlighting variables that consistently emerge as significant predictors. This investigation examined the correlates of four health practice and knowledge indices related to cardiovascular disease (CVD) in two baseline community surveys of the Pawtucket Heart Health Program (N=2,413; N=2,808). An additional dimension was the use of three adult age groups (18–29, 30–49, 50–64) in conducting the analyses.

Results of both surveys showed that sex was the strongest correlate of the four indices—knowledge of CVD, encouraging health practice changes in others, dietary intake, and exercise. The four indices related to CVD were also associated with years of education, primary language, and whether or not a recent cholesterol measurement had been obtained, although these relationships were not as consistent as the results for sex. Overall, about half of each survey's significant associations were also found in the other survey (survey 1, 30 of 62; survey 2, 30 of 56).

Consistency of significant results between surveys was best for the group ages 30–49. In either survey, it was rare for an association between a predictor and behavioral index to appear in each of the three age groups. This study supports the importance of the subjects' sex in research on personal health practices, suggests the potential for independence even among health-related indices pertinent to a single type of illness, and emphasizes the usefulness of utilizing independent samples to identify important correlates of health behavior.

A BASE OF INFORMATION about the disease prevention and health promotion activities of the adult population is steadily increasing. Since the middle 1970s, national and State level surveys have gathered data on a diverse set of personal health practices (*1–6*). Much of this work was stimulated by results from the Alameda County study (*7–9*), and the scope of health-related activities included in surveys is growing. One theme that seems to recur is that subgroups of the population with limited access to resources (for example, income, health care, formal education) are likely to have a higher prevalence of habits that increase the risk of illness. In addition, women have tended to report desired practices somewhat more often than do men, although data on vigorous activity and exercise seem to favor men (*3, 5, 10–16*).

This growing data base about preventive health practices and their correlates has helped to bring three topics into prominence. One of these is the identification of differences that may exist among specific segments of the adult population. Societal interest in health promotion is paralleled by a professional interest in tailoring behavior change programs to population subgroups who are either at particular risk of not following desired practices or who appear especially receptive to adopting new lifestyle habits. Analyses and interpretation carried out within strata of a population will make, therefore, increasingly important contributions to the literature on personal health behavior and community health promotion.

A second consideration is our ability to determine areas of consensus, or the lack of it, among studies. Several questions need to be answered as more data on health practices become available. Among them, which health practice correlates are the most consistently important from study to study? Also, when looking across a number of behaviors, is there a "core" set of predictors, or does each health practice have its own network of antecedents? Answering these questions will be complicated, in part because most surveys have not been designed around topical areas of behavior, even when they have contained several health practice questions. This diverse coverage probably contributes to the only modest associations among health behaviors that have been repeatedly observed (*17–19*). To clarify this issue of minimal association, it will be important to look at results that are obtained when the health behaviors covered in a survey have an apparent a priori reason to be clustered around a particular topic (for example, prevention of heart disease).

A third consideration is that most surveys of personal health behavior have not been designed to collect detailed data on two or more independently drawn samples from the same population. The ongoing annual National Health Interview Survey provides data on a total population level, and some information is collected about use of health services (for example, physician and dental visits), which has been especially useful for tracking national trends in these particular areas. The statewide Behavioral Risk Factor Surveys (*2*) may also be a resource for examining the correlates of behavior, even though the data are from States that have discrete populations residing there. At present, there is a need to report in the scientific literature the consistency of findings about correlates of health behavior when two or more samples are from the same population.

The present investigation was conducted to address several of these points. Several dependent variables were examined, each of which is related to cardiovascular disease. In addition, data analyses were conducted within three adult age groups—one dimension along which the population might be segmented for the targeting of behavior change messages.

Finally, analyses were replicated for two independently drawn samples from the same community populations. Although the samples were drawn from a particular geographic region and are not, therefore, representative of the general national population, this procedure allowed an examination of the consistency of results between two surveys (and samples) that were likely to be more similar than any other two independently done studies that would presently be found in literature on personal health behavior.

Conducting analyses on multiple samples from a population can be especially helpful. On the one hand, correlates of health practices that do not achieve significance in either of the samples might be given less attention in subsequent studies because they do not appear to be consistently important. On the other hand, those correlates that do achieve significance in two or more surveys gain extra prominence through their independent replication. The objective of the present investigation was to identify correlates (if any) that received independent replication.

Methods

Background. Data for this report are based upon baseline community surveys of adults ages 18 through 64, in two southeastern New England communities, conducted as a component of the population surveillance activities of the Pawtucket Heart Health Program (PHHP). The PHHP is a community-wide intervention aimed at the modification of risk factors of cardiovascular disease (CVD), and it is supported by the National Heart, Lung, and Blood Institute (*20, 21*).

A major evaluation component of the PHHP is biannual random household surveys to monitor cardiovascular risk factors in the intervention and comparison communities. Survey data from the two communities are combined for this report, although city of residence was included as a control variable in the analysis. Also assessed are selected health practice and sociodemographic variables. The surveys used for this report were the first two of a series that continues through 1991. The dates of the surveys were March 1981–April 1982 for survey 1 ($N=2,413$) and April 1983–June 1984 for survey 2 ($N=2,808$).

The intervention and survey activities of the PHHP are conducted by separate units. The household survey employs its own logo, identification, and field office so that staff are not connected by interviewees with the intervention activities of the PHHP. The 1981–82 survey was conducted before any intervention, and the 1983–84 survey occurred in the very early phase of intervention, before community-wide impact on knowledge or behavior could have been produced. They are, therefore, both considered baseline surveys.

Samples. Demographic characteristics of the 1981–82 and 1983–84 survey samples, combined across both communities, are presented in table 1. Other analyses supported the comparability of the two cities.

