

A tailored intervention to promote breast cancer screening among South Asian immigrant women

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ABSTRACT

This study developed and evaluated a socioculturally tailored intervention to improve knowledge, beliefs and clinical breast examination (CBE) among South Asian (SA) immigrant women. The intervention comprised a series of socioculturally tailored breast-health articles published in Urdu and Hindi community newspapers. A pre- and post-intervention design evaluated the impact of the mailed articles among 74 participants. The mean age of participants was 37 years (SD 9.7) and they had lived 6 years (SD 6.6) in Canada. After the intervention, there was a significant increase in self-reporting 'ever had' routine physical checkup (46.4-70.8%; $p < 0.01$) and CBE (33.3-59.7%; $p < 0.001$). Also, the total summed scores of accurate answers to 12 knowledge items increased (3.3-7.0; $p < 0.001$). For constructs of health belief model, participants rated their level of agreement for a number of items on a scale of 1-4 (disagree to agree). After the intervention the following decreased: misperception of low susceptibility to breast cancer among SA immigrant women (3.0-2.4; $p < 0.001$); misperception of short survival after diagnosis (2.7-1.8; $p < 0.001$); and perceived barriers to CBE (2.5-2.1; $p < 0.001$). Self-efficacy to have CBE increased (3.1-3.6; $p < 0.001$). The change scores of five predictor variables were entered in a direct logistic regression to predict the uptake of CBE among participants who never had it prior to the intervention. The model, as a set, was statistically reliable [$\chi^2(5, n = 48) = 14.2, p < 0.01$] and explained 35% of variance in the outcome; perceived barriers remained an independently significant predictor. The results support the effectiveness of written socioculturally tailored language-specific health education materials in promoting breast cancer screening within the targeted population. Future research should test the intervention in other vulnerable populations.

Key Words

Breast cancer; Health promotion; Intervention; Health belief model; Stages of change; South Asian immigrants

Introduction

Although screening facilitates the early detection of breast cancer and improves prognosis (Garfinkel & Mushinski, 1999), many women in North America and Europe remain underscreened. Several studies report that immigrant women have lower breast cancer screening rates (Maxwell, Kozak, Desjardins-Denault, & Parboosingh, 1997; Maxwell, Bancej, & Snider, 2001).

This gap is of particular concern for countries with increasing population diversity such as Canada, USA, United Kingdom, and New Zealand. In Canada, 18% of the population consists of first-generation immigrants with higher proportions in metropolitan areas such as 43% in Toronto (Statistics Canada, 2003). There is a general consensus that gaps in breast cancer screening rates need to be addressed by effective health promotion interventions aiming to reach vulnerable immigrant sub-populations.

Migration is often associated with a period of adjustment and re-orientation. Many immigrants encounter economic, systemic, information, cultural, and

linguistic barriers to access health services (Reitz, 1995). The extent of these challenges is often higher for immigrant women due to their multiple care-giving responsibilities that limit opportunities to interact with the host population. Furthermore, challenges to optimal health care access are intense for women migrating from traditional cultures with rigid patriarchal norms and gender roles. For instance, George and Ramkissoon (1998) observed that South Asian (SA) immigrant women's childcare and household responsibilities are major reasons for neglecting self-health, especially for preventive practices when health benefits may seem distant. Other studies with SA immigrant women report cultural tendencies of strong familial orientation that result in low priority for self-care in the presence of competing demands (Bottorff et al., 1998; Chandarana & Pellizzari, 2001). This vulnerability is also manifested in studies reporting low cancer screening rates among SA immigrant women (Choudhry, Srivastava, & Fitch, 1998; Gupta, Kumar, & Stewart, 2002).

Review of the literature on breast cancer and screening among SA immigrant women reveals certain culturally based norms, beliefs and values that are likely to hinder their uptake of breast cancer screening (Bottorff et al., 1998; Johnson et al., 1999; Choudhry et al., 1998). For instance, tremendous fear of the disease is suggested in women's avoidance of the word "cancer" and preference to use "terminal life disease". The latter is also an expression of a culturally based fatalistic belief in which suffering is viewed as inevitable due to fate (*karma*). Additionally, SA women seem to view breast cancer as a disease specific to western women while North American epidemiological evidence suggests convergence of the breast cancer age-standardized mortality rates of Asian migrants with the host population over time (Kliewer & Smith, 1995). In addition to perceptions of high seriousness of breast cancer and low self-susceptibility, studies report SA women's barriers to have breast cancer screening including a cultural taboo to touch one's body, and modesty about having the breast examination or even discuss it with family members or health professionals. Evidence also suggests that SA immigrant women have limited knowledge about available breast cancer screening procedures and resources and misinformation about its causes and risk factors (Choudhry et al., 1998; Kernohan, 1996). There exists a strong need to promote breast cancer screening knowledge and practices among SA immigrant women.

