



The gradient in mammography screening behavior: a lifestyle marker

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Abstract

The study reports a gradient in adhering to a recommended health behavior—mammography screening. Data were collected on 951 Israeli women, aged 50–74, who were mailed an invitation to a prescheduled mammography screening appointment and were later phone interviewed about their background, their other health behaviors and their health perceptions related to cancer, mammography and self-rated health. The main finding that emerged was a gradient consisting of three groups defined by their adherence to mammography screening: women who declined the invitation to undergo screening (nonattenders, 32%), women who attended a screening upon encouragement (attenders, 45%) and women who initiated the test on their own (self-screenees, 23%). This gradient was shown to be related to structural/background variables (e.g. SES, age, education, ethnicity), other health behaviors and perceptual variables related to health in general and to cancer. For example, self-screenees were of a higher SES, engaged in more health behaviors and were closer to other women who performed a mammography. An analysis carried out to discern where the difference between the three groups lied showed that it was more apparent between the self-screenees and attenders, and that the attenders and nonattenders were more similar to each other.

These findings are discussed in terms of health behavior as a discrete phenomenon vs. reflecting a lifestyle. Suggestions for intervention possibilities are presented in light of the finer ranking proposed above (as opposed to the dichotomy of engaging/not engaging in a health behavior). © 1999 Elsevier Science Ltd. All rights reserved.

Keywords: Health behavior; Lifestyle; Mammography; Screening; Israel

Introduction

Studies of health behaviors usually employ one of two dominant research strategies: one targeting health behavior and one based on the concept of lifestyle. Researchers in the first perspective target a health behavior, either a preventive health behavior, a health enhancing behavior or a health compromising behavior, and then inquire into a battery of predicting vari-

ables. The main thrust of this line of research is to identify the attributes of the individuals (perceptions, beliefs and dispositions) and their background (structural attributes such as gender, class, age and environmental cues to action). This strategy has yielded useful information concerning the determinants of health behaviors (Kasl, 1975; Harris and Guten, 1979; Fishbein, 1980; Kirsch, 1983). It has, moreover, contributed to the development of a theoretical framework in the form of generic theories which apply to different behaviors and possess a considerable degree of predictive validity (e.g. the Health Beliefs Model (Janz and

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Becker, 1984), The Theory of Reasoned Action (Ajzen and Fishbein, 1980; Ajzen, 1985) and more recently the Precaution Adoption Process (Weinstein, 1988) and the Transactional Model (Prochaska and DiClemente, 1982)). Examples of the determinants in the theoretical models are individuals' perceptions of their vulnerability, their general concern about health, the perceived probability that some action will reduce the threat of illness and their capacity to perform the target behaviors. Most of the research using this strategy targeted one health behavior at a time, relating to each behavior as a distinct, discrete phenomenon, which exists in isolation from other health behaviors: smoking (Fishbein, 1980), alcohol and drug use (Bentler and Speckart, 1979; Prochaska et al., 1992), family planning behavior (Davison and Jaccard, 1975), exercise (Valois et al., 1988), child safety (Gielen et al., 1984), home radon testing (Weinstein and Sandman, 1992), weight loss (Saltzer, 1978; Uzark et al., 1987), breast self-examination (Calnan and Moss, 1984; Baines and Wall, 1990; McCarthy et al., 1996; Rimer et al., 1991, to name just a few).

Studies of health behaviors which employ the concept of lifestyle conceive of health behaviors as a cluster. Health behaviors, or at least subgroups of behaviors, are viewed as interrelated. A certain generality across the behaviors is assumed, and a limited number of dimensions determine the relations among the behaviors (Mechanic, 1974; Abel, 1991). The use of this perspective assumes health behaviors (rather than attitudes or value orientations) to be part of the individual's broader social experience (Sobel, 1981; Donovan et al., 1993). The WHO conceptualization of lifestyle (WHO, 1985) suggests that it is a sociocultural phenomenon. A lifestyle ensues from interactions between life situations and patterns of behaviors, rather than from individuals' decisions to avoid or accept certain health risks.