Household survey procedure. The PHHP Health Surveys were designed with two components. The field protocol was administered to all selected respondents in a home visit lasting approximately 35 minutes, and included an interview of 15 to 20 minutes with questions about diet, exercise, smoking, CVD knowledge, and basic sociodemographic indicators. Physiologic measurements were taken including height and weight measurement (from which Body Mass Index was computed), two blood pressure determinations, and a nonfasting 30 millimeters (ml) blood sample for lipoprotein analysis (*21*).

To avoid confounding of technician and city differences, the survey staff was divided into two teams that rotated between the two communities every 6 weeks. A survey center, located centrally in each community, provided a base for survey technicians. Each of these centers was directed by an assistant field supervisor, who provided onsite supervision of the survey team. Field technicians were given an intensive 6-week training program in respondent selection, interviewing, and measurement techniques. They were evaluated and certified by the field supervisor before commencing field work.

In both cities, households were randomly selected from available street directories, updated by a block supplement sample (*22*). Within each sample household, a single respondent was selected from the eligible adults (ages 18 through 64 years at last birthday) using one of 12 selection tables adapted from those proposed by Kish (*22*) and Deming (*23*) to approximate a random selection process. The use of a batch system to generate the addresses assures approximately equal sampling over a 12-month survey that is designed to minimize seasonal confounds. Bilingual and trilingual technicians conduct interviews in English, Portuguese, or Spanish (using back-translated instruments and consent forms). The field supervisor coordinated all quality control in the field, which includes monitoring of production rates, feedback from taped interviews, spot checks on a randomly selected 10 percent of all dispositions, and full field evaluations.

Table 1. Comparison of surveys 1 and 2 along selected characteristics of the samples

Sample characteristics	Survey 1		Survey 2	
	Number	Percent	Number	Percent
Total	2,413	100	2,808	100
Sex:				
Female	1,407	58.3	1,656	59.0
Male	1,006	41.7	1,152	41.0
Age:				
Average	39.59	...	39.32	...
Standard deviation	14.03	...	13.79	...
18–29 years	761	31.5	846	30.1
30–49 years	918	38.0	1,175	41.8
50–64 years	734	30.4	787	28.0
Education:				
Average	10.94	...	11.00	...
Standard deviation	3.96	...	4.01	...
Less than 12 years	1,032	43.1	1,140	40.6
12 years	701	29.2	782	27.9
More than 12 years	663	27.7	884	31.5
Race:				
White	2,243	93.0	2,569	91.5
Black	137	5.7	110	3.9
Other	31	1.3	128	4.6
Marital status:				
Married	1,451	60.1	1,680	59.8
Never married	506	21.0	589	21.0
Other	456	18.9	539	19.2
Work (past 12 months):				
Working	1,725	71.4	1,998	71.2
School	119	4.9	138	4.9
Other	572	23.7	672	23.9
Regular language:				
English	1,959	81.7	2,223	79.2
Portuguese	353	14.7	434	15.5
Other	101	4.2	151	5.3

Dependent variables. Four indices were used as dependent measures in the analyses. Each represented

Table 2. Predictor variables associated with "encouraging others to change" in three age groups: surveys 1 and 2

Survey 1[1]	Unstandardized beta's	Probability value	Survey 2	Unstandardized beta's	Probability value
Ages 18–29			*Ages 18-29*		
Sex: women	.49	$P \leqslant .0001$	Group participation: more	.19	$P \leqslant .0001$
Group participation: more	.22	$.01 \geqslant P > .001$	Years of education: more	.05	$.01 \geqslant P > .001$
Smoking status: no	−.30	$.01 \geqslant P > .001$	Cholesterol check: yes	−.41	$.05 \geqslant P > .01$
Years of education: more	.04	$.05 \geqslant P > .01$			
Smoker in house: yes	−.23	$.05 \geqslant P > .01$	$F = 2.85$, $df = 20, 705$; $P \leqslant .0001$; $R^2 = .075$		
Contact with relatives: more	.07	$.05 \geqslant P > .01$			
$F = 3.38$, $df = 20, 623$; $P \leqslant .0001$; $R^2 = .098$					
Ages 30–49			*Ages 30–49*		
Sex: women	.50	$P \leqslant .0001$	Sex: women	.42	$P \leqslant .0001$
Smoking status: no	−.35	$.001 \geqslant P > .0001$	Smoking status: no	−.50	$P \leqslant .0001$
Years of education: more	.04	$.01 \geqslant P > .001$	Years of education: yes	.04	$.01 \geqslant P > .001$
Work status: working	−.36	$.01 \geqslant P > .001$	Cholesterol check: yes	−.26	$.05 \geqslant P > .01$
Systolic pressure: lower	−.01	$.05 \geqslant P > .01$	Racial group: not white	.30	$.05 \geqslant P > .01$
$F = 5.30$, $df = 20, 798$; $P \leqslant .0001$; $R^2 = .117$			$F = 6.87$, $df = 20, 1{,}027$; $P \leqslant .0001$; $R^2 = .118$		
Ages 50–64			*Ages 50–64*		
Sex: women	.40	$.01 \geqslant P > .001$	Smoking status: no	−.53	$P \leqslant .0001$
Smoking status: no	−.31	$.01 \geqslant P > .001$	Sex: women	.41	$.001 \geqslant P > .0001$
Group participation: more	.17	$.01 \geqslant P > .001$	Years of education: more	.06	$.01 \geqslant P > .001$
Primary language: English	−.50	$.05 \geqslant P > .01$			
Systolic pressure: lower	−.01	$.05 \geqslant P > .01$	$F = 3.65$, $df = 20, 633$; $P \leqslant .0001$; $R^2 = .103$		
Cholesterol check: yes	−.27	$.05 \geqslant P > .01$			
$F = 3.80$, $df = 20, 585$; $P \leqslant .0001$; $R^2 = .114$					

[1]Predictors are listed giving the direction of association with more frequent encouragement of behavior change by others. Note that the listing is based on rank order, highest to lowest.

