Women's perceptions of heart disease and breast cancer and the association with media representations of the diseases

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ABSTRACT

Background This research examined differences in perceptions of heart disease compared with breast cancer and if the differences are reflected in media presentations of the diseases. Relationships of differences in perceptions to demographic groups, heart disease risk factors and health behaviors were examined.

Methods Study 1 was a quantitative content analysis of articles and advertisements related to heart disease or breast cancer.

Results There were greater perceptions of susceptibility, preventability and controllability of heart disease and lower perceptions regarding seriousness, fearfulness and extent to which family history determines disease development of heart disease compared with breast cancer. Five times more pieces related to breast cancer were found compared with heart disease. Study 2 was a survey of 1524 women. More articles and advertisements about breast cancer than heart disease were found, and survey participants reported seeing significantly more breast cancer than heart disease media. Younger women had greater perceived susceptibility of breast cancer relative to heart disease while the content analysis revealed that the heart disease pieces were more likely to feature women older than 40 years of age.

Conclusions This research is an important step in the development of theories regarding causal effects of media on health perceptions and behaviors.

Keywords breast cancer, health education, heart disease, media, perceptions

The mortality rate for heart disease (including ischemic heart disease, heart attacks and hypertensive disorders) is much greater than that of breast cancer among North American women.[1–3] Despite these relative risks, women perceive their risk to be greater and worry more about breast than heart disease, while they feel they have more control over heart disease than breast cancer.[4–6] Others have reported that young women perceive their risk of heart disease to be very low.[7]

Differences in perceptions of heart disease relative to breast cancer may be due in part to how mainstream media (e.g. newspapers, magazines) represent the diseases. Campaigns such as the 'Red Dress' (heart disease) or 'Pink Ribbon' (breast cancer) are designed to raise awareness. The 'Red Dress' campaign has been related to a doubling of awareness of heart disease as the leading cause of death for women over 15 years, even though age and ethnic disparities in awareness remain.[8] Yet, women still worry more about breast cancer compared with heart disease, which may be a reflection of more media

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attention afforded to breast cancer compared with heart disease in conjunction with how the diseases are discussed.[4] The 'Pink Ribbon' breast cancer awareness symbol has received an enormous amount of public and corporate support,[9] and news reports about cancer (any type) have been shown to out-number stories about cardiovascular disease at a rate of 2.6 : 1.[10] Agenda setting theory proposes that through message repetition and by choosing which topics to cover, journalists and news editors help form public opinion and can influence perceptions of what topics are important[11,12] or may influence individual health decisions.[13] This corresponds with findings from information processing research that personal relevance (e.g. knowing one is at risk for a disease), sources of information, message repetition or emotion can influence how much a topic is thought about and subsequent attitudes.[14] For example, breast cancer advertising that features younger women or celebrities is more likely to attract the attention of young women.[15]

The purpose of this research is to examine differences in perceptions of heart disease compared with breast cancer and if any differences are reflected in how the media present the two diseases. A quantitative content analysis of newspaper and magazine coverage of heart disease and breast cancer in women was conducted to understand how the media present these diseases. A survey was used to examine whether women reported differences in perceptions of susceptibility, seriousness, fear, preventability, controllability and extent of family history in the development of heart disease and breast cancer. The relationship of these perceptions to amount of media exposure was also examined. The survey data provide information on perceptions of heart disease compared with breast cancer, and the content analysis provides context that aids in the interpretation of the survey results.

For the content analysis, the exploratory hypothesis was that there would be fewer media related to heart disease than breast cancer collected, and that the breast cancer articles would be more likely to contain features known to attract the attention of readers (e.g. large images, a human interest component). For the survey, it was hypothesized based on previous research[4−6] that women would (i) have lower perceptions of susceptibility, seriousness and fear of heart disease compared with breast cancer, (ii) feel more in control of heart disease and view it as more preventable than breast cancer, (iii) view family history as less important in the development of heart disease than breast cancer and (iv) report less media-related exposure to heart disease than breast cancer and this would be related to perceptions. It was further hypothesized that younger women and women with lower education and income would be less

concerned about heart disease than breast cancer compared with older women and women with higher education and income.[16]

Study 1: Content Analysis

Methods

Quantitative content analysis[17] was used to understand media effects as outlined by agenda setting theory.[11] The quantification of factors such as the number of lines in a print article, features that attract attention such as having a picture[18] or a human interest component[14] are indicators of the importance a media source places on an issue and the likelihood that an article or advertisement will draw attention.