Each perspective emphasizes a different set of determining variables (though usually not ignoring the alternative). The perspective that targets a distinct behavior emphasizes variables which may be characterized as perceptual. Such variables are perceptions of risk, perceptions of probabilities or the perception of personal efficacy. These are malleable and can vary from one behavior to another. After all, one may view breast cancer as a severe threat with a high probability in itself and therefore conduct periodic mammography screening checks, and at the same time perceive the probability of cystic fibrosis as low. Behaviors vary within a person and may lead to a situation where one person engages in some health behaviors and not in others. Stage theories, in particular, emphasize cognitive changes the individual undergoes as s/he moves through the range from unawareness to maintaining a specific behavior for a substantial period of time. The

lifestyle perspective, conversely, highlights structural determining variables. That is, background or demographic variables such as ethnic origin, education, income and gender. These variables are always present in the person, exert an influence across behaviors and contribute to stability in people's health behaviors.

Interrelations among health behaviors

The evidence pertaining to the interrelations among health behaviors is mixed. Often, studies find modest to no correlation between various health behaviors (Rajala et al., 1980; Maron et al., 1986; Dean, 1989; Calnan, 1989; Donovan et al., 1993). Conversely, other or even the same studies find modest to high correlations among subgroups of health behaviors (e.g. alcohol consumption, drunk driving and seat belt misuse) (Norris, 1997; Bradstock et al., 1988; Dean, 1989). Moreover, analyses carried out in order to unravel a possible structure in health behaviors find a clear pattern among them, in spite of the modest correlations. Some of these analyses report a single factor underlying the different health behaviors (Harris and Guten, 1979; Walker et al., 1987; Rakowski et al., 1991; Abel, 1991; Donovan et al., 1993; Barrett, 1995; Donaldson and Blanchard, 1995). Sometimes the single factor also includes attitudes and social influences (Mayer et al., 1990; Slater, 1991; Wolfe et al., 1991).

We reported on the clustering of health behaviors elsewhere (Hagoel et al., 1998). In that study, we identified 'healthy' and 'nonhealthy' behavior clusters. Being assigned to the 'healthy' cluster was strongly associated with performing mammography: women in the 'healthy' cluster were 2.7 times more likely to undergo mammography screening. They were also far more likely than women in the 'nonhealthy' cluster to engage in additional health behaviors.

In this paper, based on data from the same study, we present a further step in conceptualizing engagement in health behaviors. We would like to suggest an additional, finer, distinction. Traditionally, individuals are characterized dichotomously, as engaging or not engaging in health behaviors. We propose that they may be ranked on a *scale* with regard to another, targeted, behavior. In the case of mammography screening, the scale ranges from refusal, through positive response to encouragement, to self-initiation of the test. Our data indicate that women's group assignment along this gradient is strongly associated with most of their measured attributes (demographics, other behaviors and perceptions). In terms of the lifestyle perspective on health behaviors, assignment along the scale of mammography performance is related to the probability that a woman will engage in a more or less healthy lifestyle. Mammography performance may be viewed as a marker for other health-related behaviors

