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The Predictive Utility of Demographic
variables for the Breast self-
examination and the PAP test: an
application of the Health Belief Model
using the 1985 Health Promotion Survey

by

Thane George Jovanovich B.Sc.

A thesis submitted to the Faculty of
Graduate Studies in partial fulfilment
of requirements for the degree of
Master of Arts.

Department of Sociology and Anthropology
Carleton University
Ottawa, Ontario
22 October, 1990

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submitted by Thane George Jovanovich, B.Sc.
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the degree of Master of Arts

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November 25, 1990

Abstract

The use of the Health Belief Model for predicting health behaviours has focused upon the belief variable. Demographic variables mediate beliefs, and are not utilized as direct predictors of behaviour. Questions relating to early cancer detection techniques were extracted from the 1985 Health Promotion Survey. The believed frequency in performing the breast self-examination better predicted its practice ($R^2 = 15\%$) than demographic variables alone ($R^2 = 1\%$). Demographic variables were better predictors of the recency of having a PAP test ($R^2 = 12\%$) possibly because having a PAP test is similar to using a service and is not just a volitional personal practice. The Health Belief Model should be expanded to include demographic variables as direct predictors of behaviour. The inconsistent relationships between demographic variables and health behaviours indicates that a more careful scrutiny of the use of demographic variables in the development of health-oriented public policy is warranted.

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Introduction

The Health Belief Model has been used to predict the practice of various health behaviours. Common use of the Health Belief Model focuses upon beliefs as the main predictors of behaviours, although there are other components to this model. Demographic variables are included in the framework of the Health Belief Model, but demographic variables have not been utilized as predictors. The predictive utility of the Health Belief Model may be improved by the inclusion of demographic variables, if the demographic variables are found to be significant predictors of health behaviours. The 1985 Health Promotion Survey includes information about the socio-demographic traits, health beliefs and the health practices of the respondents. The 1985 Health Promotion Survey sampled 11,181 residents in Canada, excluding only those in the Northwest Territories. The interview was completed by telephone, and contained the responses from the members of households who were 15 years of age and older. The variables used in this study are extracted from the 1985 Health Promotion Survey. The health practices to be extracted from the survey are the early cancer detection techniques.

The behaviours studied in this analysis are female-specific early cancer detection practices. The breast self-examination (BSE) and the PAP test are the two behaviours.

The belief measure for the practice of BSE will be examined. The study of the predictive utility of belief is restricted to the BSE due to the range of questions in the 1985 Health Promotion Survey (HPS).

The study of health behaviours is important because medicine has become a powerful mechanism of social control (Calnan 1984: 561). Much of daily life has been medicalized, and health behaviours are often routine in peoples' lives. A dependency upon the medical bureaucracy is suggested to exist (Calnan 1984). Some groups may be more vulnerable to the bureaucracy than others. Women may tend to be more dependent by being in lay careers (Calnan 1984), or through socialization. Dependence can refer to an acceptance of and faith in scientific knowledge or advice (Calnan 1984). Dependence is also used to depict the passive stance with a preference for medical technology rather than active management of health needs. The BSE can be viewed either as medicalization since it is prescribed behaviour, or as an appropriation of health care practices by the individual.

A review of the Health Belief Model will be performed in detail to establish its tenets, and will demonstrate the nature of the model's framework. The need to examine the predictive utility of demographic variables upon the

practice of health behaviours, will be evident from an examination of past studies. The Health Belief Model incorporates demographic variables into its framework, but these variables are neglected because demographic variables are considered modifiers of beliefs and do not influence behaviours directly. Yet, demographic variables may be stronger predictors of behaviours than beliefs. If demographic variables are found to be significant predictors of health behaviours, they should be included in the model's framework to improve its overall predictive utility.

Overview

The use of the Health Belief Model for predicting health behaviours has focused upon the belief variable. The model makes the assumption of self-sufficiency with regards to its predictive value. Socio-demographic variables are seen to influence an individual's health beliefs, but are not viewed as directly related to behaviour (Sutton 1976: 367). Hence socio-demographic variables have been neglected as direct predictors of health behaviours. Suchman (1965) studied the association between social group structure and an individuals' medical orientation. Medical orientation refers to the mode of medical care sought. The mode can be either scientific health care, or folk/ popular health care. Suchman (1965: 9) found that certain demographic variables were significantly related to the individual's medical

orientation.

This study will determine whether the predictive utility of the Health Belief Model can be enhanced by the inclusion of demographic variables as direct predictors of behaviour. The Health Belief Model proposes a relationship between demographic traits with beliefs about BSE, and beliefs about BSE with the frequency of BSE practice. Beliefs are mainly considered when predicting health behaviours, and socio-demographic variables are perceived as moderators of beliefs. The predictive framework for the Health Belief model would appear as:

demographic traits → belief → health behaviour.

This relationship can be tested by examining the association between the belief in BSE and the frequency of BSE practised. Demographic variables might be stronger predictors of health behaviours.

Socio-demographic traits have been shown to be significant direct predictors of beliefs (Becker et al. 1977) and behaviours (Suchman 1965). Therefore, the predictive relationship of the Health Belief Model should include the socio-demographic variables as direct predictors in its framework. The predictive relationship in this

analysis will be determined using variables from the Health Promotion Survey. Belief is measured as the considered frequency that women should practice BSE in this study. The measures of behaviour are the frequency of BSE practised, and the last time the woman had a PAP test. According to the Health Belief model, the predictive relationship between the variables would exist as follows:

demographic traits → belief → health behaviour.

This study attempts to go beyond past studies which solely concentrate upon testing the predictive utility of beliefs. If demographic variables are found to be significant predictors of early cancer detection behaviour, then the Health Belief Model's predictive utility can be improved through its expansion. The predictive contribution of the demographic variables of age, education, total household income and marital status to the early cancer detection behaviours will be explored in this study. Thus, the fundamental predictive framework of the model will be tested in this analysis.

Two studies were completed using the 1985 Health Promotion Survey which looked at the early cancer detection techniques. One study looked at the relationship of some demographic variables with early cancer detection techniques

using crosstables ("Female Preventive Health Practices" (Garceau 1988)). The other study (Norman 1988) examined factors influencing Canadians to engage in the various health practices included in the survey. The predictive utility of demographic variables was not tested in either of the two studies. In addition to testing the nature of the framework of the model, a comparison between the findings of the government studies and this analysis will be performed.

A definition of health behaviours will be presented first in order to understand what behaviours the Health Belief Model is referring to. A description of the Health Belief Model's tenets will then be conducted, and past studies will be cited in order to depict the approach taken by the model. These examples will be followed by the presentation of the studies using the 1985 Health Promotion Survey.

Health Practices Defined

Harris and Guten's (1979) definition of health behaviours is robust, and allows for broad applications. The definition facilitates the use of the health behaviours in this study. Harris and Guten (1977: 18) define health protective behaviour as:

any behaviour performed by a person, regardless of his or her perceived or actual health status, in order to protect, promote, or maintain his or her health, whether or not such behaviour is objectively effective towards that end.

Harris and Guten's (1979) definition allows for the study of a range of health behaviours and individuals who can be included in the study. Studies of the behaviour of diabetics and those carriers of Tay Sachs were performed with the use of the expanded definition of health behaviour. This definition of health practices will allow for variations in the use of early cancer detection practices in this study.

Langlie (1977) subdivided health behaviours into two groups. The two groups are direct health behaviours and indirect health behaviours. The direct health behaviour has a direct (immediate) potential for causing an injury or disease (e.g. driving recklessly, or the improper handling of hazardous materials). An indirect health behaviour is

not hazardous in and of itself (e.g. a medical examination or avoiding immunization in Canada due to herd immunity). It is not inherently hazardous not to practice an indirect health behaviour (Rutledge 1987). Early cancer detection practices are indirect health practices.

The Health Belief Model

The Health Belief Model (HBM) has been portrayed as a self-sufficient model made up of a collection of variables (Sutton 1987). The HBM has evolved into a broad based model, and has been adapted in order to better predict health practices. The development of the model will be presented, and the work performed by Norman (1988) on the 1985 Health Promotion Survey.

The early tenets of the Health Belief Model were:

- (1) the threat posed by a disease is a function of the likelihood of the susceptibility perceived by the individual, and the perceived severity of contracting the disease;
 - (2) the perceived benefits in the efficacy of a behaviour in reducing the threat of contracting the disease; and
 - (3) the perceived barriers posed by psychological, physiological or financial constraints/ costs in performing the proposed action. Included in these postulates are cues for behaviour. Cues could be internal (ie. physiological symptoms) or external (ie. health information in the media communication, or advice from significant others)
- (Becker et al. 1977: 349).

