Healthy Behaviors among Women in the United States and Ontario: The Effect on Use of Preventive Care

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ABSTRACT

Objectives. This study examined how several healthy behaviors among women in Ontario and the United States explained (1) the use of preventive health services, (2) differences in use between socioeconomic groups, and (3) differences in use between the two health systems.

Methods. 1990 data on women from the Ontario Health Survey (n = 22 985) and the US National Health Interview Survey (n = 19 092) were analyzed. A woman who avoided smoking and obesity, used seatbelts, and regularly engaged in aerobic exercise was defined as having a healthy lifestyle. Women were considered screened if they reported a mammogram or a breast exam within the previous year or a Pap smear within 2 years.

Results. A healthy lifestyle was more common in the United States than Canada among more highly educated groups (odds ratio [OR] = 1.40; 95% confidence interval [CI] = 1.22, 1.60 for college educated) but less common in the United States for those with less than a high school education (OR = 0.52; 95% CI = 0.40, 0.67). Each additional unhealthy behavior decreased the odds of having undergone a mammogram in the previous year by 20%. However, adjusting for the number of unhealthy behaviors did not substantially change the relationship between socioeconomic status and use of preventive services.

Conclusions. The number of healthy behaviors is an important measure of demand for preventive health services. This measure varies across country and socioeconomic group. (*Am J Public Health.* 1996;86: 1755–1759)

Introduction

Despite the long-time presence of universal health care insurance in Canada, Ontario women of higher socioeconomic status are much more likely to receive cervical screening with Papanicolaou smears and breast cancer screening with clinical breast exams and mammography than women of lower socioeconomic status.[1] While the relationship between income and use is quite similar for Pap smears and breast exams in the United States and Ontario, mammography use in the United States is much higher than in Ontario for high-income relative to low-income groups.

In comparison with Pap smears and breast exams, mammography is a higher profile, more technologically intensive procedure. There may be a relatively greater demand for mammograms among high-income US women in a culture that aggressively promotes medical technology and personal health. There is a booming interest in health in the United States, reflected in the many aspects of a healthy lifestyle that are celebrated in our popular culture. Vitamin boutiques, exercise classes, antismoking ordinances, and a plethora of low-fat foods provide evidence of this trend to venerate certain aspects of health. It is not clear to what extent this development is shared in other countries,[2–6] and differences in demand for health care represent a compelling potential explanation for the extremely high use of health services found in the United States relative to other countries.

Well-accepted measures of patient demand have not been developed; a population group that manifests the attributes of a healthy lifestyle (e.g., avoiding smoking and obesity, wearing seat belts, and exercising), however, may be expected to seek more preventive health services. It is well known that health behaviors vary across socioeconomic groups,[7,8] and thus differences in health behaviors may also in part account for the gradients across socioeconomic status in the use of preventive health services.

Our objective in this study was to compare the prevalence of several healthy behaviors among women in Ontario and the United States and to define a measure of demand for preventive health services based on choices of these lifestyle behaviors. We examined whether this measure explained some of the differences in use of preventive services across socioeconomic groups, especially in Ontario, where universal coverage should make these services accessible to all. We also examined whether this measure of demand for preventive services accounted for the more extreme socioeconomic differences in use of mammography in the United States relative to Ontario.

Methods

Data Sources

We used the 1990 Ontario Health Survey and the 1990 US National Health Interview Survey (NHIS) Health Prevention Supplement Sample Person File; these population-based surveys collected

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This paper was accepted April 12, 1996.

TABLE 1—Characteristics of the Study Population: Women Aged 18 to 65 Years from the Ontario Health Survey and the US National Health Interview Survey, 1990

	Ontario (n = 22 985)	United States (n = 19 092)
Mean age, y	38.9	38.6
Education, %		
No high school	28.6	16.4
High school	29.3	40.3
Some college	14.8	23.1
College	27.3	20.2
Income, %		
< US $15 200	11.5	26.3
< US $45 000	54.6	49.5
≥ US $45 600	33.9	24.2
Married, %	71.5	56.7

detailed information on health care use, health status, health behaviors, and demographics from a sample of the civilian noninstitutionalized population.[9,10] The Ontario Health Survey response rates were 88% for the interview and 77% for a supplemental questionnaire; the NHIS response rate was 97%.[9,10] The respondents involved in the present study were women between 18 and 65 years of age who were questioned about their health behaviors and use of preventive services (for the NHIS, n = 19 092; for the Ontario Health Survey, n = 22 985). Information about the use of screening procedures and health behaviors was ascertained with similar questions in the two surveys.[1] The population characteristics in each survey are shown in Table 1.