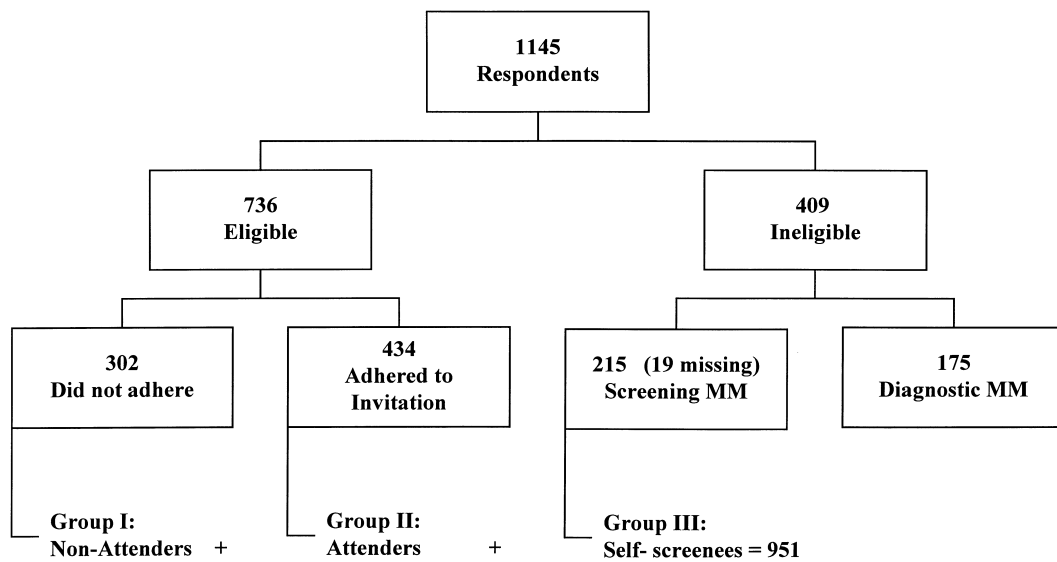


Fig. 1. MM performance.

and perceptions. This paper focuses on mammography performance being such a marker and the implications for intervention stemming from this approach.

Study objectives

In this study we used data from a larger investigation of mammography screening behavior conducted by a large HMO in Israel. The larger study was initiated in light of the fact that Israeli women did not sufficiently adhere to the standing medical recommendation (i.e. women aged 50–74 are to undergo a mammogram once every two years) for mammography screening, communicated through media campaigns and the medical staff. This study examined the effectiveness of several strategies of approaching women with a message about the need to perform mammography screening. In it we attempted to unravel the determining factors of women's responsive behavior. A gradient of mammography screening behavior was discovered. No *a priori* hypothesis as related to this phenomenon was preformulated.

Method

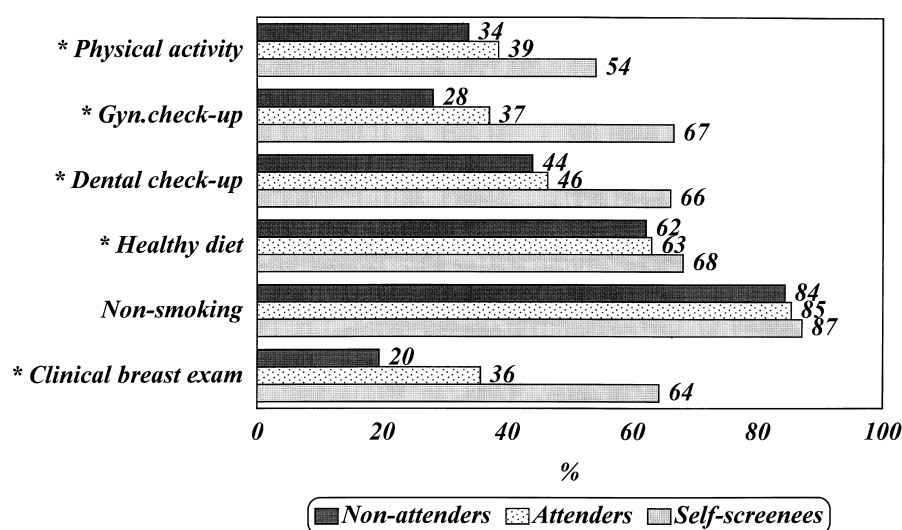
Two main sources of information were used: (1) a questionnaire constructed for the purpose of the study, comprising structural, behavioral and perceptual variables; this questionnaire was administered via the telephone. (2) The computerized National Breast Cancer Screening Program database, containing entries on performed mammograms and their respective dates.

This report concerns only findings related to the issue of mammography screening behavior, its association with structural, life-style measures and with perceptions of illness. For more detailed information on the sample and the questionnaire used in this sample, see Ore et al. (1997).