Mechanic (1962) listed the components of perceived susceptibility to diseases as: the frequency the disease strikes a given population; the familiarity of the populace with the symptoms of the disease; and the consequence of contracting the disease.

The tenets of the HBM can be represented schematically.

The diagram indicates that demographic variables do not directly impact behaviours and also shows the predictive manner in which demographic variables are used.

Figure 1: The Health Belief Model and the likelihood of practising a preventive behaviour.

* Demographic variables include age, sex, race and ethnicity.

** Social-psychological variables include personality, social class, peer and reference group pressure (Becker and Maiman 1975: 12).

This formulation of the HBM is the most commonly used model in health practice studies (Mullen et al. 1987, Becker 1979, Harris and Guten 1979, Becker et al. 1977, Becker and Maiman 1975). Behaviours that have health implications are now included even though the reason for engaging in the actions were unrelated to health (Becker et al. 1977). Other concepts included were: "feelings of control over

health matters"; " faith in doctors and medical care"; "intention to comply" (Becker et al. 1977, Gochman 1977, Gochman 1972); and social support (Calnan and Moss 1984: 204). The HBM has developed into a very broadly-based model.

Past Studies

Calnan and Rutter (1986) explored the relationship between beliefs, and health behaviours using the HBM. The beliefs taken from the model were perceived vulnerability and perceived value (Calnan and Rutter 1986: 673). Perceived severity was omitted, since it is established that women do believe breast cancer is a severe disease (Calnan and Rutter 1986, Stillman 1977). A comparison in the results would be made among three groups: those who attended BSE instruction class; those who declined to attend the class; and controls (Calnan and Rutter 1986).

The sample selected women in one health district from each of two large provincial cities in Great Britain. All the women were 45-64 years of age, and were registered with a general practitioner. Women in one district were invited to attend BSE classes at random. The group who accepted the invitation received instructional classes, and those who refused the instructional classes were from the same district. The instructional classes consisted of an

instructional film, and a lecture by a nurse. "In the control district there were no BSE classes, or campaigning, and nothing was provided beyond normal existing routine diagnostic screening" (Calnan and Rutter 1986: 674). Both the control and the other district had sample totals of approximately 1,100.

There were ten measures for the HBM beliefs. The questions asked are as follows:

1. If women examined their breasts regularly would there be fewer deaths from breast cancer
2. My health is too good at present to even consider thinking I might get breast cancer
3. If I found a lump in my breast myself it would not really matter because it is too late anyway
4. Whenever I hear of a friend or relative or public figure getting breast cancer, it makes me realize I could get it too
5. If I examined my own breasts regularly, I might find a lump sooner than if I went for a check-up
6. There are so many things that could happen to me that it is pointless to think about any one thing like breast cancer
7. Even though it is a good idea, I find examining my breasts an embarrassing thing to do
8. Examining my breasts would make me worry unnecessarily about breast cancer
9. The older I get the more I think about the possibility of getting breast cancer some day
10. Do you think your chances of getting breasts cancer are:

greater than most women?
about the same?
less than most other women?

(Calnan and Rutter 1986: 675).

Perceived susceptibility and perceived benefits were found to be significant contributors of behaviour. A weak relationship between belief and behaviour existed. The variance explained by this relationship was never greater than 25%, and was generally found to be lower (variance range is 22%, from 3% to 25%) (Calnan and Rutter 1986: 676-677). It is possible that other variables are confounding the relationship between beliefs and behaviour (Calnan and Rutter 1986). Prior behaviour was a stronger predictor of behaviour than was belief. For non-attenders beliefs weakly predicted behaviour (Calnan and Rutter 1986).

Based upon their findings Calnan and Rutter (1986: 677) suggest

a shift from the emphasis on beliefs and to concentrate instead on the structural factors which enable or constrain intended or preferred courses of action.

Calnan and Rutter (1986: 677) cite a study which found a strong relationship between social class and five of six behaviours (Calnan and Rutter 1986: 677). The relationship remained strong even after a range of variables, including belief, had been taken into account (Calnan and Rutter 1986: 677). Calnan and Rutter (1986) do not suggest altering the predictive nature of the model, but question further the manner in which socio-economic circumstances modify beliefs.

Even though Calnan and Rutter (1986) imply a potential change in the model structure may prove to be insightful, their final approach follows the postulates of the HBM.

Calnan and Moss (1984) used the HBM to predict the association of beliefs and behaviours. They wanted to determine whether the correspondence between beliefs, and behaviour exists over a time period. Sometimes people rationalize their beliefs to be congruent with their behaviour (Calnan and Moss 1984, McKinlay 1972). Two interviews were completed over a one year period. The behaviours in the study were the attendance at a breast self-examination class, and compliance with the education given at the class. The women were interviewed one month prior to their invitation to attend the class for BSE.

There was support for beliefs as predictors of behaviour (Calnan and Moss 1984). Marital status was found to be a better discriminator than belief (Calnan and Moss 1984: 205). Calnan suggests that the emphasis of the HBM should alter (Calnan and Rutter 1986), but oddly does not suggest the inclusion of socio-demographic variables as predictors even after noting their significance. Socio-demographic variables are only used when they are mediated by beliefs.

Health Promotion Survey. Norman (1988) wrote one of the technical reports from the data provided in the Health Promotion Survey. Norman (1988) sought to determine the consistency between beliefs and behaviour (BSE). The frequency of practice of the BSE was assessed by the question, "How often do you examine your own breasts?" (Norman 1988: 6). There were four possible responses (the questions are listed in full in the materials section). The belief about the frequency at which a woman should practice BSE was assessed by the question, "How frequently do you think a woman should examine her own breasts?" (Norman 1988: 6). Norman (1988) found that women who believe in the more frequent practice of BSE also tend to perform BSE more often ($r = 0.47$, $p < 0.001$) thereby supporting an association between beliefs and behaviour.

Demographic Analysis

Early Cancer Detection Screening Techniques

Demographic characteristics (ex. age, SES and sex) have been found to independently contribute to medical orientations (Suchman 1966: 9). Suchman (1966) noted this relationship when investigating the association of social group structures with medical orientation. Health practices impact both the quality of life and longevity. Demographic traits are identifiable and thus allow for health care workers' intervention. The association of demographic traits with BSE and the PAP test will be examined. The demographic traits studied are age, education, income and marital status. The conclusions drawn from this analysis will be contrasted with past studies, and to the work performed by Garceau (1988) on the Health Promotion Survey.

The Breast Self-Examination

Breast cancer is the leading cause of death among Canadian women between 35 to 54 years of age (Kaufert et al. 1987, Miller et al. 1981, Miller 1977). The survival rate is directly related to early detection and treatment of the cancer (Kaufert 1987, Baines 1983, Carlile 1981). The regular practice of the breast self-examination (BSE) by a population at risk could reduce the rate of breast cancer mortality by 18% (Greenwald et al. 1982); particularly since most breast cancers are discovered by women and not by their

physicians (Baines 1983).

Many women find lesions by chance rather than by methodical repetitive self-examination (Baines 1983). Women who regularly practice BSE are more likely to have their cancer diagnosed at an earlier stage, even though many women are not judged competent in BSE proficiency (Huguley and Brown 1981). Thus a regular routine of BSE is extremely important (Baines 1983) due to the association of BSE with early detection of cancer (Rutledge 1987, Feldman et al. 1981, Huguley and Brown 1981, Foster et al. 1978, Greenwald et al. 1978).

BSE is a volitional early detection health behaviour (Rutledge 1987). In addition to that, BSE is considered an indirect risk behaviour (Langlie 1977); it does not reduce the risk of contracting breast cancer, but improves the probability of the effectiveness of the treatment (Hill et al. 1982). Women tend to find cancer at an earlier stage of growth (smaller or more localized lesions) with the regular practice of BSE (Baines 1983).

Age

The risk of breast cancer increases with age. Women between the ages of 35 to 57 years old are most commonly afflicted with breast cancer (Kaufert et al. 1987, Miller et

al. 1981, Miller 1977). Therefore, women between these ages are more likely to discover a lesion when they self-examine (Craun and Deffenbacher 1987). There is a lack of agreement in the literature with regards to the relationship between age and the frequency of practice of BSE. Younger women are more inclined to perform BSE, and have a breast-examination performed by a health care professional (Craun and Deffenbacher 1987). Hill et al.'s (1982: 53) study found the same association between the frequency of practice of BSE and age. Rutledge (1987: 120) did not discover any support for an association between age and BSE. These studies' central focus was to test the tenets of the HBM. Demographic variables were treated with secondary consideration.

