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Attitudes as barriers in breast screening: a prospective study among Singapore women

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Abstract

Health care systems do not exist in isolation, but rather, as part of the larger social and cultural mosaic. In particular, perceived attitudes are major obstacles in health promotion exercises. This problem is especially true for non-white populations where little is known about the prevailing social and cultural perceptions towards western biomedical prescriptions. To further our understanding of Asian women's acceptance of mammograms, three attitudinal indexes are conceptualised, constructed and validated. Data from a prospective survey showed the significance of fatalistic attitudes, perceived barriers and perceived efficacy of early detection in predicting women's acceptance of a free mammogram at the National Breast Screening Project. In addition, findings reinforced the importance of social support from the family in the promotion of breast screening among Asian women.

Keywords: Mammogram; Breast cancer; Social support; Singapore; Screening

Introduction

One of the greatest challenges for social scientists working on health promotion is to identify social barriers to health seeking behaviour. While it is fairly easy to correlate trends, and obtain statistical links between demographic attributes and screening attendance, the greater challenge is to contextualise these links.

Literature from western cultures demonstrate that women who are under-represented at breast cancer screening exercises tend to be older, less educated, from ethnic minorities and socially isolated (Bottorff et al., 1998; Luengo et al., 1996; Stein et al., 1991). While such information is important in helping public health administrators to identify target groups for intensive campaigning, it does not throw light on what the campaign message should be. Although availability of information and accessibility to health care facilities are important, knowledge and awareness are not sufficient factors for acceptability of health screening. There are more salient barriers in the form of attitudes that are deep-rooted and reinforced by cultural beliefs (Bottorff et al., 1998; Straughan & Seow, 1995). Unless these attitudinal barriers are addressed, the broad-based messages may not be effective in motivating staunch non-believers to be active participants.

Attitudinal barriers are very much a result of the social construction of illness. The symbolic internation-

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alist approach postulate that lay perceptions of diseases are not necessarily determined by medical knowledge, but rather, by lay experiences of illness episodes (Brown, 1995). Attitudinal barriers often mediate the relationship between social risk factors (like race, class and ethnicity) and health promotion behaviour. Link and Phelan (1995) argued that unless we contextualise social risk factors and achieve an understanding of the process that leads to exposure to disease, we cannot affect behavioural changes.

This argument follows the notion that medical systems do not exist in isolation. Rather, meanings and norms governing illness and health seeking behaviours are attached to particular social relationships and social settings (Kleinman, 1978). Medical sociologists have recognised this, and incorporated perceived attitudes in the models explaining health promotion behaviour. The Health Belief Model, for example, has components specifying perceived attitudes towards various aspects of health seeking behaviour. While this established model serves as a useful guide for exploratory analysis, in the study of non-white populations, the model is not sufficient as an explanatory tool (see Quah, 1985). This is because the Health Belief Model is tested on predominantly white, middle-class populations, but not well-tested on minority or low-income populations (Duke et al., 1994). In addition, the Health Belief Model is based on a rational choice model that assumes adherence to western biomedical claims is rational. However, rationality itself is a social construction that is based on cultural and social norms.

The primary aim of our study is to derive, establish and validate three attitudinal indexes that provide explanatory power in the analysis of acceptability of mammographic screening in a non-white population. The multidimensional indexes are further tested in a prospective study to assess their predictive power.

Mammographic screening in Singapore

As it is in the US, the incidence of breast cancer in Singapore has risen significantly over the past two decades. The age-standard rate was 19.9/100 000 in the period 1968–1972, and rose to 31.2/100 000 in the period 1983–1987 (Lee et al., 1992). Breast cancer is currently the most common female cancer, accounting for 17.2% of all cancers diagnosed among women (Lee et al., 1992). In 1988–1992, there were 2609 cases of breast cancer in Singapore females. The age-standardised incidence rate was 38.7/100,000 women/year (Chia et al., 1996; Seow et al., 1996). Currently, breast cancer is the leading cancer among Singapore women, and its incidence is projected to increase by 3–4% every year.