Although many interventions have been developed for physicians and patients to promote breast cancer screening (Mandelblatt & Kanetsky, 1995; Olson, Chapman, Thurston, & Milligan, 1997; Bonfill, Rivero, Moreno, & Rue, 1995), little is known about their effectiveness for immigrant women. Standardized interventions are universally directed with limited relevance

to a particular individual or group (Dijkstra & de Vries, 1999). Some interventions have specifically targeted immigrant communities but have often failed to incorporate evidence-based health promotion approaches. The disparity is alarming particularly when the current era of health promotion emphasizes not only "targeting" but also "tailoring". Tailoring or sociocultural sensitivity refers to the development of health messages, materials, and interventions according to the cultural beliefs and characteristics of the targeted population without which interventions can produce only incomplete results (Pasiak, D'Onofrio, & Otero-Sabogal, 1996; Vega, 1992). Dijkstra and De Vries (1999) suggest that tailored interventions are more effective because the message is adapted to prior knowledge about the targeted individuals and, hence, it contains directly relevant information which increases attentiveness and limits defensiveness to messages (de Nooijer, Lechner, & de Vries, 2002). However, interventions towards immigrant populations have not yet integrated the concept of tailoring.

This study aimed to develop and evaluate a socio-culturally tailored intervention to promote breast cancer screening among SA immigrant women from India, Pakistan, Sri Lanka, and Bangladesh. Our intervention consisted of a series of 10 breast-health articles published in Urdu and Hindi newspapers that were mailed to the study participants. We applied the concept of tailoring at three levels: the selection of an appropriate method to present the information, the content of the message, and behavioural readiness to uptake breast cancer screening.

Health promotion through multicultural newspapers is a social marketing strategy that reaches groups at risk and is consistent with the desire of most immigrant communities to emphasize their uniqueness and value their differences (McAadoo, 1993). Furthermore, this strategy is likely to convey the message not only to women but also to entire family units. This addresses an important aspect in the lives of SA women where family orientation is a core value and women may not seek medical advice without the sanctioning and encouragement of important family members or close friends (Bottorff et al., 1998; Choudhry, 1998).

The content of the health articles was tailored to the sociocultural milieu of the SA immigrant women. A literature review identified factors associated with cancer screening practices of SA women using the health belief model (HBM) (Hochbaum, 1958; Strecher & Rosenstock, 1997). Over the last five decades, HBM is one of the most widely used conceptual frameworks in health behaviour explanatory and predictive research (Strecher & Rosenstock, 1997). The HBM is also recommended for the development of health behaviour interventions (Janz & Becker, 1984; Elder, Apodaca, Parra-Medina, & de Nuncio, 1998; Stein, Fox, Murata, & Morisky, 1992).

The model includes constructs of perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, and perceived self-efficacy. Using the HBM, our literature review identified perceptions among SA immigrant women indicating low susceptibility to breast cancer, high seriousness of breast cancer, probable benefits of early detection, high barriers to have regular breast screening, and less than optimal self-efficacy to ask or have sensitive physical examinations along with low breast cancer knowledge and misperceptions about causes of cancer (Bottorff et al., 1998; Johnson et al., 1999; Choudhry et al., 1998). A comprehensive review of the literature by Janz and Baker showed that perceived barriers are the strongest predictors of whether or not individuals engage in health-protective behaviours, followed by perceived susceptibility. Perceived severity has been the weakest predictor across studies (Janz & Becker, 1984). Despite the explanatory and predictive success of the HBM, research using this model is deficit in explaining the relationships among its components (Strecher & Rosenstock, 1997). However, the Transtheoretical Model that has some overlapping constructs as the HBM addresses this gap by empirically demonstrating the underlying principles of behaviour change (Prochaska, 1994).

Studies using the Transtheoretical Model with its core constructs of stages of change (SOC) and decisional balance (perceived barriers versus perceived benefits) empirically show that interventions are more effective when developed according to the stage of behaviour change applicable to the majority of a targeted group (Prochaska & Norcross, 2001). The SOC component of the Transtheoretical Model (Prochaska, DiClemente, & Norcross, 1992; Prochaska, Redding, & Evers, 1997) proposes a continuum of behaviour change where people could be in the pre-contemplation, contemplation, preparation, action, maintenance, or termination stage. Using the SOC construct, our literature review (Choudhry et al., 1998; Kernohan, 1996) and discussions with community workers suggested that SA immigrant women were in the pre-contemplation behavioural stage with respect to breast cancer screening practices. In pre-contemplation, individuals have no intention to take action in the foreseeable future because they are either unaware or under informed of the available behavioural options. Hence, we viewed provision of accurate, comprehensive, socioculturally appropriate and relevant information on breast cancer and screening as an appropriate intervention for SA immigrant women. Also, we anticipated perceived barriers to play a pivotal role in improving participants' breast screening behaviour based on the progression principle of the Transtheoretical Model that proposes behaviour change from pre-contemplation to the action stage is the consequence of a half standard-deviation decrease in the barriers to change (Prochaska, 1994).