Social norms for the older women may produce inhibitions that may prevent them from BSE practice, even though they are more likely to be afflicted with a lump. Social stigmas relating to sexuality exist for older women that may not be as prevalent in younger women. Younger women through secondary socialization sources, primarily the school system, can be exposed to health routines which differ from those of older women. Therefore, younger women might be more disposed to practice BSE.

Health Promotion Survey. Garceau noted that the age group of 35-64 years was most likely to perform BSE regularly. The age groups of 15-24 years and 65+ years are least likely to perform BSE (Garceau 1988).

Education

Education was associated with BSE for women who considered their health status good ("well"), and who did not have a marital partner (Kaufert et al. 1987, 173). Education is probably an indicator of a few other factors that influence the practice of BSE. These factors could be exposure to health information in the schools, and the ability to assimilate news on health matters provided by various sources. Printed media campaigns by health departments to promote health routines might be targeted towards the better educated. If these practices are assumed by students, the practice of these routines will be reinforced.

A media campaign on breast cancer had a greater impact on those women with higher education (Hill et al. 1982). The campaign was comprised of television commercials, other advertisements and local doctors disseminating information to their patients (Hill et al. 1982). Women with a higher education were more amenable to this campaign. By the nature of the campaign the information was probably more

readily available to those women with higher education .

Health Promotion Survey. Garceau (1988) noted that "highly educated" women were most likely to perform regular BSE. Garceau deduced (no evidence or reference cited) that highly educated women were older.

Income

Health Promotion Survey. No apparent trends were noted by Garceau (1988).

PAP Testing

Contrary to BSE, PAP tests are not universally accepted as a means of early detection for cancer (Skrabanek 1988, Green 1978). At the centre of the PAP testing controversy is the natural history of cancer from which the screening program is based (Miller 1988, Skrabanek 1988, Fruchter 1986, Howe and Bzduch 1986, Boyes et al. 1982, Miller 1985, Walton 1982, Green 1978, Walton 1976, Coppleson and Brown 1975, Koss 1966). A detailed analysis of the controversy surrounding the PAP test is located in the Appendix. The debate does not preclude the use of the PAP test as a health behaviour.

Age

The 1976 Walton Report recommended the annual screening of women from sexual debut up to the age of 35 years, and then at 5 year intervals after this (Walton 1982). High risk cases can be screened at a decreased interval if requested (Walton 1982). Women at high risk are those who come into contact with venereal disease, those with many sexual partners, and an early debut to intercourse.

Clarke and Anderson's (1979) retrospective (case-control) study found that the control group had PAP tests at a greater frequency than the cases (Clarke and Anderson 1979). The controls were selected for each case. The cases

were women diagnosed with invasive carcinoma of the cervix admitted to the Princess Margaret Hospital in Toronto (Clarke and Anderson 1979). The controls were neighbours of each case with similar education and total family income (Clarke and Anderson 1979). The percentage of women having a PAP test is greatest for the age cohort of 35-44 years for both the cases and the controls (Table 1) (Clarke and Anderson 1979).

Table 1: Frequency of PAP Screening for Cases and Controls.

Age (years)	Cases	Controls
20-34	7/16 (44%)	66/107 (62%)
35-44	18/36 (50%)	124/185 (67%)
45-59	31/102 (30%)	266/460 (58%)
60+	67/212 (32%)	590/1056 (56%)

(Clarke and Anderson 1979:2).

According to the Walton Report (1976) women around 35 years of age should be screened most intensively.

A survey of upstate New York women showed that the cohort of women between the ages of 25-34 years were being screened at the greatest frequency (Table 2) (Howe and Bzduch 1986: 294).

Table 2: Frequency of PAP testing for the Age Cohorts between 25-74 years, Upstate New York.

Age (years)	Papped Group (percent)	Non-papped Group (percent)	Total (N)
25-34	71	29	313
35-44	58	42	217
45-54	52	48	130
55-64	51	50	122
65-74	50	50	88

(Howe and Bzduch 1986: 294).

Health Promotion Survey. The age group of 25 to 44 years is most likely to have had a PAP test within the past year. Women in the age groups of 15-24 years and 65+ years had the highest percentage to never have had a PAP test. Garceau (1988: 81) states that, "women aged 25-44 years are in their prime child bearing years and are therefore likely to be going to their doctors for contraceptive advice".

Education

The Howe and Bzduch (1986: 294) survey found that the frequency of having a PAP smear is associated with the level of education completed (Table 3).

Table 3: Percentage Distributions of Education by PAP smear frequency, Aged 25-74 years, Upstate New York 1984.

Education (years)	Papped Group (percent)	Non-papped Group (percent)	Total
9	41	59	22
9-11	43	57	58
12	53	57	355
13 or more	69	31	456

(Howe and Bzduch 1986: 294).

A similar trend was noted in a Toronto study (refer to pages 21-22) (Clarke and Anderson 1979). The frequency of having a PAP smear increases with an increase in the number of years of education (Table 4) (Clarke and Anderson 1979).

Table 4: Frequency of screening by PAP among Cases and Controls.

Highest grade achieved	Cases	Controls
<9	22/78 (28%)	109/251 (43%)
9-11	19/64 (30%)	200/339 (59%)
12+	19/43 (44%)	214/328 (65%)

(Clarke and Anderson 1979: 2).

Health Promotion Survey. An increase in the likelihood of having a PAP test in the past year is associated with an increase in education (Garceau 1988).

Income

Clarke and Anderson's (refer to pages 21-22) (1979: 2) retrospective study noted an increase in the likelihood of having a PAP test with an increase in income for both the cases and the controls (Table 5).

Table 5: Frequency of PAP smear screening in cases and controls.

Income (in dollars)	Cases	Controls
<6,000	9/45 (20%)	81/184 (44%)
6,000-9,999	9/41 (22%)	65/124 (52%)
10,000-14,999	12/37 (32%)	128/217 (59%)
15,000+	16/35 (46%)	160/ 226 (71%)

(Clarke and Anderson 1979: 2).

Health Promotion Survey. An increase in the likelihood of having a PAP test in the past year is associated with an increase in income (Garceau 1988).

Marital Status

Divorced and separated women were more likely to have had a PAP smear (Table 6) (Howe and Bzduch 1986). Widowed women are least likely to have had a PAP smear (Table 6).

Table 6: Percentage Distribution of Marital Status by PAP smear, Aged 25-74 years, Upstate New York.

Marital Status	Papped Group (percent)	Non-papped Group (percent)	Total (N)
married	61	39	625
divorced	70	29	71
separated	74	26	27
widowed	45	55	71
never married	58	42	97

(Howe and Bzduch 1986: 294).

Health Promotion Survey. The variable of marital status was not examined in the HPS relating to the PAP test, although Garceau alluded to its importance when discussing age.

Materials

The 1985 Health Promotion Survey was designed to determine Canadians' health habits pertaining to alcohol consumption, drug use, early cancer detection practices, exercise, safety practices and smoking (Rootman 1988). Questions about attitudes and beliefs concerning these health practices were included in the survey. The information gathered by the HPS should aid in informing the promotion of healthier lifestyles. The HPS also provides a baseline from which future comparisons can be drawn.

The 1985 Health Promotion survey included residents from all ten provinces and the Yukon Territory (Catlin 1988). Residents of the Northwest Territories and full-time residents of institutions were excluded.¹ As the target population was persons over 15 years of age, the questionnaire elicited responses from the members of households who were 15 years of age and older. A total of 239 questions was used in the survey.

The HPS was conducted by telephone (Catlin 1988). The sampling method employed in the HPS was random digit dialling. The Northwest Territories was excluded due to the proportion of households in the Northwest Territories

¹ Note that the N.W.T. was studied in a separate survey (Whitehead and Layne 1989).

without telephones. The following are questions from the HPS used in the present analysis. The code used in the HPS will precede each question.

Demographic variables

AGE: Age in groups.

- 1 15-19
- 2 20-24
- 3 25-34
- 4 35-44
- 5 45-54
- 6 55-64
- 7 65+

CMARSTAT: What is your current marital status?

- 1 Married (including common-law)
- 2 Single/ never married
- 3 Separated
- 4 Divorced
- 5 Widowed

EDUC: What is the highest grade or level of education you have ever completed?

- 1 No schooling
- 2 Elementary
- 3 Some Secondary
- 4 Completed Secondary
- 5 Some ☐ Community college,
technical college,
- 6 Completed ☐ CEGEP, nurses training
- 7 Some University or teacher's college
- 8 Completed University or teacher's college
- 9 Other education or training²

² The group other education or training (9) was coded as a missing value (99).