While mammography screening as a means of early detection of breast cancer has gained acceptance as an effective means of reducing mortality from breast cancer in many parts of the world, it is a fairly new procedure in Singapore. In Singapore, there is currently no programme for systematic screening by mammography, although facilities are available in the major government and private hospitals, and in one government outpatient clinic. Women may either be referred by a doctor, or call up for an appointment at one of these facilities. The cost of obtaining a mammogram at the government clinic is currently S$100 (US$59). This is considered relatively high for many women, especially when it is compared to the cost of a Pap smear or an average outpatient medical consultation (currently of about S$15 or US$9).

The National Breast Screening Project was launched in 1994 to assess the prevalence of breast cancer among Singapore women in the high-risk age group as well as the feasibility of mammographic screening for Asian women. The project, which was sponsored by the Ministry of Health, was carried out over two years, and women between 50 and 65 years were invited for a once-off free mammogram at one of two large mammographic screening centres. Results from the project demonstrated the efficacy of mammograms for Singapore women (Ng et al., 1998). Although mammography has been shown to be effective in controlled trials, it has been widely acknowledged that in addition to high technical quality, an important determinant of the success of a population-based screening programme is the uptake of screening by women in the community (Forrest, 1986). To this end, the acceptability of the procedure to the target population is crucial. This applies both to countries where women are invited for mammography (as in the National Health Service Breast Screening Programme in the UK), and where the service is provided on request on a fee-for-service basis (as in the US). It is therefore important for health planners to understand what motivates women to adopt or avoid regular mammography.

Methods

We conducted a multistage project to promote a better understanding of the acceptability of mammography screening in Singapore. Phase I was a qualitative stage where concepts were defined and the research design mapped; phase II was a cross-sectional survey that provided, among other information, validation of the new attitudinal indexes created; phase III was a prospective study that provided empirical support for the predictive power of these indexes.

Preventive health behaviour, like other health related issues, is very much affected by cultural interpretations of health, illness and disease (Straughan & Seow, 1995;

Davison et al., 1992; Backett, 1992; Kleinman, 1978). In the conceptualisation stage of our project, we realised that while there is an abundance of literature on preventive health behaviour, most of the established findings are derived from social and cultural context that are predominantly western, i.e. from the US, UK, Australia. Singapore is a small, cosmopolitan city-state in the heart of Southeast Asia. The population distribution is predominantly ethnic Chinese (about 77%), with 15% Malays and 7% Indians. As we could not rely totally on the existing literature in our study of breast screening behaviour among Singapore women, the first phase of the project was a focus group study to identify the culturally specific dimensions that influence women's interpretation and understanding of breast cancer and breast screening. The findings are detailed in Straughan and Seow (1995). Based on the qualitative study, we designed a structured questionnaire for the quantitative phase.

Phase II was a cross-sectional survey of a random sample of Singapore women between 50 and 65 years old. Both phases II and III were conducted in conjunction with the National Breast Screening Project. As mentioned earlier, the project's primary aim was to investigate the efficacy of the two-view mammography in picking up early breast cancer. We obtained a random sample of approx. 1% from the total target population of all Singapore women between 50 and 64 years old. After accounting for bad addresses (which included those who had moved, deceased, non-existent addresses due to redevelopment and a small portion of addresses located in fairly remote areas that were hard to reach) the effective sample size was 868. The final study population comprised 660 women, which corresponds to a response rate of 76%. Our final sample was predominantly women who resided in high-rise housing developments, with only a small proportion in landed property (i.e. houses). This is not unusual as about 93% of total residences in land-scarce Singapore are high-rise flats and condominiums. Face-to-face interviews were conducted at the respondents' homes and each interviewer was trained to conduct the interview in at least two languages/dialects. Respondents were interviewed in the language they were most conversant in. This was usually Mandarin or Chinese dialects for the Chinese respondents, Malay for the Malay respondents, and English or Malay for the Indian respondents. The interviewers presented a synopsis of the study to the respondents prior to the interviews and interviews were carried out only on respondents who agreed to be part of the study.