Data collection

Data were collected from 15 September to 30 October 2012 (capturing data during the build up to, and including, breast cancer awareness month [October]) and from 15 January to 28 February 2013 (February is heart disease awareness month in Canada). Data sources were the print and web versions of the two largest Canadian national newspapers (The Globe and Mail and the National Post) and women's magazines with high circulation in Canada: Chatelaine Magazine (also a sponsor of the Red Dress campaign), Glamour, Prevention, Women's Day, Flare, Ladies' Home Journal and Women's Health. Samples were any article or advertisement that included the 'red dress' or 'pink ribbon' logos or discussed heart disease or breast cancer in women. Two research assistants systematically checked print and online daily newspapers and monthly magazine issues; every piece that mentioned breast cancer or heart disease or showed the 'pink ribbon' or 'red dress' symbol was included in the analysis.

Data analysis

An *a priori* coding scheme was developed.[17] Codes for all articles and advertisements were if a risk statistic was stated, because repetition of such information may influence disease perceptions;[11−13] whether there was an image, and if yes, the size of the image relative to the page (small [less than half a page], medium [a half-page] or large [more than a half-page to a full page]), because images capture attention more readily than text;[18] if the images were medical; the presence of people, and if so, the demographic characteristics of persons in the image (i.e. sex, age, ethnicity) to replicate research that showed younger women are featured in breast cancer media[9] and to further understand which ethnicities are most commonly represented; because emotion can increase recall of health promotion advertising,[19] tone was coded according to four

main emergent themes: prescriptive (i.e. telling people what to do), survivorship (i.e. inspiring stories about 'survivors'), fearful (i.e. frightening disease statistics or stories) or medical/research (i.e. medical or research breakthroughs). Article-only codes were whether the story contained a human interest element and the sources of information (researcher, 'survivor', family member of 'survivor', celebrity). Sources were coded, because a credible source such as a researcher can increase processing,[14] whereas stories about survivors can increase emotional responses[19] and celebrities can attract attention.[15] Final codes were if a research study was cited in the article, and if there was mention of risk factors (e.g. smoking) or related behaviors (prevention or detection).

One-third of the pieces were randomly selected using software and coded by a second assistant.[17] Inter-rater reliability was assessed using kappa (scores between 0.60 and 0.79 represent moderate agreement, between 80 and 0.90 are strong and above 0.90 are almost perfect[20]). Comparisons between the red dress/heart disease pieces and the pink ribbon/breast cancer pieces were compared using Fisher's exact test as a measure of association.

Results

Inter-rater reliability was satisfactory (kappa range: 0.65–1.0), indicating no need for further coding by the second rater.[17] Of 127 media pieces collected, 106 (83.5%) were about breast cancer. Of the 21 pieces related to heart disease, 6 were articles and the remainder advertisements. Table 1 shows the number (%) within each disease category for each code. Although the majority of breast cancer pieces were collected during breast cancer awareness month, 42% of the pieces collected during heart disease awareness month were about breast cancer. There were no articles about heart disease in the fall (all seven of the heart disease items from September and October were advertisements). Conversely, three articles and seven advertisements about breast cancer were collected during heart disease awareness month. There was no significant difference in the length of heart disease stories ($M = 120$ lines) and breast cancer articles ($M = 114$ lines), t (50) = 0.029, $P = 0.87$. All pieces with a fearful tone (all breast cancer) or about survivorship were articles; any mention of medicine or research in pieces about either disease was only in articles. There were three prescriptive breast cancer advertisements and all other pieces were articles. Four advertisements (two for each disease) gave risk statistics and the rest of the risk statistics were stated in articles. Heart disease-related images more significantly more likely to have women over the age of 40 years and to include women of Asian or African ethnicity.

There was a significant difference in mention of preventive behaviors. All heart disease articles mentioned prevention behaviors, compared with ∼45% of the breast cancer articles. Among the heart disease articles, a healthy diet ($n = 3$), exercise ($n = 2$), not smoking ($n = 1$), healthy cholesterol levels ($n = 2$) and weight loss ($n = 1$) were mentioned. Among the breast cancer articles, exercise ($n = 7$), a healthy diet ($n = 6$), reducing alcohol consumption ($n = 5$), not smoking ($n = 3$) and avoiding cancer-causing products in cosmetics or the environment ($n = 4$) were mentioned. The majority of breast cancer articles ($n = 13$) discussed detection or risk reduction behaviors such as mammograms ($n = 5$), self-exam ($n = 4$) or mastectomies ($n = 3$). Two articles mentioned weight loss, and one discussed having children at a younger age as preventive against breast cancer.

Study 2: Survey

Data collection

Data were collected from 1 to 16 June 2013 (deliberately outside of either disease awareness months) using an online survey conducted by Ipsos Reid. The study reported is original research that received full ethical approval from a university human research ethics board. Participants (1635 women) were from a panel of ∼300 000 Canadians (aged 18–99) who consented to participate in survey research and can accumulate points toward prizes for participation.