RHTINC: Household total income-grouped

- 1 0-15,000
- 2 15,001-25,000
- 3 25,001-35,000
- 4 35,001-49,000
- 5 49,001-500,000
- 8 Do not know
- 9 Not stated

SEX: Respondent is:

- 7 Female _____> Go to 61
- 8 Male _____> Go to 66

Belief variable

PRAC64: How often do you think a woman should examine her own breasts?³

- 1 At least once a month
- 2 Once every 2-3 months
- 3 Less often
- 4 Never
- 5 Don't know

Behaviours

PRAC63: How often do you examine your own breasts? Would you say..

- 5 At least once a month
- 6 Once every 2-3 months
- 7 Less often
- 8 Never

PRAC65: When was the last time you had a PAP smear test for cancer?

- 1 Within the past year
- 2 Last 2-3 years
- 3 More than 3 years
- 4 Never
- 5 Don't know

³ The values for the variables PRAC64, PRAC63 and PRAC65 are ratings.

Methods

The present analysis will determine whether demographic variables are significant direct predictors of health behaviours, and thus improve the predictive utility of the Health Belief Model by the inclusion of demographic variables as direct predictors. As is proposed by the HBM, the predictive value of demographic variables to beliefs, and beliefs to behaviour can be evaluated. The significance of demographic variables as direct predictors can be evaluated and the model expanded if demographic variables are found to be significant predictors of health behaviours. (The operational model for the analysis and the statistical techniques employed will be described later.)

Variables for demographic traits, beliefs and behaviours will be included in this analysis. The demographic variables are age, current marital status, education and total household income. The belief variable is the considered frequency of BSE practice, while the behaviour variable is the frequency of BSE practice. The measures for these variables are extracted from the 1985 Health Promotion Survey.

An Operational Model

The literature review developed operational indicants for demographic traits, beliefs and behaviour. Reference to

the review will be made to establish the precise direction of the analysis. The application of an operational model to the 1985 Health Promotion Survey will be performed to determine whether the expansion of the model will improve its predictive utility.

Demographic traits

Demographic traits are not defined in any specific way in the Health Belief Model. Becker and Maiman's (1975: 12) use of demographic variables included age, ethnicity and gender. Gender must be controlled for in this analysis since the health practices are gender specific. The demographic variable used similar to those of Becker and Maiman (1975) is age. The other demographic variables to be used in the present analysis are current marital status, education and total household income grouped.

The measures for the demographic variables of age, current marital status, education and total household income grouped will be listed in this order. Age is grouped in years as shown in the question, or age is continuous when used in the regression analysis. Current marital status is differentiated into four groups: married (including common-law), single/ never married, divorced and widowed. The categories for marital status will be used in the regression equation as dummy variables. Measures for education were

the different levels of institutional education completed. The list of the levels of education are listed in the materials section. The total household income is in Canadian dollars as shown in the question or is continuous when used in the regression analysis.

Belief

Individual's develop beliefs with the consequences of the behaviour in mind (Norman 1988). The belief will be assessed by the question, "How often do you think a woman should examine her own breasts?". The measures for the question are related to the considered appropriate frequency of BSE practice by women. The question construction for belief in the HPS is similar to a belief question on the value of regular BSE practice in the Calnan and Rutter's (1986) study (refer to pages 11 to 13).⁴

Behaviours

The behaviour that corresponds to this belief would be the BSE. The behaviour is assessed by the question, "How often do you examine your own breasts?". The measures for the behaviour are a frequency of practice. The other behaviour to be examined, but not in the context of the

⁴ Note that the development of the belief concept in the Health Belief Model is distinct from that of the Theory of Reasoned Action (Fishbein and Ajzen 1975, Fishbein 1967), and the sociology of belief (Borhek and Curtis 1975).

model's framework is the PAP test. The behaviour is assessed by the question, "When was the last time you had a PAP smear test for cancer". The measures for the behaviour are: some time in the past, never or don't know.

Statistical Procedure

Descriptive Statistics

Descriptive statistics of all variables will be presented. Measures of central tendency and spread will be applied to the variables selected from the 1985 Health Promotion Survey.

Inferential Statistics

Regression Analysis

The predictive utility of the demographic variables and the belief item to behaviour will be examined. The demographic variables to be used are as stated in the methods section. A multiple regression is performed to determine the predictive utility of the independent variables. In the multiple regression analysis, collinear independent variables will exaggerate the influence of these variables.

The independent variables must meet the minimum tolerance requirements to be applied in the regression equation. The tolerance is the proportion of a variable's variance not accounted for by other independent variables in the regression equation. The SPSS default setting for tolerance is 0.001.⁵

⁵ The proportion of variability explained by other variables is less than half for all of the variables in this study.

The multiple regression will aid in the depiction of the predictive utility of the independent variables. An equation is postulated by the regression analysis in the form $y = a + Bx + e$. The 'a' term is the y-intercept, the 'B' is the slope and the 'e' is a constant. An equation of best fit is calculated with the relative predictive strength of each of the independent variables given by the standardized regression coefficient (b); and the significance of each of the independent variables is given by the significant T value. The total variance of the equation, or how much the variance is explained by the equation is given by the R squared statistic, and the significance of the equation by the F-test value. Upon determining which independent variable is not significant (from the significant T value), these variables can be dropped from the initial equation in order to calculate a simpler regression equation.

Results

Descriptive statistics

Demographic traits

The demographic traits frequency distributions to be described are age, current marital status, education, total household income and gender.

The age cohorts range in size from 437 women to 1,788 women (Table 7).

Table 7: The frequency distribution of age in groups.

Age (years)	Value	Frequency	Percent
15-19	1	437	6.7
20-24	2	693	10.7
25-34	3	1,788	27.5
35-44	4	1,159	17.8
45-54	5	706	10.8
55-64	6	729	11.2
65+	7	995	15.3

Valid cases= 6,507; missing cases= 0.

Over half (3,687) of the women in the sample were married or living in common law (Table 8). About 80% of the women in the sample were either married/ common law or single/ never married. The separated women comprised the smallest group of women in the sample at 228 women.

Table 8: The frequency distribution of current marital status.

Marital status	Value	Frequency	Percent
married/ common law	1	3,687	56.7
single/ never married	2	1,475	22.7
separated	3	228	3.5
divorced	4	359	5.5
widowed	5	751	11.5
not stated	9	7	0.1

Valid cases= 6,500; missing cases= 7.

The largest group of women in the sample completed secondary education (Table 9). Only 2.4% less women completed some secondary education. The two groups combined comprised over half of the women respondents. One third of the women respondents had at least some post secondary education, and almost one quarter completed some form of post secondary education. Note that if the respondent has completed any grade at the elementary level, elementary level was selected (Catlin 1988: 17).

Table 9: The frequency distribution of the highest grade or level of education you have ever completed.

Value label	Value	Frequency	Percent
no schooling	1	49	0.8
elementary	2	562	8.6
some secondary	3	1,721	26.4
completed secondary	4	1,884	29.0
some community college	5	329	5.1
completed community college	6	727	11.2
some university	7	375	5.8
completed university	8	749	11.5
other education	9	43	0.7
not stated	99	68	1.0

Valid cases= 6,439; missing cases= 68.

Almost 40% of the women responded that they did not know their total household income (Table 10). Almost one third (29.4%) of the women respondents resided in households which total income was below \$25,001. This number represented over half of the women who responded with a value to the question.

Table 10: The frequency distribution of household total income-grouped.

Income (\$Canadian)	Value	Frequency	Percent
0-15,000	1	1,100	16.9
15,001-25,000	2	815	12.5
25,001-35,000	3	659	10.1
35,001-49,000	4	508	7.8
49,001-500,000	5	636	9.8
do not know	8	2,531	38.9
not stated	9	258	4.0

Valid cases= 3,718, missing cases= 2,789.

There were 6,507 women respondents in the interview, and 1,833 more women respondents than men (Table 11).

Table 11: The frequency distribution of the genders.

Gender	Value	Frequency	Percent
women	1	6,507	58.2
men	2	4,674	41.8

Valid cases= 11,181; missing cases= 0.

Beliefs

Almost 70% of the women believe that BSE should be practised monthly, and about 80% believe that BSE should be practised at least once every 2-3 months (Table 12). There were 663 (10.2%) respondents who did not know at which frequency BSE should be practised. Less than 1% of the women believe that BSE should never be practised.

Table 12: The frequency distribution of the perceived regularity a woman should examine her own breasts.

Value Label	Value	Frequency	Percent
once a month	1	4,524	69.5
once in 2-3 months	2	726	11.2
less often	3	301	4.6
never	4	49	0.8
do not know	5	663	10.2
not stated	9	244	3.7

Valid cases= 5,600, missing cases= 907.