Data for this paper was drawn from an extended interview conducted on a sub-sample of 338 women. The extended interview took about an hour, and included an additional 25 items on various health attitudes, some of which constitute the three indexes discussed in this paper. The 12-page questionnaire was formulated in English, and translated into Mandarin and Malay. The translated versions were assessed for reliability.

The demographic profile of our sub-sample mirrored very closely the characteristics of the general target population. Most of our respondents were Chinese (84.3%); 72.4% were married, compared to 19.3% who were widowed and 8.3% who were never married. Most of the women had children (95.3%), and the average number of children was 3.6 (SD = 2.1). The average age of the sample was 58.4 years (SD = 5.3). Most of the women had no formal education (33.6%). In light of the average age of the group, this is not surprising. The median household income was S$2250 (US$1324).

Validating attitudinal indexes

Acceptance of health screening tests is very much correlated with perceived physical, psychological and social barriers (Stein et al., 1991). To predict cancer-screening behaviour, three sets of attitudinal indexes measuring different aspects of perceived barriers were created. The first measured fatalistic attitudes, and details of the validation of the fatalism index is discussed elsewhere (see Straughan & Seow, 1998). Our conceptualisation of fatalism defined it as a belief that some health issues are beyond the individual's control. Fatalism involved the notion of predestination, luck and fate. To avoid catastrophic events from occurring, the individual can devise means to predict and manipulate one's fate. For example, one may rationalise that in order to avoid breast cancer, she should not allow the cancer to be detected. Thus, she would avoid screen tests. To capture our conceptualisation of fatalism, the following seven-ltem index was constructed (see Table 1). Each item on the index represented one specific aspect of fatalism. Our respondents were asked the extent to which they agreed or disagreed with the statements, and their responses were recorded on an 8-point semantic differential scale. The reliability coefficient for this index (Cronbach's alpha) was 0.7676. Fatalism ranged from 7 to 56, with high scores indicating low levels of fatalism, and the sample mean was 31.6 (SD = 10.2).

In addition, two other indexes measuring perceived barriers and perceived knowledge were constructed. In line with arguments presented in the Health Belief Model, we created an index that captured perceived barriers to screening behaviour. Though the Health Belief Model may not be appropriate as a research paradigm in itself in the study of non-white populations, we feel that there are specific aspects of the model which may be useful in our analysis. With regards to perceived barriers, we hypothesized that

Table 1
Items on the fatalism index (FATALISM)[a]

1.	Life and death are all predestined; there is nothing we can do to change our destiny.
2.	Serious diseases like cancer are all fated; we cannot prevent them from happening.
3.	If you are fated to get cancer, you will get cancer; there is nothing you can do to change fate.
4.	If you don't die from this, you'll die from that. So there's no point taking screening tests.
5.	If we fell well, we should not go looking for trouble by having medical screening tests.
6.	Many types of diseases can be prevented; it's up to us to do something about it.
7.	Whether I enjoy good health or not depends a lot on how well I take care of myself.

[a] Responses were registered using an 8-point semantic differential scale where 1 = strongly disagree and 8 = strongly agree. The scores were reversed for items 1–5 in the computation of the index such that a high score represented low level of fatalism.

women who perceived that it was difficult for them to go for a screen test were less likely to engage in breast screening. Barriers highlighted in an earlier study on non-attendees of the first phase of the National Breast Screening Exercise were included in the conceptualisation of our index on perceived barriers (Seow et al., 1998a; Seow et al., 1998b; Seow et al., 1997). The index consisted of five indicators: perceived difficulty in taking time off to go for health screening, perceived difficulty in finding alternative domestic helpers, perceived difficulty in going to the doctors' office perceived pain, and perceived embarrassment (see Table 2). The respondents were asked to indicate their extent of agreement or disagreement with the statements listed. Cronbach's alpha for this index was 0.7386, which confirmed that the items held well as an index. The range of the perceived barriers index was from 5 to 40, with high scores representing low perceived barriers. The sample mean for the index was 25.4 (SD = 9.2).