The Canadian guidelines recommend clinical breast examination (CBE) (by physicians or specially trained nurses) for adult women every 1–3 years as a part of routine physical checkups, breast self-examination (BSE) once a month for adult women provided they feel comfortable performing the procedure, and screening mammography every 2 years for women 50–74 years of age (Cancer Care Ontario, 2002). According to the Canadian migration statistics, most of the SA immigrant women are recent arrivals and belong to younger age groups (Statistics Canada, 2003). Hence, assessment of the intervention impact was primarily focused on the uptake of CBE as a first investigative step. Because of strong cultural taboo of touching oneself, we expected improvement only in the CBE behaviour of the targeted group.

Our intervention primarily aimed to increase (1) overall knowledge about breast cancer and screening, and (2) the uptake of CBE. Secondly, we aimed to investigate the progression of study participants in terms of CBE status through changes in the knowledge level and the constructs of HBM. This predictive investigation was restricted to participants who never had CBE prior to the intervention. For the HBM constructs, we hypothesized that the intervention would result in an increase in CBE-specific self-efficacy and perceived benefits while perceived barriers would decrease. We also hypothesized that perceived barriers would significantly predict the uptake of CBE screening. The exploratory component of the study included assessment of changes in the BSE status and changes in the perceived barriers of and benefits to mammogram after the intervention.

Methods

Intervention

The research team developed 10 health articles on breast cancer risk and screening (see Appendix A for the titles of the articles in chronological order of publication). A scientific writer in our team, author of books on breast health, prepared the preliminary versions of the articles that were further simplified for language and scientific facts through several revisions by all team members. In our next step, the content of articles was tailored to meet the needs of the targeted group by incorporating the literature review findings. For instance, feelings of intense fear of breast cancer were addressed by presenting information on risk factors in conjunction with benefits of early detection. Articles addressed SA women's misperceptions about low susceptibility to breast cancer and low survival rates after diagnosis by providing scientific evidence in simple language. For sociocultural context sensitivity, the

described benefits of screening included not only women's own health but also improvement in the quality of family life as well. Likewise, women's dual workload was acknowledged as a potential factor hindering regular preventative health examinations, and women were encouraged to overcome this barrier for long-term health benefits. In this series of articles, women were repeatedly encouraged to discuss their breast health concerns with family, friends, and health care providers to enhance self-efficacy. Information about screening procedures, referral system, and availability of female health personnel during sensitive examinations was provided to overcome knowledge gaps, modesty, and apprehension associated with the unknown. Relevant contact information was included in several articles. To enhance personal relevance and confidence in the benefits of early detection, the last article in our series was a cancer survivor story of an SA immigrant woman. Many quotations from the survivor story were given in earlier articles to maintain readers' interest.

The tailored versions of the articles were translated into Urdu and Hindi by two SA community members. The article accuracy was verified by bilingual research team members. Subsequently, 10 focus groups with Hindi and Urdu speaking SA women tested the translated articles for clarity and acceptability. For each language group, five focus groups were organized at collaborating community centres with 4–7 participants in each session. The articles were published every 2 weeks in Hindi and Urdu newspapers, one for each language. The selected newspapers produced 10,000 copies every week and were available at SA grocery stores at no cost. Participants received concurrently published newspapers with the health articles every 2 weeks via mail.

Participants and procedures

The study targeted SA immigrant women residing in Toronto, Canada and used a pre-intervention (PrI) and post-intervention (PoI) design collecting data from the same subjects before and after the intervention. Participant eligibility criteria included being an SA immigrant woman, aged 18 years or more, who could speak and read either Hindi or Urdu and had not been diagnosed with breast cancer. Exclusion criteria consisted of failure to provide valid contact address. Ethics approval was obtained from the research ethics board of the relevant institution.

Recruitment was conducted at two immigration and re-settlement community agencies and three group practice clinics in the Greater Toronto Area. Each group practice clinic had at least one family physician fluent in Urdu or Hindi to control for potential differences in English language abilities between parti-

cipants from community agencies and group practices. Willing participants provided informed consent. Eligible women completed the PrI questionnaire individually at the site of contact in the presence of a research assistant. These participants received the intervention for a period of 5 months. The PoI data collection began 2 weeks after mailing of the last health article. A bilingual research assistant collected data by telephone interviews in a 4-week time frame.

Measurement

The survey instrument gathered information on sociodemographic characteristics at the PrI phase and breast cancer screening status, breast cancer related knowledge, perceived risk, perceived seriousness, perceived barriers, perceived benefits, and perceived self-efficacy at both PrI and PoI phases. Additional information about participants' reactions to the newspaper information was gathered at the PoI phase. Both PrI and PoI questionnaires were translated in Hindi and Urdu and pilot tested with 10 SA women for clarity, comprehensibility and the cultural appropriateness of questions.

Sociodemographic

Data were collected on age, marital status, number of children, years lived in Canada, education level, employment status, annual household income, English language abilities, perceived health, and ethnic identity. Women rated their English speaking abilities and perceived health on a scale of 1–5 (poor, fair, good, very good, excellent) (Ware & Sherbourne, 1992). Ethnic identity was reported by choosing one of the five statements that best described participants' views about themselves: 'basically SA', 'SA-Canadian but first SA', 'equally SA and Canadian', 'SA-Canadian but first Canadian', and 'basically Canadian' (Richard M. Suinn, pers. comm.).