Behaviours

Over half (58.1%) of the women respondents practice BSE once within 3 months, and almost 40% of the women practice BSE monthly (Table 13). About 20% of the women never practice BSE, and roughly the same percentage practice BSE less often than once every 3 months.

Table 13: The frequency distribution of the stated regularity of each woman examining her own breasts.

Value Label	Value	Frequency	Percent
once a month	1	2,510	38.6
once in 2-3 months	2	1,271	19.5
less often	3	1,141	17.5
never	4	1,340	20.6
not stated	9	245	3.8

Valid cases= 6,262; missing cases= 245.

Over half (59.3%) the women respondents had a PAP test within the last year and almost three quarters within the past 3 years (Table 14). Only 11.2% of the women never had a PAP test (Table 14).

Table 14: The frequency distribution of the stated last time the woman had a PAP smear test for cancer.

Value Labels	Value	Frequency	Percent
within past year	1	3,856	59.3
last 2-3 years	2	879	13.5
greater than 3 years	3	699	10.7
never	4	728	11.2
do not know	5	101	1.6
not stated	9	244	3.7

Valid cases 6,162, missing cases 345.

Inferential Statistics

Regression Analysis

Prediction of BSE behaviour from an equation using only demographic variables.

The regression equation uses the independent variables of age, education, total household income⁶, divorce, marriage, separation and being widowed. This regression equation explains almost none of the variance (Table 15). The amount of variance explained is about 1%. These demographic variables cannot be considered useful predictors of BSE. A simpler equation will not be calculated, since a reduction in the number of predictors will only reduce the amount of variance explained. The amount of the variance explained by the regression equation is significant ($p=0.0000$) (Table 15).

Table 15: Analysis of variance.

	df	Sum of Squares	Mean Square
Regression	7	53.71	7.672
Residual	3294	3964.0	1.203

F= 6.375

p= 0.0000

Adjusted R square= 0.0113

⁶ The correlation between education and income was 0.30. Thus, the two variables, education and income, can be used.

All the variables are direct predictors of performing BSE. Being married is the strongest predictor of performing BSE ($\beta = 0.11$) (Table 16). Being divorced and widowed did not predict BSE practice as well (both β s are about 0.04) (Table 16). Age and education predicted the practice of BSE to a similar extent as being divorced. Income is about half as strong a predictor as education. The proportion of variability explained by other variables is less than half for all the variables in the regression equation. Being married and being widowed had the largest proportion of variability explained by other variables. Being separated (tolerance = 0.86) and education (tolerance = 0.84) had the smallest proportion of variability explained by other variables. The remaining variables had tolerance levels above 0.7. Being divorced, being married, age and education are significant predictors of BSE practice (Table 16).

Table 16: A summary of the regression statistics for the dependent variable of BSE behaviour.

Variable	B	Beta	Tolerance	Significant T
divorced	0.1926	0.0442	0.7731	0.0249
married	0.2427	0.1076	0.5568	0.0000
separated	0.0781	0.0136	0.8634	0.4663
widowed	0.1648	0.0420	0.5414	0.0741
age	0.0036	0.0510	0.7007	0.0136
education	0.0263	0.0447	0.8371	0.0181
income	1.046×10^{-6}	0.0202	0.7799	0.3030
constant	2.464			0.0000

The prediction of BSE behaviour using an equation that uses both demographic variables and belief.

The regression equation uses the independent variables of age, education, total household income, divorce, marriage, separation, being widowed and the believed frequency of BSE practice. This regression equation explains almost 16% of the variance (Table 17). This regression equation explains a far greater amount of variance than the equation using only demographic variables as predictors. A simpler equation will be calculated from this regression equation. The amount of the variance explained by the regression equation is significant ($p=0.0000$) (Table 17).

Table 17: Analysis of variance.

	df	Sum of Squares	Mean Squares
Regression	8	632.5	79.06
Residual	3293	3385.3	1.028

F= 76.90

$p= 0.0000$

Adjusted R square= 0.1554

All the variables in the regression equation directly predict the practice of BSE. The believed frequency of BSE practice is the strongest predictor of the frequency of BSE practice ($\beta = 0.38$) (Table 18). The strength of prediction of being married ($\beta = 0.09$) is about the same as in the equation using only demographic variables (a β difference of about 0.02 exists) (Table 18). Being divorced, being widowed, age and education strength of prediction is less than half that of being married. Being separated and income are extremely weak predictors of BSE practice. These variables possess about $1/40$, and $1/80$ the predictive strength relative to the believed frequency in BSE practice respectively. The proportion of variability explained by other variables is less than half for all the variables in this regression equation. The belief in the frequency of BSE practice had the smallest proportion of variability explained by the other variables (tolerance = 0.99). Almost none of the variability is explained by other variables for the belief item. Being married and being widowed had the greatest proportion of the variability explained by other variables in the regression equation (the tolerances are about 0.5 for both variables) (Table 18). Being married, being widowed and the belief in the frequency of BSE practice are significant predictors of the frequency of BSE practice (Table 18). Age is almost a significant predictor of BSE practice ($p = 5.73\%$) (Table 18).

Table 18: A summary of the regression statistics for the dependent variable of BSE behaviour.

Variable	B	Beta	Tolerance	Significant T
divorced	0.1353	0.0310	0.7723	0.0882
married	0.2004	0.0888	0.5560	0.0000
separated	0.0518	0.0090	0.8632	0.6011
widowed	0.1742	0.0444	0.5414	0.0412
age	0.0026	0.0364	0.6999	0.0573
education	0.0125	0.0214	0.8345	0.2224
income	2.478×10^{-7}	0.0048	0.7789	0.7918
belief BSE	0.7171	0.3815	0.9899	0.0000
constant	-0.0568			0.6712

The prediction of BSE behaviour using the simpler equation that uses both demographic variables and belief.

The regression equation uses the independent variables of marriage, being widowed and the believed frequency of BSE practice. This regression equation explains about 15% of the variance (Table 19). This regression equation explains a greater amount of variance than the equation using only demographic variables. The amount of the variance explained by the regression equation is significant ($p = 0.0000$) (Table 19).

Table 19: Analysis of variance.

	df	Sum of Squares	Mean Squares
Regression	3	623.5	207.8
Residual	3298	3394.2	1.029

F= 201.9

p= 0.0000

Adjusted R square= 0.1544

The believed frequency of BSE practice is the best predictor (beta= 0.38) of BSE practice (Table 20). The belief item is at least five times stronger a predictor of BSE practice than being married or being widowed. The variables all directly predict the frequency of BSE practice. The tolerance for all these variables is greater than 0.85 (Table 20). The believed frequency of BSE practice had the lowest proportion of variability explained by other variables (tolerance= 0.9975) (Table 20). All three variables are significant predictors of the frequency of BSE practice in this regression equation (Table 20).

Table 20: A summary of the regression statistics for the dependent variable of BSE behaviour.

variable	B	Beta	tolerance	significant T
married	0.1748	0.0775	0.8534	0.0000
widow	0.1954	0.0498	0.8545	0.0040
belief BSE	0.7231	0.3847	0.9975	0.0000
constant	0.1143			0.3255

Prediction of BSE Belief from an equation that uses demographic variables.

The regression equation uses the independent variables of age, education, total household income, divorce, marriage, separation and being widowed. This regression equation explains almost none of the variance (Table 21). The amount of variance explained was less than 1% (adjusted R square= 0.8%) (Table 21). The demographic variables are not useful predictors of the believed frequency of BSE practice. A simpler equation will not be calculated, since a reduction in the number of predictors will reduce the amount of variance explained. The amount of variance explained by the demographic variables for the regression equation with the dependent variable of belief is slightly less than (but roughly equal to) the equation using demographic variables as predictors with the dependent variable of BSE behaviour. The amount of the variance explained by this regression equation is significant ($p=0.0000$) (Table 21).

Table 21: Analysis of variance.

	df	Sum of Squares	Mean Square
Regression	7	11.48	1.639
Residual	3294	1125.5	0.3417

F= 4.799
Adjusted R square= 0.0080

$p= 0.0000$

All the variables directly predict the performing BSE except for being a widow. Education is the strongest predictor of BSE belief ($\beta = 0.06$) (Table 22). Being married, being divorced, age and income predicted the believed frequency of BSE practice to a lesser degree (the β value is greater than 0.03 for these variables) (Table 22). The tolerance indicated that the proportion of variability explained by other variables is less than half for all the variables in the regression equation. Being married (tolerance = 0.55) and being widowed (tolerance = 0.54) had the largest proportion of variability explained by other variables. Being separated (tolerance = 0.86) and education (tolerance = 0.84) had the smallest proportion of variability explained by other variables. The other variables' tolerance levels are intermediate to these fore mentioned groups. Being married and education are significant predictors of believed frequency of BSE practice (Table 22).