The next index, which we labelled perceived efficacy of early cancer detection (DETECT) was made up of six indicators (see Table 3). The index tapped mainly on respondents' awareness of the merits of early detection for cancer, their perception of whether cancer can be cured, and if mortality from cancer can be avoided. Like the other two indexes, respondents were asked to record their level of agreement or disagreement with the listed statements on perceived efficacy on an 8-point semantic differential scale. Cronbach's alpha for the DETECT index was 0.7757, and index ranged from 6 to 48 where high scores indicated positive perception on the curability of cancer. The sample mean on DETECT was 34.1 (SD = 8.9), suggesting that, on average, the women in our sample tend to agree that cancer can be prevented/cured.

At the conceptual level, attention was focused on ensuring at least face validity in the construction of the three attitudinal indexes. In addition, information on the concepts from existing literature and our qualitative data were incorporated to assess content validity. As demonstrated in the discussion above, the three indexes were further validated by data collected from the cross-sectional survey.

Prospective study

To test the predictive power of the indexes, a prospective study was conducted in phase III of the project. Women interviewed in the cross-sectional survey were subsequently invited by the National Breast Screening Project to attend a free mammogram at a screening centre located in a large general hospital. The invitation, extended between 6 months to a year after they were interviewed, was made via first-class mail. Following the standard procedure adopted by the project, two reminders were sent to women who did not respond. Of the 338 women surveyed, 303 were successfully contacted and invited to a free mammo-

Table 2
Items on the perceived barriers index (BARRIERS)[a]

1. It is difficult for me to take time off to go to the doctor's for a health check-up.
2. It is difficult to find someone to take over my responsibilities at home (e.g. looking after children, cooking) if I have to go to the doctor's for a health check-up.
3. It is difficult to find someone to take me to the doctor's for a health check-up.
4. Generally, I dislike going for medical tests that are painful.
5. Generally, I dislike going for medical tests where I have to take off parts of my clothes.

[a] Responses were registered using an 8-point semantic differential scale where 1 = strongly disagree and 8 = strongly agree. The scores were reversed for all items in the computation of the index such that a high score on the index represented a low level of perceived barriers.

gram. All together, 34% of those invited attended the free screening.

The focus of our analysis in the prospective study was to predict women's attendance at the National Breast Screening Exercise. We were particularly interested in the predictive power of our three composite indexes measuring fatalism, perceived barriers and perceived cancer knowledge.

In an earlier analysis, we found that education and fatalism were significantly correlated (Straughan & Seow, 1998). In this paper, we computed an interaction term (FATALISM*EDUCATION = FATEED) to investigate the interaction effect of education and fatalism. Both fatalism and formal education shared a common characteristic in the notion of rationalism. By our definition of fatalism, women who were less fatalistic were more likely to embrace the western biomedical model of "rational" preventive health measures. Formal education opened channels to, among other things, accessing medical information and knowledge. Thus, women who were more educated were also more likely to accept western biomedical notions of health promotion. We hypothesized that education would moderate the effect of fatalism on breast screening attendance. In addition to the three attitudinal indexes, we also included social support and some social background variables in the model.

The social support literature points to the influence of our "significant others" on our beliefs, attitudes as well as behaviours (Straughan, 1992; Litwak & Messeri, 1989; Berkman, 1985; Calnan, 1985; Gravell, Zapka & Mamon, 1985; Berkman & Syme, 1979). We conceptualised influence from informal social networks to come from two different primary groups: the family network and the network of close friends. Quality of informal social support is defined in terms of perceived social embeddedness. We asked our respondents their perception of how important they were to their family members. To indicate embeddedness in the friendship network, the same question was repeated for their close friends. We hypothesised that the better the quality of informal social support, the more likely the woman would go for the mammogram.