Breast cancer knowledge

Participants' knowledge was assessed by 12 items on breast cancer risk, causes, symptoms, and screening methods. The items were derived from the literature and developed according to the screening guidelines (Champion, 1993; Meana, Bunston, George, Wells, & Rosser, 2001; Lipskie, 1998). For each knowledge item, participants selected one statement that appeared 'true' to them from a provided set of 4–5 statements. For PrI and PoI comparison, a single variable with a total summed score of correct answers was derived for 12 items with a minimum possible score of 0 and a maximum of 12.

Breast cancer screening status

After brief definitions of CBE, BSE, and mammogram, three items asked participants whether they had 'ever heard' of CBE, BSE, and mammogram (yes/no).

Participants were asked to report whether they 'ever had' CBE (yes/no) and 'ever performed' BSE (yes/no). Women who had the examination were asked about the last time they performed or had the exam and the reason for having a CBE. Also, participants reported ever having had a routine physical checkup (yes/no). Progression of participants' CBE screening behaviour from pre-contemplation to action stage was assessed by the change in their self-reported CBE status at the PrI and PoI phases. To control recall bias, participants at the PoI were asked whether they had a (1) routine physical checkup, and (2) a CBE after their completion of the baseline survey for this study.

Constructs of the health belief model

The constructs of the HBM were operationalized by asking the participants to rate their level of agreement for a number of items on a scale of 1–4 with options of 'strongly disagree', 'disagree', 'agree', and 'strongly agree'. For items or derived variables, a mean value of 2 or less refers to some level of disagreement, and values more than 2 refer to some level of agreement. The construct of perceived risk was assessed by one item: 'risk of breast cancer among SA women is lower than in Canadian-born women'. Perceived seriousness was assessed by one item: 'life expectancy after cancer diagnosis is probably not more than 5 years'. The construct of perceived self-efficacy was assessed by three items that asked participants about their ability to discuss breast cancer screening with friends or family members, and a family doctor (without hesitation) and confidence in having a CBE. The constructs of perceived barriers to and benefits of CBE were derived from studies by Champion (1999) and Champion and Scott (1997), for details see Appendix B. Parallel items gathered data on perceived barriers and benefits to mammogram to explore changes after the intervention. For subsequent analyses, benefit and barrier mean scores were derived across respective items.

Reactions to intervention

At the PoI phase, participants were asked how many of the newspaper articles they had read (none, few, some, most, all). Also, they were asked to rate their satisfaction with the articles' content (scale 1–5, not at all to very satisfied), and whether they had talked to a friend or family member about the articles (yes/no).

Study sample and statistical analyses

Prior to the study, a sample size of 76 women was calculated assuming 20% change in the knowledge level after the intervention (Kernohan, 1996). The probability of making type-I and type-II errors was set at 0.05 and 0.1 ($\alpha = 0.05$ and $\beta = 0.1$), respectively. The data were analysed by executing descriptive statistics, paired *t*-test

for comparison of means, and McNemar Chi-square for comparison of proportions. To examine the best predictors of change in CBE status at the PoI phase for participants who never had CBE prior to the intervention, a direct logistic regression analysis was executed by entering change scores (score at PrI minus score at PoI) of predictors that changed significantly after the intervention (Tabachnick & Fidell, 2001). According to Rogosa and Willet (1985), change scores provide an estimate of change within individuals over two assessments and, contrary to traditionally held beliefs, its limitations are not substantiated. The data were analysed using the Statistical Package for the Social Sciences (SPSS) version 10.1.

Results

One hundred SA Hindi or Urdu speaking immigrant women provided consent with an overall consent rate of 78.7% (Fig. 1). Eighteen women were excluded due to invalid contact information. Eighty-two women completed the PrI survey and received the intervention. There were no statistical differences between the 82 participants and the 18 excluded women for

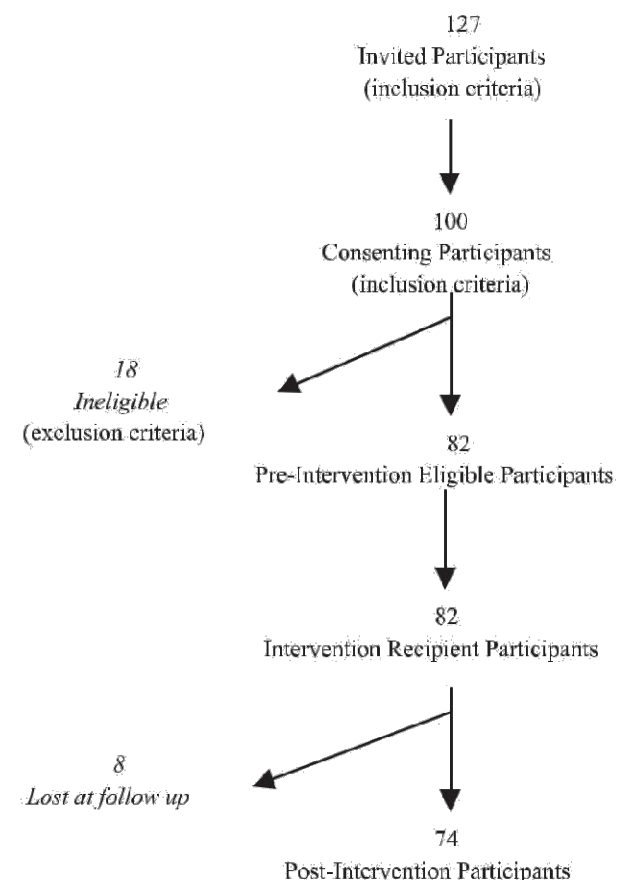


Fig. 1. Flow of participants.