Table 22: A summary of the regression statistics for the BSE belief variable.

Variable	B	Beta	Tolerance	Significant T
divorced	0.0798	0.0344	0.7731	0.0810
married	0.0589	0.0491	0.5568	0.0346
separated	0.0367	0.0120	0.8634	0.5210
widowed	-0.0131	-0.0063	0.5414	0.7906
age	0.0014	0.0385	0.7007	0.0633
education	0.0191	0.0613	0.8371	0.0012
income	1.112×10^{-6}	0.0404	0.7799	0.0397
constant	3.516			0.0000

Prediction of having a PAP test.

The regression equation uses the independent variables of age, education, total household income, divorce, marriage, separation and being widowed. This regression equation explains about 12% of the variance (Table 23). This regression equation explains a greater amount of variance than the regression equation using demographic variables to predict the frequency of BSE practice and the regression equation using demographic variables to predict the believed frequency of BSE practice. There is less than a 4% difference in the amount of variance explained by this equation than the equation that predicted the frequency of BSE practice using the belief item. A simpler equation will not be calculated for this regression equation since only the being widowed is not a significant predictor of having a PAP test. Being widowed is almost a significant predictor ($p = 0.06$) (Table 23). The amount of the variance explained by the regression equation is significant ($p = 0.0000$) (Table 23).

Table 23: Analysis of variance.

	df	Sum of Squares	Mean Square
Regression	7	343.2	49.03
Residual	3294	2440.8	0.741

F= 66.17
Adjusted R square= 0.1214

$p = 0.0000$

Age is inversely related to the recency of having a PAP test. The rest of the variables are direct predictors of the recency of having a PAP test. The order of predictive strength (absolute value) of the demographic variables is as follows: age, married, divorced, income, separated, education and widowed. Age is almost twice as strong a predictor of the practice as compared to being married. Being married ($\beta = 0.17$) is about twice as strong a predictor of the recency of having a PAP test as compared to being divorced, or to income (betas about 0.08 for both variables) (Table 24). The remaining variables beta values are up to 0.04 less than those of being divorced and income. None of the variables had more than half of their variability explained by other variables. Being married and being widowed had the largest proportion of variability explained by other variables (tolerances of 0.55 and 0.54 respectively) (Table 24). Being separated (tolerance = 0.86) and education (tolerance = 0.83) had the smallest proportion of variability explained by other variables (Table 24). The tolerance values for the other variables are greater than 0.7 (Table 24). All the demographic variables are significant predictors of the recency of having a PAP test, except for being widowed (Table 24).

Table 24: A summary of the regression statistics for the dependent variable of having a PAP test behaviour.

Variable	B	Beta	Tolerance	Significant T
divorced	0.2878	0.0793	0.7731	0.0000
married	0.3125	0.1663	0.5568	0.0000
separated	0.2721	0.0568	0.8634	0.0012
widowed	0.1347	0.0412	0.5414	0.0629
age	-0.0169	-0.2878	0.7007	0.0000
education	0.0249	0.0510	0.8371	0.0043
income	3.254×10^{-6}	0.0755	0.7799	0.0000
constant	3.665			0.0000

Discussion

The Health Belief Model has traditionally focused on beliefs as predictors of health behaviours (Mullen et al. 1987, Calnan and Rutter 1986, Calnan and Moss 1984, Hill et al. 1985, Becker 1979, Becker et al. 1977, Becker and Maiman 1975). Suchman (1965) noted the significant independent association of demographic variables with an individual's medical orientation. Despite past studies' findings that demographic variables are significant direct predictors of health behaviours (Rutledge 1987, Calnan and Rutter 1986, Calnan and Moss 1984), demographic variables have not been utilized as direct predictors of health behaviours within the framework of the HBM. Demographic variables are only considered as being mediated by other variables (often beliefs) (Ronis and Kaiser 1989, Rutledge 1987, Calnan and Rutter 1986, Calnan and Moss 1984). This study suggested the expansion of the Health Belief Model to include demographic variables, to improve its overall predictive utility.

The regression equation which used only demographic variables as predictors of the frequency of performing BSE explained about 1% of the variance (Table 15). This regression equation possesses almost no explicative value for the practice of BSE behaviour. A reduction of the equation was pointless to be performed because the amount of

variance explained would only approach 0% with the simpler equation which uses fewer independent variables.

Demographic variables as exclusive predictors of BSE practice add little insight.

The regression equation using both demographic variables and the believed frequency in performing BSE explained 15% of the variance (Table 19). This regression equation was comprised of the believed frequency of BSE practice, being married and being widowed (marital status categories were dummy variables in the equation). The belief item was almost four times as strong a predictor ($\beta = 0.38$) of BSE practice as compared to being married and being widowed combined (Table 20). Most of the explanation of the variance for this equation would be a product of the belief item, since demographic variables explained about 1% of the variance. Being married was almost twice as strong a predictor as being widowed. The believed frequency of BSE practice, being married and being widowed were all significant predictors of the frequency of BSE practice ($p < 0.05$) (Table 20).

Calnan and Rutter (1986: 676) study found that the amount of variance explained by the regression equations with a collection of belief items was from 3% to 25%. This study's regression equation, with a single belief item,

explained a consistent amount of variance. The believed frequency of BSE practice contributed mostly to the amount of variance explained.

According to the HBM, beliefs are a mediator of demographic variables and behaviour in the HBM (Ronis and Kaiser 1989, Rutledge 1987, Calnan and Rutter 1986, Calnan and Moss 1984). Therefore, the regression equation produced by demographic variables should have explained a greater amount of variance for the belief item than the behaviour variable. However, the amount of variance explained by the regression equations produced by the demographic variables for both the considered frequency of BSE practice and the stated frequency of BSE practised was about 1% (Tables 15 and 21). Contrary to the proposition of the HBM, demographic variables were equally weak predictors of both beliefs and behaviours. Demographic variables added little information to the explanation on the frequency of BSE practice or the believed frequency of BSE practice.

In the case of the other behaviour under study, the last time of having a PAP test, the regression equation produced by the demographic variables explained 12% of the variance (Table 23). The regression equation produced by demographic variables explained a greater amount of variance for the behaviour of the recency of having a PAP test

compared to the frequency of performing BSE. The regression equation produced by the demographic variables for the dependent variable of the recency of having a PAP test explained a similar amount of variance as the regression equation including both demographic variables and the belief item. The difference in explained variance for the two equations was about 3%. Age was the strongest predictor (beta= -0.29) of the recency of having a PAP test, and being married was the next strongest predictor (beta= 0.17) of the behaviour. The remaining variables were about half as strong a predictor as being married. Except for being widowed all the demographic variables were significant predictors of the recency of having a PAP test ($p < 0.05$).

Beliefs have been shown (Table 20) to be the best predictor of performing BSE. Consequently, modifying beliefs may provide a means of promoting, or altering a behaviour. For instance, changes in behaviour have been noted both after education and media campaigns. Calnan et al. (1983) found an improved compliance in the technique in performing BSE after attending BSE classes. In a study by Hill and associates reported monthly practice of BSE rose by 13% after a 12 month television campaign, advertising and support from local doctors (Hill et al. 1982). The proportion of women that reported the television as a source of information about BSE rose from 26% to 69% (Hill et al.

1982: 51). Kegles (1969) found that women who have obtained information about PAP testing were more likely to visit a clinic for testing. Education and the mass media offer an opportunity to disseminate information to alter beliefs and possibly behaviours. Television appears to be a good method through which this education can occur. Suchman (1965: 9) found "demographic characteristics and social group structure as contributing independently to medical orientation". This study found that the believed frequency of BSE practice independently predicted the practice of BSE (tolerance= 0.9975). This further demonstrates the importance of the belief item in the prediction of the frequency in performing BSE.

The relationships between demographic variables and health behaviours were analyzed for those demographic variables which were significant predictors of the health behaviours. The relationship between the belief item with the practice of BSE has already been reviewed. Here the relationship between being married and being widowed will be discussed in regards to the frequency of performing BSE. These two variables - being married and being widowed - formed the simplest equation. The relationship between age, current marital status, education and total household income each with the recency of having a PAP test will be discussed subsequently.