Study population

Fifteen hundred women residents of Haifa, aged 50–74 (the age group recommended for screening every two years), were sampled from eight primary care clinics in the city. The sample represented high, middle and low socio-economic status (SES) areas in the city of Haifa. All women were mailed a personal letter inviting them to attend a prescheduled mammography screening. A telephone survey was carried out 8–10 weeks afterwards. The information obtained in the telephone interview concerning performance of the mammography test was validated through the database of the National Breast Cancer Screening Program. Based on these two sources of information the women were classified into three groups (Fig. 1).

1. Eligible women who adhered to the invitation and performed the test: 434 women. They were named *attenders*.
2. Eligible women who did not adhere: 302. They were named *nonattenders*.
3. Administratively ineligible women to this project (who had a mammography on their own within the former 2 years): 409 women. 234 women performed mammography for screening purposes and were



* $P < 0.0001$

Fig. 2. Health-behaviors by MM performance.

labeled *self-screenees* (19 of them had missing data excluding them from the analysis). The rest, 175 women, performed mammography for diagnostic purposes and were excluded from this analysis.

An additional 355 women were excluded from the analysis as no computerized evidence of mammography performance was found for them¹. The current study sample includes 951 women. Seven hundred thirty-six of them are women who did not perform the test within the former two years (groups 1 and 2 combined) and 215 (of the 234) were self-screenees as well as reported having received the invitation letter.

Measures

The telephone interview included questions about receiving the invitation, performing the test, reasons for nonattendance (if applicable) and about variables hypothesized to be related to attendance: demographic,

preventive health behaviors and perceptual — health perceptions and accessibility of cancer.

The structural-demographic questions included the following variables: SES as measured by area of residence, ethnic origin (Asia/Africa, Europe/America and Israel), education, profession (later classified according to low, high and medium prestige by using the Tieri scale (Tieri, 1981), working outside the home, marital status, religiosity and age.

There were also questions about behaviors: smoking, diet (observing a low-fat diet and eating vegetables and fruits), regular physical activity, periodic gynecological examinations, periodic dental check ups, periodic general check ups when feeling healthy, self breast examination and clinical breast examination.

The questions on perceptions focused on cancer and health perception. Cancer accessibility variables included questions on familiarity with cancer patients and familiarity with breast cancer patients. Respondents were also asked about their familiarity with the mammography procedure and their acquaintance with other women who had performed mammography. Health perception was measured by self-rating of perceived health in comparison to others of the same sex and age.

Procedure

All respondents were mailed a letter inviting them to attend mammography screening. Eight to 10 weeks later they were contacted by telephone and interviewed for 10 min by a trained interviewer. Evidence on test performance was cross validated with information

¹ We excluded a group of women who had no entry in the computerized national data-set on mammography screening. This data-set served as our 'gold standard' for mammography performance (rather than self reports). Having no entry in the computerized national data-set could result from either no prior performance of mammography or from coordinative problems with small mammography clinics. We preferred to analyze a smaller but a valid sample. Since no reasons for lack of entry were completely ascertained, there was no reason to believe a bias was introduced.