Variables

The dependent variables were as follows: (1) Pap smear within 2 years, (2) clinical breast exam within 1 year, and (3) mammogram within 1 year. Although recommendations for the frequency of screening Pap smears vary from 1 to 3 years, we selected a 2-year interval because it was the most comparable interval across the surveys.

A measure of a healthy lifestyle was used as both a dependent variable and a covariate in separate analyses. There are no widely accepted criteria for defining lifestyles, although some have been suggested.[11] We conceptualized our lifestyle measure focusing on health as overall orientation, with components composed of behavioral factors that could be directly linked to health outcomes. We chose four factors: smoking, exercise, seat belt use, and obesity. Each variable was dichotomized, positive responses representing current smoking, exercising more than one time per week, always using seat belts, and a body mass index of less than 29 kg/m^2. The four health behaviors selected were ascertained in a comparable way in the two surveys.

There is evidence that these behaviors represent different domains of health behavior[12]; provide a conceptual bridge between health and lifestyle values, attitudes, and behaviors[11]; and are linked to health outcomes in the minds of the general population and the medical community.[13–15] These behaviors have also been linked empirically to health outcomes.[16] The concept of a healthy lifestyle had been used by the investigators in the Alameda Study, who constructed an index composed of a simple sum of seven healthy practices, including three of those included in our index, and then demonstrated a relationship between a healthy lifestyle and future disability in a long-term longitudinal study.[16] Finally, these types of behaviors have been associated with preventive health service use, although there has been no consistent approach to using an index of behaviors or controlling for socioeconomic factors or the presence of one or more healthy behaviors.[17–19]

The principal independent variables of interest were family income and education. We used a purchase-power parity factor (.763) described by the Organization for Economic Cooperation and Development[20] to deflate Canadian dollars to US dollars. Family size was included as a continuous variable. In both surveys, income was missing in 15% of cases. All data elements were complete for 77% of the Ontario sample and 82% of the US sample. It is important to note that the distribution of sociodemographic factors and screening use between women excluded and those included was very similar in the two surveys. Women excluded because of any missing data were less likely to have been screened and had lower family incomes and lower educational levels than those included in the analysis.

Analysis

We present univariate relationships between health behaviors and socioeconomic characteristics and a multiple logistic regression model for the dichotomous dependent variable representing a healthy lifestyle (1 = no unhealthy behaviors). The independent variables were age, education, income, and country. Interaction terms with country and education were added to assess the differences across education levels by country. We also analyzed an ordinal dependent variable, representing the number of healthy behaviors, using ordinal logistic regression. Because the results of the two analyses were very similar, we present only the odds ratios (ORs) from the logistic regressions.

We then examined the association between use of the three preventive services and socioeconomic characteristics and country with and without controlling for health behaviors. Separate multiple logistic regression equations were modeled for each procedure. For Pap smear screening, we included women 18 to 65 years of age; for clinical breast exam and mammography screening, we included women 40 to 65 years old. Independent variables included terms for country, education, income, and age (age and age squared, to capture the diminishing rate of increase in use with age). For Pap smear only, we included terms for marital status and pregnancy within 2 years because these variables were strongly associated with socioeconomic status and the screening test. After a systematic examination of interactions between selected independent variables, an interaction term for marital status and age was included for the Pap smear analysis only.