sociodemographic characteristics such as age, number of years lived in Canada, perceived health or ever having had a physical health examination. After the intervention, 74 women completed the survey and eight women were lost to follow up. Participants lost to follow up were similar in sociodemographic characteristics to the 74 participants who completed the PoI survey except self-rated English language abilities, which were higher among participants. Among participants lost at follow up, four were visiting their country of origin, two had out-of-service telephones with no new contact information, and two could not participate due to sickness in the family.

Descriptive data

The study results are presented for 74 participants who completed both PrI and PoI surveys (see Table 1). On average, participants were 36.8 years (SD 9.7) of age and had lived 6 years (SD 6.6) in Canada. The majority of participants were well educated, married with low annual household income and had a family physician. Perceived health and English-speaking abilities were rated on average as 'good' and almost 'good' on a scale of 1–5.

At the PrI, 56–64% of the participants had heard of BSE, CBE, or mammogram (Table 2, first column). In other words, 36–44% had never heard of these screening methods. Only 31–33% were in the action phase and reported ever having the BSE or CBE while 46% ever had a routine physical health exam. Based on these results, the majority of the participants were in the pre-contemplation stage. In terms of frequency, most of the women who had had CBE at the PrI phase reported that the last exam was within the last 3 years (97%). Among women who reported performing BSE at the PrI phase, 48% performed it during the last month.

At the PoI, almost all participants (97.3%) reported reading at least some of the articles and 62.2% reported reading all or most of the 10 articles. The participants expressed high satisfaction with the content of the articles with a mean of 4.7 on a scale of 1–5. Approximately 76% reported talking to a friend or family member about the articles. Two participants who reported not reading articles were excluded from subsequent analyses.

Pre- and post-intervention comparison

The comparative analyses of the PrI and PoI phases ($n = 72$) support our hypotheses about effectiveness of the intervention in improving uptake of CBE; breast cancer knowledge; self-efficacy to discuss and have the CBE; and barriers to CBE. However, perceived benefits of CBE did not statistically increase after the intervention, contrary to our hypothesis, probably due

Table 1
Sociodemographic characteristics

Variable	Percentage or mean	±SD or CI%
Age in years, <i>m</i>	36.8 (<i>n</i> = 73)	±9.7
Years in lived Canada, <i>m</i>	6.0 (<i>n</i> = 72)	±6.6
Marital status, %	(<i>n</i> = 73)	
Married currently	91.8	85.5–98.1%
Separated/divorced/ widowed	8.2	1.9–14.5%
Had children, %	(<i>n</i> = 74)	
Yes	87.8	8.1–95.0%
Education, %	(<i>n</i> = 73)	
Up to grade 5	6.8	12.9–15.0%
Up to grade 12	30.2	19.5–40.5%
University some/comp	63.0	51.9–74.1%
Employment status, %	(<i>n</i> = 67)	
Employed	15.0	6.5–23.6%
Annual HH income, ^a %	(<i>n</i> = 49)	
≤\$20,000	40.8	27.0–54.6%
\$20,001–30,000	26.5	14.1–38.9%
$30,001–40,000	16.3	26.6–59.6%
> \$40,001	16.4	26.8–60.3%
English language, ^b <i>m</i>	(<i>n</i> = 74)	
Speaking ability	2.6	±1.3
Reading/writing ability	2.8	±1.4
Perceived ethnic identity, %	(<i>n</i> = 72)	
Basically SA	48.6	37.1–60.1%
SA and Canadian equally	26.4	16.2–36.6%
SA-Canadian but first SA	15.3	7.3–23.6%
SA-Canadian but first Canadian	4.2	0.4–8.8%
Basically Canadian	5.6	0.5–10.7%
Perceived health, ^b <i>m</i>	2.9 (<i>n</i> = 72)	±1.1
Had family physician, %	(<i>n</i> = 73)	
Yes	92	85.5–98.1%

^a 34% missing responses.

^b Scale of 1–5, poor to excellent; SD, standard deviation; CI 95%, confidence interval.

to the high endorsement of the benefits prior to the intervention.

Comparative analyses for breast cancer screening status (Table 2) revealed a statistically significant increase after the intervention in the proportions of women who had 'ever heard of' BSE (63.4–87.5%, $p < 0.001$), CBE (63.9–90.3%, $p < 0.001$), and mammogram (55.6–91.7%,

$p < 0.001$). The proportion of women reporting 'ever had' CBE increased significantly (33.3–59.7%, $p < 0.001$) while the change was not statistically significant for 'ever performed' BSE (30.6–43.1%, $p = 0.2$). The proportion of women reporting ever having had a routine physical checkup also increased after the intervention (46.4–70.8%, $p < 0.01$).