Being married was the common predictor for the two health behaviours. Supervision by, or contact with physicians could be a reason for this association. Married women may be in the process of, or attempting to bear children. Additionally, married women may also seek more advice about contraception. In the process they may receive advice about early cancer detection techniques. Garceau (1988: 81) in a somewhat similar vein postulated that "women aged 25-44 years are in their prime child-bearing years and are therefore likely to be going to their doctors for contraceptive advice". This, she argues, is the reason for the relationship between health behaviour and age. Being widowed was the weakest predictor ($\beta = 0.05$) of BSE practice. Being widowed would likely be the weakest predictor of BSE practice, since those women would not be getting similar medical advice as married women who are seeking family planning.

For the PAP test all the SES variables (education and total household income) were predictors of practice, while for the BSE they were not. The BSE is a volitional health behaviour, entirely under the control of a woman. A woman must make a decision to have a PAP test after recommendation from her physician. For that reason the process of utilizing a service may be more related to SES than a

self-practice behaviour. Although the BSE and the PAP test are both considered indirect health practices, the nature of their practice is distinctly different. Therefore, a more comprehensive categorization of behaviours should be developed.

Age was the strongest predictor of the recency of having a PAP test ($\beta = -0.29$; see Table 24). There exists an inverse relationship between the recency of practice and age. These observations are similar to those of Garceau (1988), and Howe and Bzduch (1986: 294), who found that young women were likely to have had a PAP test. This follows the recommendation of the Walton Report (1976) for risk, where young women are to be screened more regularly. The difference in practice appears to be "risk-age" related. Women might be seeking to obtain a PAP test upon recommendation from their physicians while procuring advice on family planning.

Compared to the other marital statuses, being married better predicted ($\beta = 0.17$) the recency of a PAP test (Table 24). In fact, being divorced and being separated combined did not possess the predictive strength of being married. However, Howe and Bzduch (1986: 294) found that divorced and separated women were most likely to have had a PAP test. Widowed women in both of these studies were least

likely to have had a PAP test. Family planning often occurs under the marital status of married. These women are under greater supervision by physicians than other women, which may explain why in the present study being married was the strongest predictor of the recency of having a PAP test.

Education directly predicts ($\beta = 0.05$) the recency of having a PAP test. However, education has about one fourth the predictive strength as being married. Better educated women seem to be more inclined to utilize this medical service possibly as a consequence of attending institutions which offer a wide range of services. These results are similar to those of Howe and Bzduch (1986: 294), where women with 13 or more years of education were most likely to have had a PAP test. In another study, Garceau (1986: 80) that "women who have attained higher education... are more likely to have had a PAP smear within the year preceding the survey."

There is a direct predictive relationship between total household income with having a PAP test within the past year (Table 24). The trend is the same as Garceau reported (1980: 80). Clarke and Anderson's (1979: 2, see Table 5) retrospective study also found an increase in the proportion of women having a PAP test with an increase in income for both the cases and controls. Women with more money might be

more accustomed to the utilization of services than those with less money.

In addition to belief, demographic variables have been shown to be significant but weak predictors of behaviour. Survey respondents are more likely to associate personal beliefs with behaviour than demographic traits with a behaviour. People at times rationalize that their beliefs to be congruent with their behaviour (Calnan and Moss 1984, McKinlay 1972). This rationalization may contribute to the strength of the relationship. There may have been some cuing to the response, or leading of the respondent due to the ordering of the belief and practice measures in the questionnaire. Better questionnaire design could avoid this potential problem, or to be able to test for it would improve the study.

The demographic analysis also highlighted those women who are not practising the behaviours. Women who have not been married were least likely to practice the both of these health behaviours. While marital status does not alter the biological risk for the contraction of these diseases, it definitely alters the pattern of practice. Educational and media campaigns should consider the targeting groups of women to improve their health practises.

Research interests might have been better served had the questionnaire construction been informed by theory. There are several theories that could have been addressed by this study. Theories that have been applied to these behaviours are the Breast Self-examination Practice Model, Social Network Theory and the Theory of Reasoned Action. Questions about social group structure and culture would have allowed for the testing of the Social Network Theory (Berkman 1986, Broadhead et al. 1983, Radelet 1981, Berkman and Syme 1979, Langlie 1977, Suchman 1965). Questions about attitudes and intentions would allow for the study of the Theory of Reasoned Action (Sheppard et al. 1988, Fishbein and Ajzen 1975). These theories better inform researchers on the nature of practice of behaviours. As a result, the survey construction should accommodate the examination of these theories. In fact, the mandate of the Health Promotion Survey seems to require such a goal.

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Appendix A

Definitions

benign tumour

A tumour which is mild and slow growing. It does not invade the surrounding tissues or spread to distant organs. It does not usually recur after treatment.

cancer

Any malignant tumour (includes both carcinoma and sarcoma).

carcinoma

A malignant tumour developing in any epithelial tissues of the body.

carcinoma in situ (CIS)

Cancer of any type of epithelium which has not spread beyond the basement membrane- same as pre-invasive carcinoma, and intra-epithelial carcinoma.

cytology

The study of cells.

epithelium

The cellular tissue of the surface layer of the skin, and the mucous membranes including hollow organs, glands, and ducts.

invasive carcinoma

A carcinoma which has spread beyond the confinement of the basement membrane of the epithelium into adjacent tissues.

malignancy

A condition which if unchecked usually develops into serious illness, and may cause premature death. When applied to tumours, may be described as the uncontrolled growth of cells.

metastasis

Spread, or transplantation of cancer from a primary region to a secondary site.

Papanicolaou Test (Smear)

A test used to study cells from the genital tract. Often called PAP smear or test.

sarcoma

A malignant tumour originating primarily from connective tissue.

APPENDIX B

The following presents the debate surrounding the PAP test.

The Argument Against PAP Testing

There has been no randomized controlled trial on the efficacy of cervical cancer screening (Skrabanek 1988). Mortality as a result of cervical cancer was declining prior to the introduction of cervical cancer screening (Skrabanek 1988, Green 1978). The decline in mortality due to cervical cancer observed following the introduction to mass screening programmes was not influenced by the programmes (Skrabanek 1988, Green 1978). A correlation between screening intensity and mortality in younger women does not exist (Skrabanek 1988). Cytology had no discernable impact upon the mortality rate (Green 1978). Mass screening programmes in Canada, United States of America, Sweden, Finland, Iceland, Denmark, Norway, Great Britain, Poland, Czechoslovakia and the U.S.S.R. did not influence the mortality rate caused by invasive cervical cancer (Skrabanek 1988).

The Dogma of Progression

Invasive cervical carcinoma evolves through successive stages according to medical dogma (Skrabanek 1988). The treatment of the precursor lesions is thought to prevent the

development of cancer (Skrabanek 1988). The distribution curves for carcinoma in situ (CIS), and invasive carcinoma are not compatible with the carcinoma conversion theory. If all the cases with carcinoma in situ develop into invasive carcinoma, then number of cases of invasive carcinoma must equal that carcinoma in situ at an earlier time. This has not been demonstrated. Thus step-wise progression is not possible. The predictive value of a positive, or negative smear is low enough to be useless (Skrabanek 1988). Mass screening is premature and unjustifiable on a scientific and ethical grounds (Skrabanek 1988: 88).

The Argument in Favour of PAP Testing

The prevention against the advance of cancer and death as a result of metastasis is the goal of screening (Howe and Bzduch 1986). Although the efficacy of the PAP smear has not been conclusively determined through randomized clinical trials, voluminous evidence supports screening as an effective early detection technique (Howe and Bzduch 1986). The reduction in mortality from cervical cancer has been demonstrated at the provincial level, and at the census district level with the increase in screening intensity (Miller 1985). A decrease in the rate of invasive carcinoma correlates with an increase in screening (Miller et al. 1976). The decrease in mortality is related to the proportion of the population screened (Miller et al. 1976).

The low rates of invasive cervical carcinoma will be sustained by prudence in obtaining regular examinations (Fruchter 1986).

Approximately two thirds of the women in New York State who die from cervical cancer are under 65 years of age and one third are under 55 years of age (Fruchter 1986). Ninety-seven percent of the women in New York State have had a PAP test in their life, 82% within the past 3 years, and 60% within the past year (Howe and Bzduch 1986). Ninety-two percent of all American women between the ages of 25 to 44 years will have been screened within the past 3 years (Hendershot 1981).

Table 25: The Mean Age of Diagnosis of Stages of Cervical Carcinoma.

mean age at diagnosis of carcinoma in situ	34 years
mean age at diagnosis of carcinoma in situ with microinvasion	43.7 years
mean age at diagnosis of occult carcinoma of the cervix	48.6 years
mean age at diagnosis of clinical carcinoma of the cervix	52 years

(Walton 1976:8)

Screening for cancer of the cervix is based upon the theory that individuals diagnosed with dysplasia, carcinoma in situ with microinvasion or occult invasion carcinoma of

the cervix will progress to invasion carcinoma unless detected and treated (Miller 1985).