Our primary hypotheses were that (1) a healthy lifestyle would be associated with the use of preventive services; (2) adjustment for a healthy lifestyle, as represented by the number of healthy behaviors practiced, would decrease the strength of the relationship between income and use of all preventive services;

TABLE 2—Distribution of Healthy Behaviors among Sample, by Level of Education: Ontario and US Women Aged 18 to 65 Years

	Ontario[a]			United States[b]		
	Less than High School Education, %	College Education, %	OR (95% CI)	Less than High School Education, %	College Education, %	OR (95% CI)
Avoidance of smoking	61	77	2.2 (1.9, 2.5)	62	86	4.0 (3.5, 4.6)
Nonobesity (body mass index < 29)	79	90	2.4 (2.1, 2.9)	73	90	3.2 (2.8, 3.6)
Seat belt use (always)	87	94	2.3 (1.9, 2.8)	55	86	5.2 (4.6, 6.0)
Exercise (at least once a week)	20	39	2.2 (2.0, 2.5)	18	43	3.4 (3.0, 3.8)

Note. OR = odds ratio; CI = confidence interval.
[a]Average number of healthy behaviors (% engaging in all four healthy behaviors): those with less than a high school education, 2.5 (10%); those with a college education, 3.0 (26%) (OR = 3.2, 95% CI = 2.8, 3.8).
[b]Average number of healthy behaviors (% engaging in all four healthy behaviors): those with less than a high school education, 2.1 (5%); those with a college education, 3.0 (32%) (OR = 8.3, 95% CI = 6.9, 10.0).

and (3) a healthy lifestyle in the high socioeconomic groups in the United States vs those in Ontario would explain the stronger relationship of mammography use to income observed in the United States. A variable representing number of healthy behaviors was included in the regression models just described to assess the relationship between health behaviors and use of preventive services. First-order interaction terms between country and income and between country and education were examined, with and without adjustment for number of healthy behaviors, to test the second and third hypotheses. We calculated the adjusted odds ratios of having a screening test for US and Ontario women with higher incomes and education levels relative to women with lower incomes and education levels.

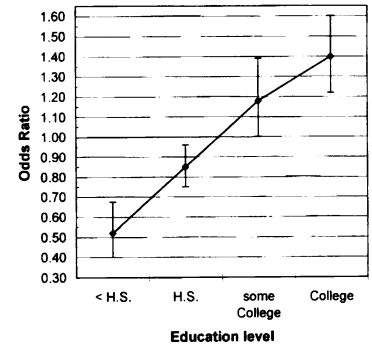
We used the sampling weights in all analyses. In the model building process, we estimated standard errors for the logistic regression model using robust regression techniques. We assessed the statistical significance of individual regression coefficients and groups of coefficients using Wald tests. We calculated standard errors for the regression coefficients of the final models using a balanced repeated replication technique[21] that accounted for the different cluster sampling strategies in each survey. Finally, we assessed model fit with the C statistic and examined the Hosmer–Lemeshow statistic on unweighted regression models. We used STATA (College Station, Tex) in all analyses.

Results

Smoking rates were lower in the United States. Exercise rates were similar in the United States and Ontario, and rates of obesity and not using a seat belt regularly were higher in the United States. These overall results are comparable to previously reported comparisons of health behaviors in the United States and Canada.[22] Although the population means were similar, there was a marked difference when the results were examined across education levels. Table 2 shows that the differences across education levels in the US population were consistently much larger than those in Ontario.