Table 2
Pre- and post-intervention results^a ($n = 72$): screening status

Variable	Pre-intervention n (%)	Post-intervention n (%)
Breast self-examination		
Ever heard**	45 (63.4)	63 (87.5)
Ever performed	22 (30.6)	31 (43.1)
Clinical breast examination		
Ever heard**	46 (63.9)	65 (90.3)
Ever had**	24 (33.3)	43 (59.7)
Mammogram, ever heard	40 (55.6)	66 (91.7)
Routine physical checkup, ever had*	32 (46.4)	51 (70.8)

* $p < 0.01$.

** $p < 0.001$.

^aBased on McNemar Chi-square significance test.

The knowledge score increased significantly at the PoI phase with a mean of 7.0 compared to a mean of 3.3 at the PrI phase (see Table 3). At the PrI phase, only 20% of the participants had accurate responses to half or more of the 12 knowledge questions. After the intervention this proportion increased to 79%. Details on the percentage gain in the accurate answers to 12 knowledge items are presented in Fig. 2. The perceived barriers to CBE decreased significantly at the PoI. For perceived risk, misperception that SA women are at lower risk of breast cancer compared to Canadian-born women significantly decreased. For perceived seriousness, there was a significant decrease in misperception that life duration after cancer diagnosis is less than 5 years. Perceived self-efficacy to discuss breast cancer screening with friends or family members, and family doctors and to have the CBE increased significantly at the PoI stage.

Exploration of the intervention impact on perceived barriers to and benefits of a mammogram revealed a positive but non-significant change, after Bonferroni correction. The perceived benefits increased from a mean of 3.1 (SD 0.5) to 3.3 (SD 0.3) and perceived barriers decreased from 2.6 (SD 0.7) to 2.4 (SD 0.5).

Predictors of clinical breast examination status change

A direct logistic regression analysis was executed with full-model against the constant-only model to predict CBE status at the PoI phase for participants who never had the exam before the intervention and

Table 3
Pre- and post-intervention results^a ($n = 72$): knowledge and CBE-specific perceived benefits, perceived barriers, perceived seriousness and self-efficacy

Variable	Pre-intervention mean \pm SD	Post-intervention mean \pm SD
Knowledge ^b (12 items)*	3.3 \pm 2.8	7.0 \pm 1.9
Perceived benefits of CBE ^c (five items)	3.2 \pm 0.4	3.3 \pm 0.3
Perceived barriers to CBE ^c (eight items)*	2.5 \pm 0.7	2.1 \pm 0.5
Perceived risk ^c		
Risk of cancer among SA is lower than in Canadian-born women*	3.0 \pm 0.8	2.4 \pm 0.6
Perceived seriousness ^c		
Life expectancy after cancer diagnosis is probably not more than 5 years*	2.7 \pm 0.8	1.8 \pm 0.6
Self-efficacy ^c		
Able to discuss with friends or family*	3.0 \pm 0.6	3.6 \pm 0.5
Able to discuss with family doctor*	3.1 \pm 0.7	3.7 \pm 0.5
Confident to have clinical breast exam*	3.1 \pm 0.6	3.6 \pm 0.5

* $p < 0.001$.

^aResults are based on paired t -test with Bonferroni correction; only $p \leq 0.01$ or lower are reported.

^bTotal score range from 0 to 12.

^cScale 1–4: 1, strongly disagree; 2, disagree; 3, agree; 4, strongly agree.

reported reading the health articles ($n = 48$). Five predictor variables that changed significantly after the intervention were entered into the regression analysis using change scores. These included (1) perceived seriousness, (2) perceived risk, (3) perceived barriers to CBE, (4) perceived self-efficacy to have CBE, and (5) knowledge. The model, as a set, was statistically reliable, $\chi^2(5, n = 48) = 14.2, p < 0.01$, had a good fit to the data

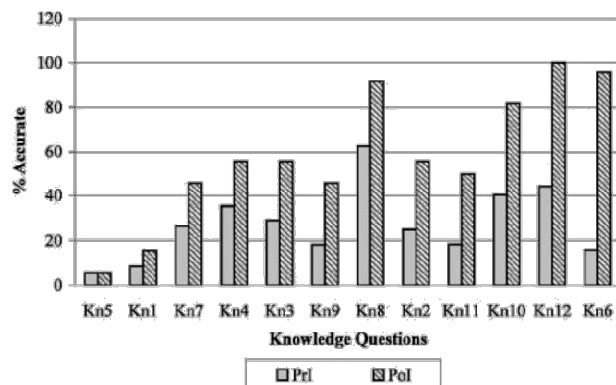


Fig. 2. Knowledge questions: per cent of accurate response PrI and PoI. Kn5: women 50 and over should have a screening mammogram every 2 years (86% selected 'every year' after the intervention); Kn1: on average, one out of 9 Canadian women will develop breast cancer during her lifetime; Kn7: bruising or bumping do not cause breast cancer; Kn4: women who feel comfortable performing BSE should be perform it once every month; Kn9: in early stages of breast cancer pain is not a common symptom; Kn3: breast cancer risk is higher for women with a close relative diagnosed with breast cancer; Kn8: breast cancer cannot spread from person to person; Kn2: breast cancer risk is higher for women aged 50 and over; Kn11: radiation during mammogram is not a serious health risk; Kn10: Canadian women do not have to pay for a mammogram test; Kn12: non-pregnant women should see a doctor if there is discharge from nipples; Kn6: breast screening procedures for women 50 and over include BSE, CBE and mammogram.