With regards to formal social support, we asked our respondents if any physician had ever advised them to go for a mammogram. Women who had been advised to go for a mammogram by a physician are more likely to be receptive to the invitation for a free breast screening. Past mammography experience was also included in the model. We hypothesised that women who have had mammograms are more likely to accept the invitation to a free screening because they are aware of the screen test.

Five dimensions of the respondent's social background were in the model. They are marital status (conceptualised in terms of presence of a spouse verses no spouse), parenthood status (indicated by the presence of children), age, education and household income. Research in breast screening and other preventive health behaviour generally found that women from the lower social class who are widowed and less educated are less likely to participate in health screening (Straughan, 1992). All together, 13 variables were included in the logistic model to predict attendance at the National Breast Screening Exercise.

Table 3
Items on the perceived efficacy of early cancer detection index (DETECT)[a]

1. If breast cancer is detected early, chances of cure are very high.
2. There are medical tests now that can detect breast cancer in its very early stages.
3. There is very little I can do to reduce my chances of dying from breast cancer.
4. Even if breast cancer is detected early, nothing can be done about it.
5. Cancer is like a death sentence; if you get it, you will surely die from it.
6. Cancer cannot be cured; you can only prolong the suffering.

[a] Responses were registered using an 8-point semantic differential scale where 1 = strongly disagree and 8 = strongly agree. The scores for items 3–6 were reversed in the computation of the index such that a high score represented positive perception on the efficacy of early cancer detection.

Results

Of the 13 predictor variables, four were dichotomous: DOC (measuring the advice from a doctor regarding mammograms), MAMHIS (measuring mammography history), CHILD and SPOUSE (measuring the presence of children and spouse respectively, indicating parenthood and marital status, and the availability of child and spousal social support). The dependent variable, ATTEND was coded such that "0" represents rejection of the invitation to attend a free mammogram and "1" represents attendance at the National Breast Screening Exercise. All the dichotomous variables were coded in accordance with the hypotheses i.e. "0" for categories hypothesised to lower likelihood of breast screening and "1" for categories hypothesised to have higher likelihood of breast screening.

The statistical tests accessing how well the model performs are in Table 4. The Nagelkerke R^2 was 0.298, and indicated that the logistic model regression model explained about 30% of the "variation" in the breast screening attendance. The model chi-square (which tests the null hypothesis that the coefficients for

Table 4
Logistic regression result I — performance of model predicting attendance at mammographic screening

Tests assessing model performance	Chi-square value	Degrees of freedom	Statistical significance
−2 Log likelihood	162.146	na	na
Model	36.902	13	0.0004
Nagelkerke R^2	0.298	na	na
Classification outcome	71.62% Accurate		

all the predictor variables in the current model, except the constant, are 0) was significant at the 99% confidence level ($p = 0.0004$). The outcome of the classification table showed that overall, the model accurately predicted the attendance outcome of 72% of the women in our sample. Taken together, these results suggest that our model provide a statistically viable explanation of the data.

The regression coefficients and their respective significance are in Table 5. In logistic regression, it is more comprehensive to report the odds ratios, which is the exponential of the regression coefficient [Exp (B)]. For example, for women who perceived that they were important to their family members, holding all the other variables in the model constant, we see from the odds ratio that they were 1.6 times more likely to attend the free breast screening. The statistical significance of the regression coefficients is derived from the Wald statistic. Of the 13 predictor variables in the model, 10 are statistically significant at the 90% confidence level. They are perceived barriers (composite index BARRIERS), efficacy of early detection (composite index DETECT), fatalism (composite index FATALISM), the interaction of fatalism and education (FATEED), perceived importance of respondent to her family (FAMILY), perceived importance of respondent to her friends (FRIEND), household income, age of respondent, education level of respondent and if respondent had been asked by a physician to go for a mammogram (DOC).

From the model, we see that women who attended the free breast screening were more likely to:

i. be less fatalistic;
ii. have fewer perceived barriers;
iii. perceive that cancer was curable and preventable;
iv. perceive that they were important to their family members;
iii. come from higher income households; and
iv. have higher formal education.