Measures

Demographics

Age, education and household income information was collected. Participants were asked if they had ever been diagnosed with high blood pressure, high cholesterol, heart disease, stroke, angina, diabetes, cancer (and if so, what type) or other long-term health condition.

Health behaviors

Smoking history was categorized as never smoked, ex-smoker or current smoker. Physical activity was assessed with two validated items advocated for use in population-level studies.[21] Physical activity at work was ranked as very light (mostly sitting), light (e.g. sales), moderate (e.g. cleaning, kitchen) or heavy (e.g. construction, farming). Leisure-time physical activity was ranked as very light (almost none), light (walking or nonstrenuous cycling or gardening once a week), moderate (regular activity at least once a week), active (regular activities such as intense walking more than once a week) or very active (strenuous activities several times a week). Fruit and vegetable consumption was determined by asking the likelihood, in terms of

Table 1 Quantitative content analysis codes (advertisements and articles), frequency (%) each code was represented by disease category and P-value for Fisher's exact test

Code	Sub-category	Heart disease, N = 21	Breast cancer, N = 106	P
Number of pieces that were articles	—	6 (28.6%)	49 (46.2%)	P = 0.10
Collection period	September–October	7 (33.3%)	96 (90.5%)	P < 0.001
	January–February	14 (66.6%)	10 (9.4%)	
Risk statistic (yes)	—	4 (19.0%)	30 (28.3%)	P = 0.28
Image included (yes)	—	20 (95.2%)	86 (81.1%)	P = 0.19
Image size	Small	5 (25.0%)	27 (31.4%)	P = 0.86[a]
	Medium	6 (30.0%)	24 (27.9%)	
	Large	9 (45.0%)	35 (40.7%)	
Medical image (yes)	—	1 (5.0%)	11 (12.8%)	P = 0.31[a]
Person in image (yes)	—	13 (65.0%)	66 (76.7%)	P = 0.58[a]
Number of people	One to three people	11 (84.6%)	48 (72.7%)	P = 0.30[b]
	Three or more	2 (15.4%)	18 (27.3%)	
Gender	Women only	9 (69.2%)	59 (89.4%)	P = 0.09[b]
	Men only	1 (7.7%)	1 (1.5%)	
	Mixed	3 (23.1%)	6 (9.1%)	
Age	Under 40 years	6 (46.2%)	31 (47.2%)	P = 0.02[b]
	40–65 years	4 (30.8%)	7 (9.1%)	
	65 years or older	1 (7.7%)	0	
	Mixed	2 (15.4%)	28 (42.4%)	
Ethnicity	All Caucasian	9 (69.2%)	51 (71.3%)	P = 0.01[b]
	All Asian	1 (7.7%)	0	
	All African	2 (15.4%)	5 (7.5%)	
	All south-east Asian	0	1 (1.5%)	
	Mixed	1 (7.7%)	9 (13.6%)	
Tone	Prescriptive	3 (14.3%)	13 (12.3%)	P = 0.49
	Survivorship	1 (4.8%)	10 (9.4%)	
	Fearful	0	9 (8.5%)	
	Medical or Research	2 (9.5%)	14 (13.2%)	
Human interest[c]		3 (50%)	15 (30.6%)	P = 0.30
Research study[c]		2 (33.3%)	18 (36.7%)	P = 0.62
Prevention mentioned (yes)[c]		6 (100%)	21 (44.7%)	P = 0.01
Source[c]	Researcher	3 (50%)	20 (40.8%)	P = 0.50
	Survivor	1 (16.7%)	12 (24.5%)	P = 0.56
	Family member	1 (16.7%)	5 (10.2%)	P = 0.52
	Health practitioner	1 (16.7%)	18 (36.7%)	P = 0.31
	Celebrity	0	1 (2.0%)	P = 0.89

[a]Calculated only for those items that included an image (denominators are 20 for heart disease and 86 for breast cancer).
[b]Calculated only for those items that had a person in the image (denominators are 13 for heart disease and 66 for breast cancer).
[c]Only articles were coded (6 heart disease articles and 49 breast cancer articles).

percentage, of eating the recommended daily number of fruits and vegetables regularly over the next month.