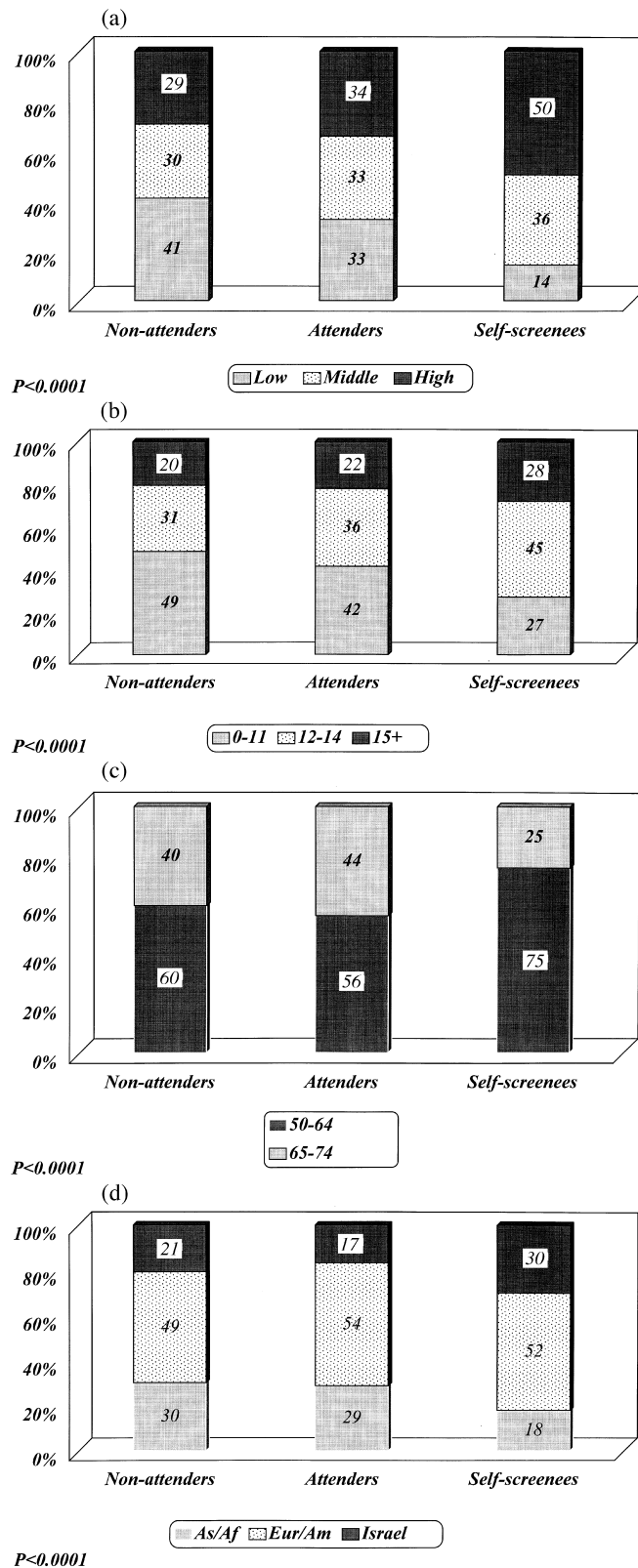


Fig. 3. (a) Socio-economic status by MM performance. (b) Education (Years) by MM performance. (c) Age (Years) by MM performance. (d) Ethnic origin by MM performance.

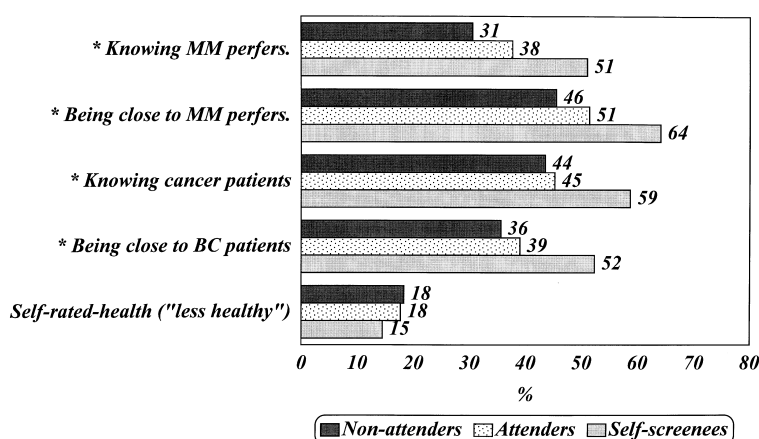
* $P < 0.0001$

Fig. 4. Illness perceptions by MM performance.

from a national data set on mammography performance. It should be noted that the test is free of charge to all eligible women in Israel.