Table 3. Predictor variables associated with "CVD knowledge" in three age groups: surveys 1 and 2

Survey 1[1]	Unstandardized beta's	Probability value	Survey 2	Unstandardized beta's	Probability value
Ages 18–29			*Ages 18-29*		
Years of education: more	.10	$P \leqslant .0001$	Years of education: more	.18	$P \leqslant .0001$
Group participation: more	.31	$.001 \geqslant P > .0001$	City of residence: Pawtucket	−.26	$.01 \geqslant P > .001$
City of residence: Pawtucket	−.37	$.01 \geqslant P > .001$	Income: higher	.05	$.05 \geqslant P > .01$
			Group participation: more	.11	$.05 \geqslant P > .01$
$F = 5.95$, $df = 20, 623$; $P \leqslant .0001$; $R^2 = .160$			Sex: women	.23	$.05 \geqslant P > .01$
			$F = 12.31$, $df = 20, 705$; $P \leqslant .0001$; $R^2 = .259$		
Ages 30–49			*Ages 30-49*		
Group participation: more	.24	$P \leqslant .0001$	Years of education: more	.11	$P \leqslant .0001$
Years of education: more	.09	$P \leqslant .0001$	Primary language: English	−.68	$P \leqslant .0001$
Sex: women	.36	$.001 \geqslant P > .0001$	Racial group: white	−.41	$.01 \geqslant P .001$
City of residence: Pawtucket	−.26	$.01 \geqslant P .001$	Cholesterol check: yes	−.36	$.01 \geqslant P .001$
Contact with relatives: more	.06	$.05 \geqslant P .01$	Group participation: more	.08	$.05 \geqslant P > .01$
			Sex: women	.21	$.05 \geqslant P > .01$
$F = 11.00$, $df = 20, 798$; $P \leqslant .0001$; $R^2 = .216$			Perceived blood pressure: high	−.29	$.05 \geqslant P > .01$
			$F = 19.58$, $df = 20, 1{,}027$; $P \leqslant .0001$; $R^2 = .276$		
Ages 50–64			*Ages 50–64*		
Years of education: more	.08	$P \leqslant .0001$	Years of education: more	.09	$P \leqslant .0001$
Work status: working	−.26	$.001 \geqslant P > .0001$	Sex: women	.41	$.001 \geqslant P > .0001$
Sex: women	.44	$.001 \geqslant P > .0001$	Smoking status: no	−.31	$.05 \geqslant P > .01$
Cholesterol check: yes	−.40	$.01 \geqslant P .001$	Perceived cholesterol: high	−.40	$.05 \geqslant P > .01$
$F = 4.46$, $df = 20, 585$; $P \leqslant .0001$; $R^2 = .132$			$F = 6.01$, $df = 20, 633$; $P \leqslant .0001$; $R^2 = .159$		

[1]Predictors are listed giving the direction of association with greater CVD knowledge. Note that listing is based on rank order, highest to lowest.

one aspect of a preventive orientation for cardiovascular disease. They were

Preventive CVD knowledge. Survey participants were asked an open-ended question, "What specific steps can a person take to make a heart attack or stroke less likely?" An index was created based upon the number of preventive measures that were stated. A nondirective probe was used to ensure that participants had completed their lists. Eight potential responses were included in the count (smoking, fats-cholesterol, calories, exercise, weight, blood pressure, stress, salt) so that scores could range from 0 to 8.

Encouraging others. A series of four questions asked whether the respondent encouraged health practice changes by others in the areas of quitting smoking, losing weight, cutting down on salt or fat, and increasing exercise. Response was on a four-point scale: never, seldom, occasionally, frequently. A summary score was calculated based upon the number of areas that received an answer of "frequently" or "occasionally." Scores could range from 0 to 4.

Exercise. Participants were asked about their frequency of exercise, using the response categories of every day versus at least once a week versus less than once a week. Although these response categories are not as effective as is currently recommended in more recent survey questions on activity and exercise (*24*), the response "every day" sets a strict criterion and therefore probably acts to attenuate correlation with exercise habits.

Dietary intake. Nine food items were included in the survey to assess respondents' eating patterns. The items were eggs, red meat, ice cream, fried foods, cheese, whole milk, processed meat, fish, and poultry. Response categories were less than once a week, versus more than once a week but less than once a day, versus once a day or more. Three PHHP nutritionists, blinded to the survey data, independently rated each response category for each food item with respect to its potential impact on CVD health using a scale of -2 (least preferred dietary pattern), -1, 0 (no clear benefit or harm), $+1$, $+2$ (most preferred dietary pattern). Two of the authors (WR and RCL) reviewed the ratings independently for consensus, and then they met to determine the final weighting for each response category. Zero-order, Pearson product-moment correlations were then calculated between the dietary index and total serum cholesterol. Results for the two surveys were consistent (survey 1: $r=.116$; survey 2: $r=.108$; both P-values $=<.0001$). This magnitude of correlation was considered adequate to allow using the dietary index for the purposes of this report.

Predictor variables. A set of predictor variables for the four indices were selected to broadly represent sociodemographic and cardiovascular health-related domains. Included were sex, years of formal education, total persons in the household, city of residence, total household income, marital status (married versus not married), work status (working versus not working), racial group (white versus all other), and primary language spoken at home (English versus all other).