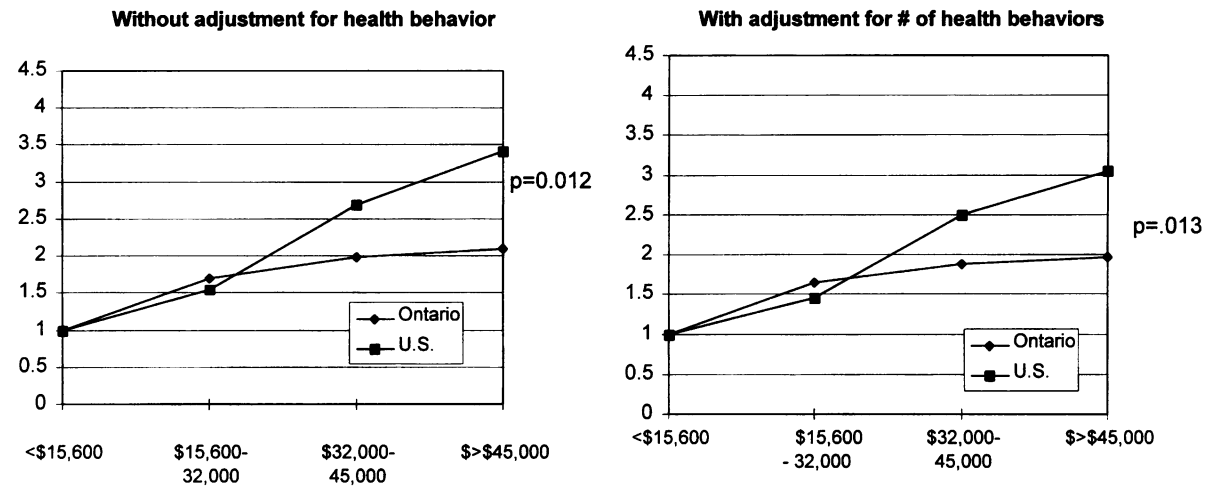
The results testing the significance of these findings, in a multivariate analysis adjusting for age, income, and family size, are shown in Figure 1. As can be seen, high-education groups in the United States were 40% more likely than comparable groups in Ontario to have a healthy lifestyle. By contrast, low-education groups in the United States, in comparison with such groups in Ontario, were only half as likely to have a healthy lifestyle. The odds of a healthy lifestyle also increased with income in both countries (OR = 1.7 for high vs low income, 95% CI = 1.5, 2.0) and decreased with increasing age (OR = 0.44 for 50- to 65-year-olds vs 18- to 34-year-olds, 95% CI = 0.39, 0.50). The relationship between income and healthy lifestyle was not significantly different in the two countries when tested with or without the country and education interaction terms.

The odds of obtaining a Pap smear increased 24% for each additional healthy behavior a woman reported (OR = 1.24, 95% CI = 1.20, 1.28). Similarly, the odds of obtaining a mammogram for women between 40 and 65 years of age increased 23% for each additional healthy behavior (OR = 1.23, 95% CI = 1.20, 1.28). For clinical breast exams, the odds ratio was 1.33 (95% CI = 1.28, 1.39). The relationship between number of healthy behaviors and preventive care use remained after adjustment for age, income, family size, and education; for Pap smears, the relationship remained after further adjustment for marital status and recent pregnancy. In the multivariate analyses, each additional healthy behavior resulted in a 19% to 26% increase in the odds of receiving each of the three preventive care screening tests ($P < .001$ in all cases). We confirmed that this relationship was linear in a model using dummy variables representing the number of



Note. Odds ratios were adjusted for age, income, and family size. Error bars represent 95% confidence intervals. H.S. = high school.

FIGURE 1—The adjusted odds of reporting all four healthy behaviors, by level of education: US women vs Ontario women.



Note. Each point represents the odds, relative to the lowest income group in Ontario or the United States, of obtaining a mammogram within 1 year for women between 40 and 65 years of age after adjustment for age, education, and family size. *P* values represent tests for differences in slopes between the two lines.

FIGURE 2—The odds of mammography use by income and country, before and after adjustment for number of healthy behaviors.

healthy behaviors as opposed to a single ordinal variable.

The final analyses examined whether including lifestyle behaviors changed the relationship of socioeconomic variables and preventive service use in the United States and Ontario (corresponding to our second and third hypotheses). For all three preventive care services, the odds of receiving the service for those with a high income relative to those with a low income (<$15 200) increased linearly with income after the other covariates, including education, had been controlled. There was a trend for the relationship between income and service use to be steeper in the United States, although the relationship achieved significance only for mammography use. The inclusion of healthy behaviors as a covariate did not modify the income–use relationship or the difference in that relationship between countries. This relationship was assessed by examining the coefficients for income and the interaction terms of income and country with and without the addition of the healthy behavior count as a covariate.

Figure 2 presents mammography use across income groups in Ontario and the United States both with and without adjustment for number of unhealthy behaviors. Differences in the number of healthy behaviors between countries did not substantially change the relative relationship between income and use. In both countries, there was only a slight diminution in the gradient of use across income groups (quantified by a 10% decrease in the odds of obtaining mammography for high- vs low-income women).