Data analysis

We employed two data-analytic strategies. First, we considered whether mammography screening behavior can be used as a marker for a woman's lifestyle. For this purpose we examined (using a χ^2 analysis) whether the division to 'attenders', 'nonattenders' and 'self-screenees' of mammography screening behavior is related to structural variables and to engagement in other health behaviors. Upon finding that this division represents a gradient of structural and behavioral features, we examined whether the three groups also differed in perceptual variables. Secondly, we conducted a series of logit analyses in order to compare the three groups and discern where the difference is most evident: between the nonattenders and the attenders or between the attenders and the self-screenees.

Results

Mammography performance: a lifestyle marker?

The categorization of the sample into the three groups — nonattenders, attenders and self-screenees — yielded a clear distinction in the distribution of the other variables. Self-screenees engaged much more in other positive health behaviors and much less in detrimental health behaviors than the attenders group, and the latter group engaged more in positive health behaviors than the nonattenders. A Mantel-Haenszel test for linear association demonstrated that there is a sig-

nificant trend for all behavioral variables but smoking. Fig. 2 presents the percentage of respondents in each group who engage in health behaviors. The three groups differed significantly on all behaviors but one. A scrutiny of the figure reveals that in each health behavior, engagement is highest among self-screenees, intermediate among attenders and the lowest among nonattenders. For example, two thirds of the self-screenees undergo a periodic gynecological check-up, much less do it among the attenders (37%) and even less so among the nonattenders (28%).

The gradient among the three groups is not restricted to the adoption of health behaviors. The same phenomenon emerges with respect to structural-demographic variables concomitant with a significant trend. The results are displayed in Fig. 3a–d. In the group of self-screenees, 50% are of high SES, 36% of middle SES and only 14% of low SES. Conversely, in the group of nonattenders, 29% are of high SES, 30% of middle SES and 41% were of low SES. A similar trend is noted in the other structural variables. Women of European/American origin are of the highest frequency in the self-screenees group (52%), as opposed to only 18% of Asian/African origin. The reverse holds for the nonattenders. The pattern repeats itself with education — the more educated the women the more likely they are to be among attenders or self-screenees; the more prestigious profession (data not included in figure) a woman holds, the more likely she is to perform a mammography screening. Likewise, more women who work outside the home are in the self-screenees and attenders groups; the self-screenees and attender groups have a higher percentage of married women; and finally, the self-screenees and the attenders have a lower percentage of religious women than the nonattenders.

Table 1

Odds ratio of loglinear estimate (λ) for comparisons of MM groups on structural, behavioral and perceptual variables

Variables	Comparison of nonattenders to attenders		Comparison of attenders to self-screenees	
	odds ratio of estimate	95% confidence interval	odds ratio of estimate	95% confidence interval
<i>Structural variables</i>				
SES	0.68 ^a	0.48–0.97	2.65 ^a	1.82–3.82
Age	1.19	0.88–1.60	2.04 ^a	1.52–2.75
Education	1.24	0.83–1.88	1.89 ^a	1.27–2.83
Ethnicity	0.85	0.53–1.34	2.60 ^a	1.67–4.06
<i>Behavioral variables</i>				
Physical activity	1.19	0.87–1.63	1.51 ^a	1.12–2.03
Gyn. check-up	1.51 ^a	1.08–2.12	2.94 ^a	2.16–4.01
Dental check-up	1.10	0.80–1.51	1.98 ^a	1.46–2.69
Healthy diet	1.05	0.56–1.97	1.24	0.66–2.34
Nonsmoking	1.04	0.68–1.58	0.96	0.63–1.46
Clinical breast exam	2.27 ^a	1.58–3.25	3.22 ^a	2.36–4.39
<i>Perceptual variables</i>				
Knowing MM perfers.	1.15	0.83–1.58	1.89 ^a	1.35–2.66
Being close to MM perfers.	0.82	0.98–2.12	1.14	0.73–1.77
Knowing cancer patients	0.84	0.61–1.15	1.77 ^a	1.30–2.44
Being close to a BC patient	1.34	0.85–2.12	1.40	0.92–2.12
Self-rated health ('less healthy')	0.96	0.64–1.45	0.79	0.53–1.19

^a Significantly different at 0.05 level.