In addition, they were older, less likely to have been told to go for a mammogram by their physicians, and less likely to perceive that they were important to their close friends. With the exception of the last three findings, the rest of the results concur with our original hypotheses.

Discussion

A prospective study is able to throw light on cause and effect, given the sequential order of events that were tracked. Our findings provided empirical evidence

Table 5
Logistic regression result II — regression coefficients of model predicting attendance at mammographic screening

Predictor variable	Description of predictor variable	Exp (B) odds ratio
BARRIERS	Index on perceived barriers	1.06*[a]
FATALISM	Index on fatalism	1.09*
DETECT	Index on perceived efficacy of early cancer detection	1.07*
SPOUSE	Presence of spouse	0.94
INCOME	Monthly household income	1.0003*
AGE	Age of respondent	1.10*
EDUCATION	Highest formal education	3.01*
CHILD	Presence of children	0.38
MAMHIS	Ever had mammography	1.38
DOC	Ever been advised by doctor to do a mammogram	0.36*
FAMILY	Perceived importance of respondent to her family	1.61*
FRIEND	Perceived importance of respondent to her close friends	0.67*
FATEED	Interaction of fatalism and education	0.97*

[a] *Statistically significant at $p = 0.10$, based on the Wald statistic.

supporting the importance of attitudinal barriers in women's decision on uptake of breast screening. In addition, the results also further reinforced the importance of informal social support in health promotion behaviour.

Fatalism and education in breast screening

Women who were less fatalistic were more likely to accept the free breast screening invitation. Belief in the efficacy of screen tests in cancer prevention is primarily embedded in the western biomedical model. Women who were more fatalistic tend to have less faith in the western medicine. Thus, when we evaluated their health beliefs against the western biomedical model, they might appear "irrational". However, we argue that this label of "irrationality" is a culturally biased perception. On the contrary, when we examined women who were very fatalistic in our focus groups interviews, we found that their beliefs were very rational in their discourse of lay epidemiology (Straughan & Seow, 1995).

Like fatalism, the independent effect of education on attendance was positive: the higher the formal education level, the higher the odds of attendance. Formal education is very much structured after the western model of rationalisation. Women who were more educated tend to be more cosmopolitan in their outlook, and less traditional in their beliefs. Formal education opened the channels to, among other things, accessing medical information and knowledge and scientific reasoning. Thus, it is expected that women who were more educated were more likely to accept the invitation to a free screening. While the direct effects of education and level of fatalism were moderated by the negative coefficient of the interaction term, overall, the influence of education and level of fatalism on attendance were still positive. To illustrate, for a respondent who scored 50 on fatalism and had high school education, the overall effects of fatalism and education for this respondent is exp(1.9), which results in the odds ratio of about 7. For a university-educated respondent with the same level of fatalism, the odds ratio is 1.49 [exp(0.4)].

Perceived barriers and perceived efficacy of early detection

As hypothesised in the Health Belief Model, women with higher perceived barriers were less likely to attend the free breast screening. We identified five perceived barriers: time, domestic responsibilities, logistics, pain and embarrassment. Conceptually, the first three are physical and the last two are psychological barriers. To alleviate physical barriers, one suggestion is to bring the screening sites closer to the target population. This would enable those who are pressed for time or who are less mobile to adopt preventive health screening as part of their normal routine. It is more difficult to overcome psychological barriers. Perceptions of pain and notions of modesty are both very subjective, and often, they are indicative of other, more sublime issues like cultural perceptions.

On the issue of modesty, generally, Asian women are more private in their perceptions of their body, and are less receptive to revealing private parts of their body, even to health care providers (for an illustration of how modesty is an issue in health screening among South Asian women, see Bottorff et al., 1998). Of course we can adopt measures that will make it easier, like matching the gender of patients and health care providers to alleviate embarrassment for the patient. To overcome anxieties arising from anticipated pain, new machines for screening can be devised, and health care providers can be educated to be more sensitive about this issue, and advised to take special care when carrying out procedures for screening. However, the key to improving uptake of mammograms is to get women to adopt regular breast screening in spite of their concerns about pain and discomfort. One way is to increase their awareness of the importance of early detection.