Other predictors were health-related, and they included history of diabetes (yes, no); Body Mass Index (BMI); systolic blood pressure, as measured by the second reading; perceived risk of heart attack or stroke within 5 years (high versus not high); perceived blood pressure status (high versus not high); and perceived level of cholesterol (high versus not high). The first three were considered "objective" conditions, the latter three, "subjective" assessments.

Number of friends and relatives seen or spoken with regularly, and participation in group-based events (for example, clubs, community organizations, societies) were asked, along with whether or not any persons in the household were smokers (excluding the respondent). Finally, the participant's own smoking status (yes, no) was used as a predictor, as was whether or not they reported having had their cholesterol level assessed in the previous year (yes, no). Because cholesterol measurement had not yet received significant national media attention even by the time of survey 2, the investigators were interested in whether having had such an assessment (for any reason) would be associated with more health-conscious practices.

Age groups. Three adult age groups were formed as strata within which analyses would be conducted—18–29, 30–49, and 50–64. Sample sizes and percentages for these age groups in the respective surveys were survey 1: $N=761$ (31.5 percent), 919 (38.1 percent), and 734 (30.4 percent); survey 2: $N=846$ (30.1 percent), 1,175 (41.8 percent), and 787 (28.0 percent). Because of the number of variables to be used in the regression analyses, along with the added dimension of comparison between surveys, population segmentation along a single attribute (that is, age) was viewed as an appropriate strategy.

Results

Multiple linear regression was applied to the data to identify the predictors of CVD health practices and knowledge within each age group. Unweighted data

Table 4. Predictor variables associated with "dietary intake" in three age groups, surveys 1 and 2

Survey 1[1]	*Unstandardized beta's*	*Probability value*
Ages 18–29		
Perceived cholesterol: not high	2.03	$P \leq .0001$
Smoker in house: no	1.15	$.001 \geq P > .0001$
Primary language: non-English	1.59	$.01 \geq P > .001$
Work status: working	−1.09	$.01 \geq P > .001$
Marital status: married	−.92	$.01 \geq P > .001$
Years of education: more	.15	$.01 \geq P > .001$
Body Mass Index: higher	.08	$.05 \geq P > .01$
Sex: women	.80	$.05 \geq P > .01$
$F=4.48$, $df=20, 594$; $P \leq .0001$; $R^2=.131$		
Ages 30–49		
Sex: women	1.39	$P \leq .0001$
Smoking status: no	−1.06	$.001 \geq P > .0001$
Cholesterol check: yes	−1.12	$.01 \geq P > .001$
Primary language: non-English	1.16	$.01 \geq P > .001$
Persons in house: fewer	−.22	$.05 \geq P > .01$
Perceived cholesterol: not high	1.22	$.05 \geq P > .01$
Smoker in house: no	.59	$.05 \geq P > .01$
Marital status: married	−.68	$.05 \geq P > .01$
Systolic pressure: higher	.02	$.05 \geq P > .01$
$F=5.43$, $df=20, 766$; $P \leq .0001$; $R^2=.124$		
Ages 50–64		
Cholesterol checked: yes	−1.31	$.001 \geq P > .0001$
Sex: women	1.12	$.01 \geq P > .001$
Primary language: non-English	1.68	$.01 \geq P > .001$
Income: higher	.25	$.01 \geq P > .001$
$F=3.51$, $df=20, 564$; $P \leq .0001$; $R^2=.111$		

Survey 2	*Unstandardized beta's*	*Probability value*
Ages 18-29		
Sex: women	1.65	$P \leq .0001$
Smoking status: no	−1.13	$.001 \geq P > .0001$
Perceived cholesterol: not high	1.39	$.01 \geq P > .001$
Perceived CVD risk: lower	1.38	$.05 \geq P > .01$
Persons in house: fewer	−.26	$.05 \geq P > .01$
Income: higher	.13	$.05 \geq P > .01$
$F=4.26$, $df=20, 705$; $P \leq .0001$; $R^2=.108$		
Ages 30–49		
Cholesterol check: yes	−1.52	$P \leq .0001$
Smoking status: no	−.97	$.001 \geq P > .0001$
Sex: women	.85	$.01 \geq P > .001$
Perceived cholesterol: not high	1.35	$.01 \geq P > .001$
Income: higher	.14	$.05 \geq P > .01$
Systolic pressure: higher	.02	$.05 \geq P > .01$
$F=4.69$, $df=20, 1,027$; $P \leq .0001$; $R^2=.084$		
Ages 50–64		
Sex: women	1.91	$P \leq .0001$
Cholesterol check: yes	−1.14	$.01 \geq P > .001$
Smoker in house: yes	1.12	$.01 \geq P > .001$
Perceived blood pressure: high	−1.03	$.01 \geq P > .001$
Years of education: more	.13	$.05 \geq P > .01$
Smoking status: no	−.13	$.05 \geq P > .01$
Contact with relatives: fewer	−.23	$.05 \geq P > .01$
$F=5.63$, $df=20, 633$; $P \leq .0001$; $R^2=.151$		

[1]Predictors are listed giving the direction of association with dietary intake tending to limit fat and cholesterol.

Note that listing is based on rank order, highest to lowest.

were used in the regressions. Analyses of weighted and unweighted PHHP data have produced virtually identical results. In addition, we believed that the objective of the report, to compare results from two samples, would be better addressed by staying as close as possible to the actual sources of the data, rather than inferring back to larger populations. Results are presented in tables 2–5.