The gradient among the three groups continues to manifest itself with perceptual variables (Fig. 4). More than half of the self-screenees reported knowing other women who performed a mammography, whereas only 38 and 31% of the attenders and nonattenders, respectively, knew women who performed mammography. The same trend is apparent in reporting being close to other women who performed mammography, knowing cancer patients and being close to breast cancer patients in each group. It is worth noting that although the self-screenees are more cognizant of cancer they do not feel they are less healthy than the average person of their age and gender. Only 14.5% of the self-screenees report themselves as 'less healthy' than average among women of their age, compared to 17.7% of the attenders and 18.3% of the nonattenders.

Direct comparisons between the three groups

In order to ascertain where the main differences lie — between the attenders and the nonattenders or between the attenders and the self-screenees — we conducted post hoc contrast comparisons. We used a logit model which is a multiway frequency analysis, testing associations between discrete variables. In our analysis the marker variable was assignment to mammography group and the related variables were the three sets of

variables: structural, behavioral and perceptual. For each variable, the first contrast compared the attenders to the nonattenders and the second contrast compared the attenders to the self-screenees. Table 1 displays the odds ratio of loglinear parameter estimate (λ) and its accompanying 95% confidence interval for each comparison.

The comparisons between the nonattenders and the attenders on the structural variables yielded only one significant result: the two groups were significantly different in their social-economic status but not in their levels of education, age and ethnic origin. By contrast, all four comparisons between the attenders and the self-screenees on the structural variables yielded significant differences. Comparisons of the six behavioral variables yielded two significant differences between the nonattenders the attenders and four significant differences between the attenders and the self-screenees. The last set of comparisons on four perceptual variables related to mammography and cancer yielded no significant differences between the nonattenders and the attenders and three significant differences between the attenders and the self-screenees. There were no significant differences between any two groups in self-rated health.

Discussion

The present paper highlights two major findings. First, a segmentation into three groups emerged from the data. It supports our claim that a finer, three-way distinction with respect to engaging in health behaviors can be drawn, compared to the widely used dichotomy of either engaging or refraining from health behaviors.

Second, our results suggest that mammography screening behavior is not a discrete behavior. It is rather, part of a lifestyle. The division of respondents into three groups of nonattenders, attenders and self-screenees of mammography was related to a host of other attributes. These attributes include, as was assumed, structural (demographic) variables, health behavioral variables and illness perceptions. It is possible that these very attributes increase the likelihood that their physicians will discuss health issues with them and possibly refer them to screening. Our findings indicated that women who initiated mammography screening were more likely to engage in other health behaviors than other women, and women who responded to an encouragement to participate in mammography screening were more likely to engage in other health behaviors than those who did not respond favorably to such encouragement. Finally, mammography screening was also related to a host of perceptual variables concerning perceived health, cancer in general and mammography in particular. The lifestyle results are consistent with previous findings (Norris, 1997; Harris and Guten, 1979; Walker et al., 1987; Bradstock et al., 1988; Dean, 1989; Abel, 1991; Rakowski et al., 1991; Donovan et al., 1993; Barrett, 1995; Donaldson and Blanchard, 1995). For example, Neilson and Whynes (1995) also found that screening for colorectal cancer is associated with other preventive behaviors, such as dental care and visiting a GP within the previous year.

The emergence of three ranked groups raises the question as to where the difference among them lies. Our data provide the following answer: a greater difference exists between women who initiate health behaviors on their own and those who respond to external encouragement, and to a smaller extent (Table 1) between women who do not adhere to the invitation and those who respond to it positively.