set and explained 34.7% of the variance (Nagelkerke R^2) in the outcome. The model had a prediction success of 63% for participants who obtained CBE and 75.9% for participants whose CBE status did not change after the intervention. According to the Wald criterion, perceived barriers to CBE remained an independently significant predictor over and above other predictor variables in the direct logistic regression model. Table 4 shows regression coefficients, Wald statistics, odds ratio, and significance of odds ratio for each of the predictor variables.

Discussion

The study results demonstrate the effectiveness of a socio-culturally tailored, language-specific, written health education intervention in promoting breast cancer screening within the targeted population. There was an improvement in breast cancer knowledge, beliefs, self-efficacy, and uptake of CBE among study participants. Grounded in the HBM, the intervention significantly decreased participants' perceived barriers to CBE, increased self-efficacy to discuss and undergo breast examination, and corrected misperceptions of low risk and high seriousness of breast cancer. At the multi-variate level, change in perceived barriers was the most significant predictor of the uptake of CBE. Although specific to SA immigrant women, the findings provide preliminary support for the utility of sociocultural tailoring in health promotion programs serving vulnerable immigrant and ethnic groups. Also, it demonstrates applicability of western theoretical frameworks for immigrant populations from the east.

Prior to the intervention, more than 90% of the study participants had a regular family physician and more than half had heard of BSE and CBE but only one-third

Table 4
Logistic regression: predictors of CBE status at post-intervention ($n = 48$)

Variable	B	S.E.	Wald test	Significance	Odds ratio	95% CI	
						Lower	Upper
<i>Change scores</i>							
Perceived risk	0.22	0.39	0.29	0.59	1.24	0.57	2.71
Perceived seriousness	-0.13	0.45	0.09	0.77	0.88	0.37	2.11
Perceived barriers to CBE	1.52	0.57	6.97	0.01	4.56	1.49	14.04
Self-efficacy ^a	0.92	0.54	2.86	0.09	2.49	0.86	7.22
Knowledge	0.02	0.13	0.02	0.89	1.02	0.79	1.32
Constant	-2.08	0.89					

B, coefficient; SE, standard error.

^a Item 'confident to have clinical breast examination from a health care provider on regular basis'.

Note: Bold is the significance value.

ever had or performed the exam. The rate of CBE reported by our study participants is similar to CBE rates documented by other pilot studies with SA immigrant women. For instance, a study with SA women in Toronto found that 49% of women ever had at least one CBE (Choudhry, 1998). The low rate of CBE in our study was also accompanied by low rates of routine physical checkups. Approximately one-third of the participants ever had a routine physical examination. Overall, findings show that participants were in the pre-contemplation stage before the intervention, as we expected in the beginning of the study, and needed an intervention to promote breast screening and physical checkups.

Also, in accordance with the existing literature (Choudhry, 1998), the cancer related knowledge was very low before the intervention despite the fact that many women had heard of BSE and CBE, were well educated, and rated English language abilities as average. A possible explanation of this low knowledge may lie in the economic and systemic differences between participants' country of origin and the adopted country. According to the World Health Organization (WHO), health expenditure of North American countries are 9–13% of the gross domestic product while in South Asia it remains less than 5% (WHO, 2003). Also, cross-country differences in life expectancies lead to variations in prioritization of health resources between acute and chronic health conditions. For instance, women living in South Asia are expected to live up to 62 years, which is much lower than the expected 82 years in North America (WHO, 2003). Nevertheless, life expectancy increases after immigration and, hence, it is salient to address knowledge gaps according to health needs of the adopted country to achieve optimal health for all.

In our study, participants' knowledge scores doubled after the intervention. The highest knowledge gain was for the question on recommended breast screening procedures for women 50 years of age and over. Participants perceived benefits to CBE did not change after the intervention as most of the participants endorsed these benefits even before the intervention. The intervention improved participants' beliefs about life expectancy after cancer diagnosis and, hence, it was successful in promoting optimistic views towards breast cancer diagnosis and prognosis. This transformation is of significant value as previous studies report that SA women have fatalistic views about cancer and its treatment that discourage uptake of screening (Bottorff et al., 1998; Johnson et al., 1999).