Each table gives the results for one of the four dependent variables, with survey 1 appearing on the left side, and survey 2 on the right side. Several points are important for later discussion and interpretation of the findings. First, in each survey, 12 separate analyses were conducted. Therefore, any one of the predictor variables could achieve significance in up to 12 analyses (the total number of combinations that existed among the three age groups and the four dependent variables). In addition, within each age group in a survey, there was a cumulative total of 80 pairings among the four dependent variables and 20 predictors. Of these 80 combinations, four would be expected to achieve significance by chance ($80 \times .05 = 4$). However, less than one significant result would be expected to be replicated by chance alone between any two of the age groups ($.05 \times .05 \times 80 = .2$) or across all three ($.05 \times .05 \times .05 \times 80 = .01$).

In the following sections, predictors are compared and discussed qualitatively as being "important" or "prominent" based upon their relative frequencies of achieving statistical significance at the conventional level of $P<.05$. However, counts of how often statistical significance was attained are also given to maintain the distinction between the two concepts. Because of the relatively few reports from even a single sample on multiple behaviors and their predictors, there is not a standard rule-of-thumb for what constitutes an "important predictor variable" (for example, when statistical significance is achieved for 25 percent, 50 percent, or 75 percent of the practices studied).

Survey 1 and survey 2 comparisons. The following sections summarize the major similarities and differences between the results for surveys 1 and 2. Outcomes were to some extent unexpected, primarily in regard to the few predictors that consistently achieved significance in both surveys. Results from both surveys showed that it was rare for any predictor to reach statistical significance in more than 4 of the 12 possible age-group × dependent variable combinations.

Consistency of individual predictors. The first way to examine the results is to look for any predictor variables that consistently achieved statistical significance in both surveys (that is, relative to the 12 analyses conducted in each survey). From this perspective, the strongest similarity between the two surveys was the importance of sex as a predictor of health-related practices. Sex was the only predictor in survey 1 to achieve statistical significance consistently at the $P<.05$ level (see the left-hand columns of tables 2–5). Except for CVD knowledge in the 18–29 age group (table 3), sex appeared in all survey 1 combinations of age group × dependent variables (that is, in 11 of the 12 possible pairings). The direction of association also was consistent. Women reported more favorable practices than men, except for the question on exercise, when men reported more frequent vigorous activity.

The right side of tables 2–5 shows that in survey 2 sex was again the single most prominent predictor, in this case failing to achieve significance only for "encouraging others" toward behavior change in the 18–29 age group (table 2). The directions of association were identical with the results for survey 1, with women indicating more favorable practices in all areas except vigorous exercise. In all, then, 10 of the statistically significant regression associations between sex and the behavior-knowledge indices were common to both surveys. No other predictor variables achieved this degree and consistency of prominence in both samples.

Years of education achieved significance as a predictor in 7 of the 12 combinations of age groups × dependent variables in both survey 1 and survey 2. This outcome was largely due to its association with the "encouraging others" and "CVD knowledge" indices (tables 2 and 3). In survey 1, more formal education was associated with greater CVD knowledge in all three age groups (table 3) and with encouraging others to change behavior among persons aged 18–29 and 30–49 (table 2). In survey 2, more formal education was associated in all three of the age groups with both greater CVD knowledge of measures to limit risk of heart attack and stroke and with encouraging others to change behavior. Education was not strongly associated with "diet" or "exercise" in either survey. Education therefore had rather consistent associations between surveys, but it was not as broadly associated with the dependent variables as was the subject's sex.

Two other predictors, having had a cholesterol assessment in the past year and the primary language spoken at home, also achieved significance in 7 of the 12 possible age group × dependent variable pairings in survey 1. In contrast to education, this outcome was largely due to associations with the diet and exercise indices. Having had a cholesterol assessment was related to more regular exercise in all three age groups (table 5), and to a better reported diet for persons ages 30–49 and 50–64 (table 4).

Having a cholesterol assessment was important most consistently for persons ages 50–64 in survey 1, achieving significance for all four of the health practice indices. English as the language spoken at home was also associated with more regular exercise in all three age groups (table 5); non-English speaking status was related to a better reported diet across all three age groups (table 4). Neither having had a cholesterol assessment nor primary language were strongly associated with encouraging others and CVD knowledge in survey 1.

Having a cholesterol assessment in the past year and primary spoken language became less prominent in the results for survey 2. Although having had a cholesterol assessment reached significance for 6 of 12 pairings, no pattern of associations was evident. Primary language (English, non-English) also showed no consistent pattern of results in survey 2, except that persons ages 18–29 and 30–49 who spoke English as their primary language tended to report more frequent vigorous exercise, a result similar to survey 1 (table 5). Overall then, results for cholesterol assessment and primary language were not as consistent between surveys as were the results for sex and education.

Predictors across the three age groups. A second way of approaching the results, related to but not the same as the first, is to look for associations that existed in all three age groups, in either survey or both surveys. In this regard, sex was the predictor that achieved significance most often across all three age groups in both surveys. In total, there were only eight instances in survey 1 of the possible 80 pairings (4 dependent variables × 20 predictors) in which a predictor was significantly associated with the same behavior or knowledge index across all three age groups. Three of these involved sex (with encouraging others, diet, and exercise), and two involved primary language (with diet and with exercise). The other three occurred between nonsmoking status and encouraging others, having had a cholesterol assessment and exercise, and education with CVD knowledge.