Our findings suggest that group assignment with regard to mammography screening behavior (and possibly to other anchor behaviors) could be used as a marker for the probability that a woman will engage in additional health behaviors. There exists a continuum from refusing to attend, through agreeing, to initiating the test by themselves. The relationship among the three groups needs to be further examined. Fig. 1 displays the fact that, as opposed to women in the self-screenees group, those in the first two groups

have in common their eligibility for the project: they did not have a mammogram in the two years prior to the project, as is medically recommended. In addition, these two groups seem to form one rather homogeneous group in terms of structural attributes: the major differences lie between these two groups and the third one (Ore et al., 1997). Yet in terms of specific health-behaviors and perceptions, these two groups are not as homogeneous: they differ significantly in some behaviors and perceptions and not in others. For example, the nonattenders and attenders are significantly different in undergoing a regular gynecological check-up, but they are similar in having a regular dental check-up. This inconsistency in the behavioral and perceptual variables between the two eligible groups may reflect a dynamic process of individuals adopting a variety of health behaviors at different paces. This process may not be independent of structural factors.

The present study provides results pertinent to theory and practice alike. Theoretically, it leans towards those theorists who view health behaviors as part of a larger context (Mechanic, 1974; Sobel, 1981; Abel, 1991; Donovan et al., 1993; Neilson and Whynes, 1995). Most such theorizing focused on structural or behavioral features. Our results provide further support for this view and extend the context to include perceptual variables as well. Conceptualizing lifestyle with structural variables as the determining factor conflicts with some of the critique of this concept: lifestyle has been criticized as a concept covering a loose aggregation of behaviors and conditions viewed as pathogenic and within the responsibility of the individual (Davison and Smith, 1995). Our results are pertinent to this postmodern controversy regarding the responsibility for disease causation and disease avoidance: do structural factors carry the brunt of responsibility or does the individual? Our view is similar to the one expressed by Kelly and Charlton (1995), namely, that “structures set the limits as to what may be achievable at any given moment”, but that there is still space for ‘free will’ expressed in perceptions, which act either as mediators or as determining factors on their own (Hagoel et al., 1995).

This conceptualization of lifestyle carries practical implications for intervention. First, it strongly suggests that interventions could be customized for specific segments in a target population. The segments, furthermore, need to be characterized not only in terms of structural variables, as is usually actualized, but also in terms of perceptual and behavioral attributes: what individuals think about their health and about health issues, as well as their routine health behaviors. Second, this inclusion of other kinds of characterizing attributes constitutes an opportunity. A woman may not work outside the home, she may smoke and reside in a low class neighborhood, but if she visits a gynecol-

ogist periodically that behavior can be used as a lever to move her over towards a target behavior or cluster of behaviors. The present findings suggest that individuals in the intermediate group (attenders) can be persuaded to engage in target behaviors that they did not initiate on their own. Some of these women do or think in ways that are congruent with the target behavior or behaviors. If the target behavior and the attributes already present can be tied together, there is an opportunity to work towards a healthier lifestyle. The principle of consistency or self-perception theory supports this conclusion (Heider, 1958; Bem, 1972). Indeed, Unger (1996) posits that a change in one behavior may indicate a more general responsiveness to change in the direction of enhancing other behaviors as part of one's healthy lifestyle. Possibly, we need to identify such behaviors and employ them in order to relocate the woman along the continuum of healthy behaviors.

Based upon the findings and the conceptualization outlined, we suggest a long term approach, consisting of two major steps, aimed at encouraging women in the first two groups on the continuum to move towards being self-screenees.

1. Nonattenders→Attenders
2. Attenders→Self-screenees

Thus, nonattenders would need to be encouraged to behave more like attenders, while with regard to the latter the goal would be to encourage them to approach the self-screenees. A different, specific intervention is required for each step to be taken by each group. Women in the nonattenders group could profit the most from a segmentation and customized intervention (Douglas, 1995).

Concurrently, we suggest that it would be useful to add an indirect approach to the direct approach to intervention. The direct approach targets a discrete behavior (such as mammography) and encourages individuals to adhere to medical recommendations. We surmise that encouraging individuals to adhere to a healthy lifestyle may ultimately result in their adoption of the target behavior as well.

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