Our intervention resulted in a significant uptake of the CBE. Out of 48 women who never had the examination at the PrI phase, 19 women reported having the examination after the intervention. Likewise, women reported more routine physical checkups after the

intervention. Hence, the intervention played a vital role in motivating participants to have regular physical checkups and its CBE component. Although participants' CBE status is based on self-reports, a parallel increase reported in the physical checkups increases our confidence in the self-reported CBE status. Furthermore, a lack of significant increase in the BSE status, also self-reported, rejects the possibility of recall bias. This positive change in the preventative health orientation of study participants is salient in light of the existing literature. For instance, other studies have suggested that SA women may consider health care visits necessary only when symptoms arise (Bottorff et al., 1998), and encounter time constraints, due to unshared work burden embedded in patriarchal social system and traditional gender roles (George & Ramkissoon, 1998; Naidoo & Davis, 1988), to comprehend the concept of health screening. Nevertheless, our study results support the notion that socioculturally tailored health messages and interventions are likely to promote preventative health practices. Such strategies are likely to contribute in overcoming existing health disparities across diverse populations with a sociocultural sensitivity when participants do not need to reject their culture or identity but to make informed decisions by critical analysis of life context.

Our study also provides theoretically driven evidence about the underlying mechanism of change in the CBE status of participants. The observed uptake of CBE through a significant decrease in CBE-specific perceived barriers is in accordance with the SOC model which proposes that progression from pre-contemplation to the action requires almost half a standard-deviation decrease in barriers (Prochaska, 1994). The multivariate analyses show that a decrease in perceived barriers independently predicted the uptake of CBE, over and above other predictor variables. This strong predictive effect of perceived barriers is also in congruence with the literature review findings of Janz and Baker (1984). This finding further highlights the significance of addressing perceived barriers through sociocultural tailoring of the health messages and not just addressing the knowledge gaps.

In our study, the proportion of women performing BSE increased after the intervention but the change was not statistically significant. Based on the literature, a possible explanation for the disparity in the uptake of CBE and BSE may lie in the SA cultural norms where touching one's own body is a taboo (Bottorff et al., 1998). Improvements in the uptake of BSE may follow interactive tailored interventions with person-to-person contact especially with ethnic concordance. Future research is needed to advance our understanding about uptake of regular BSE in this population.

The participants' reaction(s) to the intervention is another positive sign to sociocultural tailoring of written

health education materials. Almost all the women read at least some of the articles and two-thirds talked about the articles with a friend or a family member. This is in accordance with the existing literature that tailoring leads to increased attentiveness, retention and sharing of the information along with behaviour change (Strecher, Kreuter, Den Boer, & Kobrin, 1994).

Although the study did not include a control group, the findings present a preliminary assessment of the utility of tailored materials in promoting breast screening. Moreover, there were no other major health promotion campaigns towards breast screening during this time period thereby contributing to our view of the impact of our intervention. Also, theoretically explained progression of the participants' CBE status reassures our confidence in the impact of our intervention. The study does not address the impact of newspaper articles among women residing in the community who did not participate in our study. Future studies with inclusion of non-participant and control groups would be beneficial. Considering challenges of research with ethnic minorities due to their limited trust in the system (Corbie-Smith, Thomas, & St George, 2002; Shavers, Lynch, & Burmeister, 2002) and lack of related information (Brown, Fouad, BasenEngquist, & TortoleroLuna, 2000), our study makes a significant contribution in existing scientific knowledge that aims to address disparities in health care access by ethnicity and immigration status.

The studied intervention is a proxy for usefulness of ethnic newspapers in tailoring and promoting health practices. In our study, almost two-thirds of the participants reported reading the selected newspapers prior to the intervention. The use of ethnic newspapers to promote health has the potential to provide wide coverage at a low cost within the targeted populations. Moreover, strategies that utilize existing windows of opportunities are important for sustainability of health promotion interventions.

In conclusion, the study results support the notion that sociocultural tailoring of written health education materials is effective in promoting breast cancer screening knowledge, beliefs, self-efficacy, and uptake within the targeted population. Future research with other vulnerable populations would enhance understanding of the intervention.

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Appendix A. Article titles

1. Your health in your hands.
2. Breast lumps.
3. What is your risk?
4. Modifiable risks for breast cancer.
5. Finding breast cancer early: improve your breast watch.
6. What is mammography and who needs it?
7. What if a breast lump seems suspicious?
8. Breast cancer screening programs.
9. Medical advances in risk assessment, screening, early diagnosis, and outcomes of breast cancer.
10. Survivor story.

Appendix B. List of items

Perceived benefits of CBE¹

1. After I will get a CBE, I will feel good about myself.
2. After I will get a CBE and nothing is found, I will not worry as much about cancer.
3. Having a CBE will decrease my chances of dying from breast cancer.
4. Having a CBE will help me find breast lumps early.
5. Having a CBE will benefit my family.

Perceived barriers to CBE (see footnote¹)

1. I do not know where to go for a CBE.
2. I do not know who to ask about a CBE.
3. I do not understand how a CBE is done.
4. I have other problems more important than getting a clinical breast exam.
5. Having a CBE every year will make me worry about breast cancer.
6. Having a CBE is too embarrassing.
7. Having a CBE takes too much time.
8. Having a CBE is uncomfortable.

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¹Modified versions of items were included for screening mammogram.

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