Similarly, there were only 6 instances in survey 2 (of the 80 possible) in which a predictor was significantly associated with the same health practice index in all

Table 5. Predictor variables associated with "exercise" in three age groups: surveys 1 and 2

Survey 1[1]	*Unstandardized betas's*	*Probability value*
Ages 18–29		
Primary language: English	.29	$.01 \geq P > .001$
Sex: men....................	.20	$.01 \geq P > .001$
Cholesterol Check: yes.........	.37	$.05 \geq P > .01$
Years of education: more	−.02	$.05 \geq P > .01$
$F=3.12$, $df=20, 621$; $P \leq .0001$; $R^2=.091$		
Ages 30–49		
Sex: men	.24	$.001 \geq P > .0001$
Primary language: English	.30	$.01 \geq P > .001$
Cholesterol check: yes	.23	$.01 \geq P > .001$
Body Mass Index: lower	.01	$.05 \geq P > .01$
$F=4.33$, $df=20, 797$; $P \leq .0001$; $R^2=.098$		
Ages 50–64		
Sex: men	.24	$.01 \geq P > .001$
Cholesterol check: yes	.23	$.01 \geq P > .001$
Primary language: English	.28	$.05 \geq P > .01$
Persons in house: fewer........	−.06	$.05 \geq P > .01$
$F=1.93$, $df=20, 583$; $P \leq .009$; $R^2=.062$		

Survey 2	*Unstandardized beta's*	*Probability value*
Ages 18-29		
City of residence: Pawtucket	.16	$.01 \geq P > .001$
Sex: men....................	.16	$.05 \geq P > .01$
Primary language: English	.19	$.05 \geq P > .01$
Body Mass Index: lower	.01	$.05 \geq P > .01$
Cholesterol check: yes	.23	$.05 \geq P > .01$
Marital status: not married	−.11	$.05 \geq P > .01$
$F=2.52$, $df=20, 704$; $P \leq .0003$; $R^2=.067$		
Ages 30–49		
Sex: men	.21	$P \leq .0001$
Primary language: English	.23	$.01 \geq P > .001$
$F=2.34$, $df=20, 1,027$; $P \leq .0008$; $R^2=.044$		
Ages 50–64		
Sex: men	.20	$.01 \geq P > .001$
Body Mass Index: lower	.01	$.05 \geq P > .01$
$F=1.82$, $df=20, 633$; $P \leq .02$; $R^2=.054$		

[1]Predictors are listed giving the direction of association with more regular exercise. Note that listing is based on rank order, highest to lowest.

three age groups. Three of these were again accounted for by sex (with CVD knowledge, diet, and exercise) and two by years of education (with encouraging others and CVD knowledge). The sixth instance occurred between nonsmokers and diet. Nonsmokers in the 30–49 and 50–64 age groups also reported encouraging others toward behavior change, with a trend toward significance in the age group 18–29, closely paralleling the outcome for survey 1. This outcome of relatively few predictors across the adult age range is consistent with results observed in a national data set (*25*).

From the perspective of replication between surveys, three of the eight predictor × dependent variable pairings that achieved significance in survey 1 for all three age groups were replicated in survey 2 (education and CVD knowledge, table 3; sex and diet, table 4; sex and exercise, table 5). Another three pairings from survey 1 achieved significance in two of the age groups in survey 2 (sex and encouraging others, table 2; smoking status and encouraging others, table 2; primary language and exercise, table 5). Only two of the eight (cholesterol checked and exercise; primary language and diet) were not replicated. From the standpoint of the results in survey 2, three of the six pairings to appear in all three age cohorts were also found in survey 1 (as were listed previously), and two others lacked only one age group (education and encouraging others, table 2; sex and CVD knowledge, table 3). The sixth, not smoking and reporting a better diet, did achieve significance in survey 1 for those ages 30–49, approached significance for the 50–64 group, but was absent at ages 18–29 (table 4).

Overall consistency between surveys. The replication of statistically significant predictors between surveys 1 and 2 was most extensive for the group ages 30–49. There were a total of 23 significant associations in survey 1 and 20 in survey 2. Of these, 13 predictor-health practice combinations were replications (that is, survey 1, 13 ÷ 23 = 56 percent; survey 2, 13 ÷ 20 = 65 percent). There was less extensive replication of significant predictors for the age groups 18–29 (survey 1, 10 of 21; survey 2, 10 of 20), and 50–64 (survey 1, 7 of 18; survey 2, 7 of 16). Even the extent of replication for persons ages 30–49 does not seem especially high; however, there are no other data yet available for comparison. The results also well exceeded numbers that would have been expected by chance, as noted previously.

Summing these numbers across all age groups and dependent variables, there were 30 total instances in which a statistically significant pairing was replicated between surveys 1 and 2. These 30 replications were approximately one-half of the total number of significant associations in each survey (survey 1, 30 of 62; survey 2, 30 of 56). There were no discrepancies between surveys in the directions of association in any of the 30 predictor-dependent variable combinations. Therefore, although replication between surveys was not complete, there were no inconsistencies in the direction of results for a particular predictor from the first survey to the second.

Finally, in neither survey were the three indices of objective health status or the three of perceived health status strongly related to health practices. In no analysis did any more than two of the six indices show an association with behavior or CVD knowledge. Only with the diet index were two of the six variables associated (table 4, surveys 1 and 2, ages 18–29 and 30–49). The same outcome occurred for the sociodemographic variables of marital status, work status, income, contact with relatives, and total persons in the household; only income achieved significance for up to two practices in an age group (survey 2, ages 18–29, tables 3 and 4).

Discussion

The results from this investigation suggest the complexities that can be encountered in health behavior and knowledge surveys, despite having samples drawn from the same population and dependent variables that pertain to the same area of disease prevention. Each of the two samples used for this report was based on a random household survey, conducted for epidemiologic purposes of community-level CVD risk factor surveillance. As noted earlier, rather than argue for ignoring variables that failed to achieve significance in the surveys, the main objective of this paper was to provide additional support for those predictors that were consistently important. A predictor's relatively weak showing might still have been because of other considerations (that is, the measurement scales used for predictor and outcome variables).