Natural History

Coppleson and Brown (1975) using a mathematical approach, determined that the regression of carcinoma in situ occurs in some cases. The conclusion was arrived at after a lack of correlation between the incidence of carcinoma in situ and the rate of invasive cancer (Coppleson and Brown 1975). The cumulative number of cases of carcinoma in situ outstrips that of the cumulative incidence of invasive cancer (Miller 1985).

Dysplasia and Carcinoma in Situ

The concept of progressive stages proceeding the development of cervical cancer appears to be firm (Cartwright 1988, Walton 1976). Carcinoma in situ and dysplasia are potential precursors of clinical invasive cancer (Miller 1985). Carcinoma in situ has been considered a precursor of invasive cancer for the past three decades (Walton 1976).

Borderline lesions (dysplasia of the cervix) are closely related to carcinoma in situ, with which they form the family of precancerous lesions of the cervix (Koss 1966: 180).

Regression is an important component of the natural

history of carcinoma in situ (Miller 1985, Walton 1982, Walton 1976, Boyes et al. 1982, Koss 1966). Regression (with biopsy control) of 30% to 40% has been noted with dysplasia (Walton 1976). There is a high recurrence rate of dysplasia following spontaneous regression (Walton 1976). The destructive nature of some diagnostic procedures will increase the counts for regression (Walton 1976).

Cervical invasive carcinoma displays both the properties of a progressive history and a dynamic history. Slow progress may have no effect upon mortality trends (Miller 1985). Continued screening is vital with regression being an important part of the natural history of cervical carcinoma (Miller 1985). Varied timetables for screening are suggested. The timetable is dependent upon risk factors and age. The frequency of screening decreases with age.

Some factors predicting risk are age at first intercourse and multiple sex partners (Walton 1982, Miller and Rawls 1981). The increase in the number of sexual partners increases the risk of cervical neoplasia (Fruchter 1986). The provision of PAP testing in birth control services provided an increase in the proportion of the population screened in the advent of changed sexual patterns (Fruchter 1986).

The Risk in Avoiding Screening

Clarke and Anderson's (1979) study in Toronto observed an increased risk for being diagnosed with invasive cervical cancer among women not screened in the past five years compared to screened women. La Vecchia's (1984) work in Milan observed a similar risk pattern. Lynge and Poll (1986: 352) estimated the incidence of invasive cervical cancer following a negative smear in Maribo County, Denmark. The probability of developing cervical cancer within a five year period decreases following consecutive negative smears (Lynge and Poll 1986).

Table 26: The Probability of Developing Cervical Cancer in a five year period following a negative smear.

frequency of negative smears	probability of developing cervical cancer
0	0.0029
1	0.0015
2 to 4	0.0009
5 or more	0.0000

(Lynge and Poll 1986: 352).

Analysis of the Debate

Laara et al. (1987: 1247-1249) found a decline in mortality due to cervical cancer after the introduction of screening programmes in Denmark, Finland, Iceland and Sweden. This adds to the non-experimental support for

organized screening programmes (Laara et al. 1987: 1247). Skrabanek (1987: 1432) criticized this paper claiming that screening intensity had no impact on mortality, or the incidence of cervical cancer. Skrabanek (1987) bases his conclusions on an age cohort that possesses a range of 34 years (25 to 59 years of age). Varied rates of decline in mortality from cervical cancer were observed for each age cohort in the paper by Laara et al. (1987: 1247-1249). The greatest decline in mortality for this disease was noted among women under the age of 40 years. These women are the most likely to contract the disease. In a letter to the editor Day and Hakama (1987: 8552) comment about Skrabanek's article.

"His (Skrabanek's) idiosyncratic use of other people's data, however, suggests that he does not expect "Lancet" readers to study the articles he cites in his support".

Skrabanek (1987: 1432) refers to the decrease in the incidence of cervical cancer, but his emphasis is misplaced. The point of a PAP test is to diagnose (early detection), and treat those afflicted with a disease as soon as possible.

Skrabanek supported the argument against screening through selective referral of other literature (Miller 1988). Koss (1968) depicts the subtle nature of the

precursors of invasive carcinoma and their attributes. Skrabanek (1988) cites Koss conveniently avoids any emphasis placed on the progress of the disease, and the means of diagnosis at various stages of progression. Skrabanek presents Koss' research in a light where Koss' work supports the theory that CIS is not a precursor of cancer. This is clearly far from the position taken by Koss.

Skrabanek's selective approach to research is best exemplified by the conspicuous absence of the controversy surrounding Green and the treatment of women at the Auckland's National Women's Hospital in New Zealand.

Judicial Inquiry.

Judge Silvia Rose Cartwright presided over a Committee of Inquiry into allegations concerning the treatment of cervical cancer at the National Women's Hospital and into other related matters in Auckland, New Zealand in 1988. The Judicial Inquiry looked at many points. The second of investigation point was central to the Judicial Inquiry.

(2) Whether, as alleged in the Metro article, a research program into the natural history of CIS of the genital tract was conducted at the National Women's Hospital, and if so,

(a) Whether it was approved by any person or body before it was instituted or while it was underway; and

(b) Whether patients examined or treated in the course of the programme were aware that they were participants in a research programme?

(c) Whether any expressions of concern about the programme were considered and investigated at the time, and if so, by whom?

(Cartwright 1988:4).

Although the doctrine of informal consent was not developed by 1966 in New Zealand, the concept was well established.

The Nuremberg Code of 1947 stated:

...the voluntary consent of the human subject is absolutely essential

(Cartwright 1988: 133).

The World Medical Association in Helsinki drafted a Code of Ethics on Human Experimentation in 1964. Point one of section two from the Code stipulated:

... If at all possible, consistent with patient psychology, the doctor should obtain the patient's freely given consent after the patient has been given a full explanation

(Cartwright 1988: 133).

What occurred was an attempt to prove a theory that backed scientific validity and little attention was given to ethical considerations. The women at the trial were not informed of their options for treatment. It is internationally accepted and known that informed consent must be given. The concept may not have been formally preserved in New Zealand, but the concept is not foreign.

Dr. Green did not treat cases under his supervision for CIS because he did not believe CIS is a precursor of cancer.

Professor Green asserted that a woman with a positive cervical smear showing what is called "cancer in situ" is no more likely to develop invasive or malignant cancer of the cervix than any other women of the same age. In other words, in situ cancer is not a forerunner of invasive cancer, and the smear tested is over-rated.

Auckland Star, 21 June 1972
(Cartwright 1988:108)

Dr. Green doubted the value of abnormal cytology, and the treatment of patients with CIS. There existed an elevated risk of developing invasive cancer within one to years for patients treated during the years 1965 to 1974, compared to the time periods before and after (Cartwright 1988: 231). It was at this time that Dr. Green practised at the National Women's Hospital.

McIndoe, McLean, Jones and Mullins published in "Obstetrics and Gynaecology" (1984, 64: 451) utilizing Dr.

Green's data from his cases. Patients with abnormal cytology following the diagnosis of CIS were likely to develop invasive carcinoma 24.8 times more than women with normal cytology. This study clearly demonstrates that CIS of the cervix had a significant invasive potential. It was concluded in the Judicial Inquiry that the undermining of the importance of taking a cervical smear must be avoided. The disease can be detected, diagnosed and treated at the early stage, when it is thought to be almost 100% curable, rather than at a later invasive stage (Cartwright 1988: 193).

Sampling for a PAP test

The increase in screening sensitivity will be more effective in the reduction of mortality than will increasing the frequency of the screening (Thompson 1989A, Walton 1982). Sensitivity is defined as the ability of a test to give a positive finding when the person tested truly has the disease under study (Walton 1976: 10). Cytological laboratories are monitored to test proficiency by the Laboratory Proficiency Testing Program (LPTP). One monitoring technique method is the slide score index to test variation of the "calls" in screening. There are problems in accuracy and sensitivity in PAP testing, often as the result of inadequate or inappropriate sampling techniques (Thompson 1989B).

Specificity of a screening test is defined as the ability of a test to give a negative finding when a person tested is free of the disease under study (Walton 1976: 10). Low specificity will result in a high number of false-positives called (Walton 1976). Cancer being a malignant disease; a reduction in specificity exists in order to catch all potential cases. Inherent in the procedure is the enormous amount of stress, and anxiety caused by the diagnosis of a false-positive in order to catch all the positive cases. Sensitivity and specificity tend to operate in an inverse relationship (Walton 1976). Undercalls, or false-negatives due to sampling problems can result (Thompson 1989B). Adequate sampling will reduce the number of false-negatives called.

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