The perceived efficacy of early detection index was positively correlated with attendance at the breast screening exercise. Women who were aware of the merits of early cancer detection were more likely to take proactive control of their susceptibility to breast cancer. From a public health policy perspective, how can we increase the awareness in the target population? One obvious method is through public education and mass-target campaigns. However, these are often expensive and unless they are specifically targeted at relevant segments of the population, they are not very effective.

Perhaps another more effective method would be to invoke the power of informal social support in the promotion of health screening behaviour. In a separate phase of our breast-screening project, we conducted an intervention study to test different stimuli to improve acceptability of breast screening. The outcome of that randomised trial demonstrated the importance of informal social support in promoting acceptability, even in populations that are initially resistant to screening (see Seow et al., 1998a,b). While information on breast screening can be obtained from many other sources, it has been demonstrated (in our intervention study and elsewhere) that the source of that information as well as the conveyor of that information are both very important. We are more likely to adhere to advice given by people close to us (whom we respect and trust) than we are to advice provided by "faceless" sources (like a health promotion pamphlet).

We do, however, have to be cautious of the boomerang effect of such preventive health promotions. There is still a lot medical science cannot understand about cancer, but in the zest of advocating proactive lifestyles, the little knowledge that we have in combating cancer may be exaggerated. In the course of promoting the efficacy of early detection and pro-active measures, we might inadvertently highlight the inconsistencies, i.e. cases of individuals who follow the rules but still fall out. And in the construction of lay epidemiology, these inconsistencies will serve to reinforce psychological barriers to health screening (see Davison et al., 1992).

Social support

As hypothesised, women who perceived that they were important to their family members were more likely to accept the free mammogram. This result is consistent with our findings from the randomised trial. It reinforces the notion that health-screening behaviour is very "social" in nature, i.e. whether a woman goes for breast screening is influenced by her perceived embeddedness in her family. Social embeddedness can affect acceptance of screening in two ways. First, as demonstrated in the randomised trial, family members can serve as conveyers of messages. Women are more likely to adhere to advice given by trusted family members. Second, because of their perceived importance in the family, women who are embedded are more likely to want to sustain their health status so as to enable them to continue their role in the family.

While the effect from family support was positive, the effect of support from close friends was negative. We asked our respondents if they perceived themselves to be important to their close friends. Those who responded positively were less likely to accept the free mammogram. Thus, the finding suggests that while embeddedness in the family involves the desire to sustain one's healthy status, being important to one's close friends does not have the same effect.

Similarly, we found a negative relationship between physician's advice and attendance at the National Breast Screening Exercise. Women who had been advised by a physician to go for a mammogram are less likely to accept the free invitation. While we do not have information on the screening history of these women, we do however suspect that some of them are very likely to be on a regular screening routine, and thus, did not need a free mammogram. Nonetheless, this negative correlation should be further analysed in future studies.

Social demographics

In addition to education, two other demographic variables have a significant effect on acceptance. They are household income and age. Women with higher household incomes and who are older are more likely to accept the invitation. With regards to age, while we generally expect that older women tend to be underrepresented at mass screening exercises, it should be noted that our target population was women between 50 and 65 years.

Implications of findings

Our primary objective in this paper is to validate the three attitudinal indexes, and establish their predictive power in the study of uptake of breast screening among Asian women. Acceptance of breast screening and other health promotion behaviour is very much influenced by social beliefs and perceptions. These attitudes are not always evident, and typically, tend to prevail in segments of the population where screening is under-utilised. It is also important to note that while there may be observable trends in social and cultural beliefs within any ethnic group, the diversity in perceptions must also be acknowledged. As Mechanic argued, "What may seem rational to an outside observer may have little relevance within the context of the individual's meaning systems and explanatory schemes" (1999:pp.711–718). Unless we search for and understand these hidden meanings, certain social groups in our population may be systematically omitted in health promotion exercises.

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