In this regard, sex was the most consistent predictor of health practices and knowledge in the three age groups and in both surveys. Given findings from other surveys, this result was not especially surprising (*3, 4, 10–16*). However, the absence of other consistent predictors was not anticipated. The outcome for sex takes on added importance for two reasons. First, all four dependent variables were pertinent to cardiovascular disease, which itself is sex-related, since being male is a risk factor.

Women appeared to have an advantage on three indices, with only vigorous activity, using a strict coding scheme, favoring men. Subsequent analyses of our own data base and other surveys should therefore examine the predictors of health practices for men and women separately, to identify subgroups within each sex who are at risk of not having desired habits. The second reason for attention to sex is that, despite a shared reference to cardiovascular disease, the correlations among the four practices were low. Their zero-order, Pearson product moment correlations based on each survey's total sample ranged from .00 to .22, suggesting substantial independence among the four indices. Any variable that is significantly related to four criteria measures that are not substantially intercorrelated deserves special attention.

Education and the implications of having a primary language other than English might also be pursued in future studies, even though they were not as important across all dependent variables in both surveys as was sex. Education (that is, more formal education) was consistently associated positively with the CVD knowledge and encouraging others indices. In addition, education's importance relative to the other predictors is consistent with findings in the general health practices literature and is reinforced by its robustness even within a stratification variable—age group.

The primary language other than English in the sample populations was usually Portuguese. When language did achieve significance, persons with English as a primary language appeared to have an advantage. The one exception was diet, when the non-English speaking tended to report a slightly more favorable pattern. Since the majority of non-English speakers in the survey area represented nationalities with strong maritime traditions (Portuguese, Cape Verdean, Spanish), it is possible that any dietary advantage comes from a tendency toward greater seafood-fish consumption. In the other areas, however, the data highlight a need for effective formulation and delivery of information regarding cardiovascular disease prevention specific to the non-English speaking population and program followup to assure comprehension of the messages and to assist initiation and maintenance of behavior change. The relatively small percentage of non-English speaking persons in the samples may have contributed to the inconsistencies that this predictor showed between survey 1 and survey 2. Oversampling in subsequent surveys would be beneficial.

The absence of strong associations between the three objective health status indices, the three subjective health indices, and the dependent behavioral-knowledge measures deserve further attention, if only because all indices were CVD-related. In regard to the objective indicators, results demonstrate that there is no guarantee persons will be able to translate at-risk physical health status into ameliorative or preventive behavioral actions without assistance from health educators, nurses, physicians, or others. Even persons with high perceived risk may require assistance to plan courses of action. However, there may also be a more subtle process operating. Another report from the PHHP household survey (*26*) found only minimal correspondence between perceived health and an objectively derived RISKO algorithm, particularly for persons at high objective risk. If such discrepancies exist in the subjective versus objective domains, it should not be surprising when consistent associations with behavior and knowledge are absent. In effect, some people may be unclear or ambiguous about their health status, leading to inconsistent patterns of behavior.

The results of this investigation also bear on the planning of community-based disease prevention programs. The educational level of the community seems to be a factor in the level of CVD behavior and knowledge that program professionals will encounter, and men appear to have a less favorable status than women. Beyond these two most general findings, few guidelines can be derived from the present results.

Results suggested the absence of an extensive "core" set of predictors both within and between the two surveys, even though all of the dependent variables were CVD-related. To the extent that the predictors identified in survey research can suggest either specific population subgroups who might be at risk of not following desired practices (that is, men), or well-defined strategies for intervention programs to use, there is no evidence from this study for pursuing any single avenue. On the one hand, strong correlates of health practices from cross-sectional studies do not necessarily represent the variables that actually promote change. On the other hand, the absence of even cross-sectional descriptive associations suggest the need for multiple intervention techniques and a strategy of community-wide social marketing (*27*).

The low correlations among the four dependent variables imply that virtually any combination of baseline knowledge and behavior status will be found. People are likely to report mixed patterns of "favorable" and "unfavorable" practices and risk factor knowledge. Interventions will have to be prepared to address these various combinations. Multiple risk factor programs will therefore have to extend the meaning of "multiple" to its extreme —not only poor status on all of the target variables, but also on the many partial subsets of them.

It is also important to note that the relevance to CVD that was considered to link the four dependent variables was a professional judgment of the research team. The interviews were not presented to participants as cardiovascular health assessments, nor were respondents instructed to adopt heart disease prevention as the context for their responses. These features in the study protocol were planned to decrease the risk of cueing the respondents. In fact, two of the four dependent variables were after-the-fact composites of individual items (encouraging others, diet). The results reinforce the potential independence even among indices with an identifiable common focus, and they underscore the challenge facing large-scale public education campaigns.

This challenge may be especially formidable early in intervention programs, when scientific information about the nature of the target problem has not diffused broadly into the population. Researchers and health professionals are usually involved in determining risk factor algorithms well before a comprehensive message on the risk factor-disease association is presented to general audiences. If persons are not aware of the full repertoire of risk factors contributing to disease, then correlations among behaviors that have now been deemed by the professional community to have a common outcome are not likely to be high. It may be only after concerted intervention, as more persons institute broader lifestyle change, that the targeted health behavior and knowledge indices show a stronger set of intercorrelations. In one sense the absence of strong associations in this investigation was consistent with, and reflects, the challenge faced by community interventions that attempt to change population risk profiles, rather than focus solely on high-risk samples.

We still do not have criteria for judging how many significant associations a predictor should have across a set of practices to be considered important on a broader level of interpretation. It is, of course, more than an issue of mere numbers. This report has used counts of significant associations as one type of least common denominator, which was allowed to some extent by the outcome that so few predictors did actually make a strong showing. Other readers, however, may find the results for a particular predictor, a specific age group, or a single dependent variable useful for their purposes. The present data do provide some assistance for one of the most noteworthy challenges facing health behavior research—that of identifying and understanding the predictors of health practices and knowledge within and across major groups of the population.