Discussion

Our findings support the use of the number of healthy behaviors as a measure of demand, given its strong independent association with use of preventive services in women across types of service (mammography, Pap smears, and breast exams), even after adjustment for income, education, and demographic variables. Other investigators have shown that several health behaviors are associated with using mammography services independently of income.[19] We have extended these findings by demonstrating an effect of healthy behaviors on the use of Pap smears, mammography, and clinical breast exams that is both linear with the number of behaviors and consistent across the three preventive services. In addition, this measure of demand for preventive services differed across education levels in Ontario and the United States. Previous work has compared individual behaviors in Canada and the United States; however, we have quantified the effect for an index of healthy behaviors and related it to the use of specific preventive care health services.[22,23]

We previously reported that the use of preventive health services differed across income levels for women in both the United States and Ontario, even though universal coverage without copays had removed all direct financial barriers to care.[1] However, for mammography, unlike Pap smears and breast exams, there were significantly greater disparities between high- and low-income women in the United States than in Ontario. We suspected that such a finding might, in part, reflect an increased demand for this high-profile screening technology on the part of US women of high socioeconomic status. We found that adjusting for number of healthy behaviors did not change the conclusion that a similar overall gradient in use of preventive services across socioeconomic groups persists in both countries or the finding, in the case of mammography, of particularly large differences between high- and low-income US women. This result points away from demand-related factors (at least in terms of demand for other health-related services) as the explanation for persisting income differences in the distribution of preventive care services in the two countries.

Factors other than patient demand may be more important in the maintenance of unequal distributions of preventive care services across income groups, even with universal coverage. Significant opportunity costs in terms of time to seek health care remain. For some population groups, there are cultural barriers to the

health care system such as language or health beliefs. For the special case of mammography, the two visits generally required to complete mammographic screening would double copay costs and might increase the access problems for low-income people in the US system, with its high reliance on patient cost sharing.

There are differences in the way mammography is provided in the two countries. In the United States, mammography has been more heavily promoted and is more readily available in the community, and there are more liberal reimbursement policies.[1] If, in fact, there is supply-induced demand, this may result principally among those with higher income and education levels in the United States. In Canada, there are guidelines recommending against screening women 40 to 50 years of age, whereas in the United States, recommendations for this age group are being debated. However, the relative use of mammography in the United States and Ontario is constant across age groups, and consistent results are obtained if 50 years of age is used as the cutoff for screening.

Consumer demand for health care does not have a commonly accepted measure and is usually ignored in favor of physician factors and issues of access to care as variables explaining variation in health care use. Many physicians anecdotally note that much overuse is due to patients who demand certain types of treatments and tests (e.g., use of antibiotics for viral upper respiratory tract infections or use of magnetic resonance imaging for low back pain); however, there are few empirical data to support or counter this view. While media analyses often attribute runaway costs in the United States to an insatiable demand for health care on the part of the American people,[24] no previous studies have quantified a societal demand for health care or demonstrated that it differs across countries.

There are good reasons to consider health behaviors as a potential measure of demand for some health care services. There is a large body of theory acknowledging that healthy behaviors and use of preventive health services result from a common motivation for self-protection.[25,26] The absence of healthy behaviors is considered to reflect a "lack of feeling of control over health and illness reflecting individual personal experience of powerlessness to affect the social and political forces shaping [one's] life."[27] There is also a consistent body of empirical evidence, in addition to our study, that healthy behaviors (e.g., not smoking) are associated with the use of preventive services such as Pap smears, dental care, and physical exams.[14,18,19,28] Finally, in our study, there was a "dose–response" relationship between number of healthy behaviors and use of preventive services.

We have chosen to focus this discussion of the adoption of health-protective behaviors on what propels people to enter or prevents them from accessing preventive health care services. To do this, we separated those behaviors that are part of the private sphere of the individual from those that require use of the medical system. Developing a measure of demand for health care based on health behaviors may allow us to investigate differences in the use of other types of preventive health services. Inasmuch as we can define discretionary preventive health services, particularly in populations with good or excellent health status, there is an appeal to developing a measure of patient demand that is based on the pursuit of lifestyle choices outside the medical arena. □

Acknowledgments

This research was funded by a grant from the Robert Wood Johnson Foundation. Dr Hofer was supported by a Career Development Grant from the Veterans Affairs Health Services Research and Development Service. Dr Katz is a Robert Wood Johnson Generalist Faculty Scholar.

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