References

1. Special section—1985 findings on health promotion and disease prevention. Public Health Rep 101: 566–606, November–December 1986.

2. Marks, J. S., et al.: The Behavioral Risk Factor Surveys: I. State-specific prevalence estimates of behavioral risk factors. Am J Prev Med 1: 1–8 (1985).

3. National Center for Health Statistics: Basic data from wave 1 of the National Survey of Personal Health Practices and Consequences: United States, 1979. DHHS Publication No. (PHS) 81–1163, Vital Health Stat [15] No. 1, August 1981.

4. National Cancer for Health Statistics: Health practices among adults: United States, 1977. Advancedata No. 64, Nov. 4, 1980.

5. National Center for Health Statistics: Health promotion data for the 1990 objectives: estimates from the National Health Interview Survey of Health Promotion and Disease Prevention:

United States, 1985. Advancedata No. 126. Sept. 19, 1986.
6. Office of Disease Prevention and Health Promotion: The 1990 health objectives for the nation: a midcourse review. Public Health Service, U.S. Government Printing Office, Washington, DC, November 1986.
7. Belloc, N. B., and Breslow, L.: Relationship of physical health status and health practices. Prev Med 1: 409–421 (1972).
8. Belloc, N. B.: Relationship of health practices and mortality. Prev Med 2: 67–81 (1973).
9. Breslow, L., and Enstrom, J. E.: Persistence of health habits and their relationship to mortality. Prev Med 9: 469–483 (1980).
10. National Center for Health Statistics: Health, United States 1986. DHHS Publication No. (PHS) 87–1232. U.S. Government Printing Office, Washington, DC, December 1986.
11. National Center for Health Statistics: Trends in smoking, alcohol consumption, and other health practices among U.S. adults, 1977 and 1983. Advancedata No. 116, June 30, 1986.
12. National Center for Health Statistics: Use of selected preventive care procedures, United States, 1982. DHHS Publication No. 86–1585. Vital Health Stat [10] No. 157, September 1986.
13. Verbrugge, L. M.: Gender and health: an update on hypotheses and evidence. J Health Soc Behav 26: 156–182 (1985).
14. Swank, M. E., Vernon, S. W., and Lairson, D. R.: Patterns of preventive dental behavior. Public Health Rep 101: 175–184, March–April 1986.
15. National Center for Health Statistics: Sex differences in health and use of medical care: United States, 1979. DHHS Publication No. (PHS) 83–1408. Vital Health Stat [3] No. 34, September 1983.
16. Hoffman, R. E.: Tracking 1990 objectives for injury prevention with 1985 NHIS findings. Public Health Rep 101: 581–586, November–December 1986.
17. Langlie, J.: Interrelationships among preventive health behaviors: a test of competing hypotheses. Public Health Rep 94: 216–225, May–June 1979.
18. Tapp, J. T., and Goldenthal, P.: A factor analytic study of health habits. Prev Med 11: 724–772 (1982).
19. William, A. F., and Wechsler, H.: Interrelationships of preventive actions in health and other domains. Health Serv Rep 67: 969–976, December 1972.
20. Carleton, R. A., et al.: The Pawtucket Heart Health Program: I. An experiment in population-based disease prevention. RI Med J 70: 533–538 (1987).
21. Assaf, A. R., et al.: The Pawtucket Heart Health Program II. Evaluation strategies. RI Med J 70: 541–545 (1987).
22. Kish, L.: Survey sampling. John Wiley, New York, 1965.
23. Deming, W.: Sample design in business research. John Wiley, New York, 1960.
24. Slater, C. H., Green, L. W., Verson, S. W., and Keith, V.M.: Problems in estimating the prevalence of physical activity from national surveys. Prev Med 16: 107–118 (1987).
25. Rakowski, W.: Age cohorts and personal health behavior in adulthood. Res Aging 10: 3–33 (1988).
26. Niknian, M., McKinlay, S. M., Rakowski, W., and Carleton, R.A.: A comparison of perceived and objective CVD risk in a general population. Am J Public Health 79: 1653–1654 (1989).
27. Lefebvre, R. C., and Flora, J. A.: Social marketing and public health intervention. Health Educ Q 15: 299–315 (1988).

Sanitary Product Use by White, Black, and Mexican American Women

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Synopsis

In 1988–89, the use of menstrual sanitary products was surveyed among 699 white, 477 black, and 425 Mexican American women to detect age and racial or ethnic differences in product use that might explain the differences in the incidence of toxic shock syndrome (TSS) in these demographic categories. Forty percent of the women had never used tampons. Significantly more whites used tampons alone (26 percent) or with pads (36 percent) than did blacks. Proportionately more blacks used tampons alone (16 percent) or with pads (27 percent) compared with Mexican Americans, 11 percent of whom used tampons alone and 21 percent of whom used tampons and pads. Since a substantial proportion of black women used tampons, racial-ethnic variations in use patterns alone cannot completely explain the low incidence of TSS among black women.

Tampon use started in the early teen years, but women in the age group 20–29 had the highest frequency of use of tampons either alone (26 percent) or with pads (33 percent). These percentages suggest that age-related differences in product use may not explain the age-related differences in the incidence of TSS. Fear was the most common specific reason for not using tampons in response to information about TSS. Decreased use of tampons in response to information about TSS was reported by 39 percent of whites, 50 percent of blacks, 46 percent of Mexican Americans, and by 36 percent of women less than 19 years, 41 percent of 20–29-year-olds, and 47 percent of women 30 years and older.