Disease perceptions

All measures were based on previous research.[4,22] Perceived susceptibility to heart disease and breast cancer was assessed with five items for each disease. Questions asked about susceptibility to heart disease/breast cancer, chance of developing heart disease/breast cancer, likelihood of developing heart disease/breast cancer, chance of developing heart disease/breast cancer in comparison to the average person and in comparison to other women their age. All items were ranked on a scale from 1 to 7 with 1 indicating lower perceived susceptibility, likelihood or chance of developing the

disease. Because internal reliability was high for both the heart disease ($\alpha = 0.96$) and breast cancer ($\alpha = 0.96$) items, mean scores were used to represent susceptibility. Single items measured seriousness (heart disease/breast cancer would be a very serious illness for me to develop) and fear (the thought of getting heart disease/breast cancer scares me), on scales of 1 (strongly disagree) to 7 (strongly agree). Single items also measured risk reduction (how much can a person do to reduce risk of getting heart disease/breast cancer), control (how much control does a person have other whether she will get heart disease/breast cancer) and family history (to what extent do you think family history determines whether a person will develop heart disease/breast cancer), on scales of 1 (nothing/no control/not at all) to 5 (completely eliminate risk/complete control/completely). Media exposure was assessed by asking during the last 3 months, how many media communications (from television, radio, newspaper or magazine) do you recall hearing or seeing on the topic of women and heart disease/breast cancer: none, one or two, three or four, five or six, or seven or more.

Data analysis

Differences between the heart disease and breast cancer perceptions were compared using paired sample t-tests. Difference scores were created by subtracting the breast cancer score from the heart disease score with higher scores indicating greater perceptions of susceptibility, seriousness, fear, preventability, controllability, family history and media recall for heart disease. These difference scores were the dependent variables in a series of hierarchical linear regressions. Demographics (age, education, income) were entered in Step 1, number of heart disease risk factors (high cholesterol, high blood pressure, diabetes) was entered in Step 2 (range 0–3), health behaviors (smoking status, fruit and vegetable consumption, physical activity at work, leisure-time physical activity) were entered in Step 3 and for the regressions with perceptions as outcome variables, the media difference score was entered in the fourth and final step. All of the analyses were computed using SPSS. Because of the multiple t-tests, α was set at 0.007 ($P < 0.05/7$).

Results

Sample characteristics

Of the 1635 participants, 76 (5%) had been diagnosed with heart disease, stroke, or angina and 39 (2.4%) with breast cancer (4 with both cancer and some form of cardiovascular disease). These participants were excluded from the analyses, leaving a sample of 1524 participants. Of these, 304 (19.9%) chose not to answer the annual household income question.

Table 2 Sociodemographic information for survey respondents ($N = 1524$)

Variables	n (%)
Education	
Did not graduate high school	53 (3.5)
Graduated high school	579 (38)
Graduated from college/CEGEP/trade school	403 (26.4)
University undergraduate degree	354 (23.2)
University graduate degree	135 (8.9)
Income[a]	
less than $20 000	88 (7.2)
$20 000–$39 999	251 (20.6)
$40 000–$59 999	241 (19.8)
$60 000–$79 999	227 (18.6)
$80 000–$99 999	152 (12.5)
more than $100 000	261 (21.4)
Marital status	
Single, never married	339 (22.2)
Living with partner	205 (13.5)
Married	756 (49.6)
Widowed	78 (5.1)
Divorced or separated	146 (9.6)
Smoking status	
Never smoked	871 (57.2)
Ex-smoker	427 (28)
Current smoker	226 (14.8)
Physical activity at work	
Very light	589 (38.6)
Light	454 (29.8)
Moderate or heavy	481 (31.6)
Leisure-time physical activity	
Very light	175 (11.5)
Light	417 (27.4)
Moderate	591 (38.8)
Active or very active	341 (22.4)
Likelihood of fruits and vegetable consumption	
0–25%	261 (17.1)
26–50%	345 (22.6)
51–75%	390 (25.6)
76–100%	528 (34.6)
Presence of risk factors	
High blood pressure	358 (23.5)
High cholesterol	260 (17.1)
Diabetes	91 (6)

[a]304 missing cases (19.9%).

This was the only missing information so the cases were imputed using multiple imputations ($m = 5$). Participant sociodemographic characteristics are shown in Table 2. The mean age of the sample was 46.08 (SD = 16.28; range: 18–90) years.

Table 3 Differences in perceptions of heart disease and breast cancer and recall of disease-related media

Variables	Heart disease, M (SD)	Breast cancer, M (SD)	t-test
Susceptibility (range 1–7)	3.79 (1.37)	3.48 (1.26)	$t = 7.89$, $P < 0.001$
Seriousness (range 1–7)	5.77 (1.44)	6.04 (1.36)	$t = -7.66$, $P < 0.001$
Fear (range 1–7)	5.57 (1.48)	5.93 (1.43)	$t = -11.80$, $P < 0.001$
Preventability (range 1–5)	3.73 (0.64)	2.92 (0.91)	$t = 33.41$, $P < 0.001$
Control (range 1–5)	3.50 (0.95)	2.61 (0.94)	$t = 35.23$, $P < 0.001$
Family history (range 1–5)	3.67 (0.77)	3.84 (0.80)	$t = -8.13$, $P < 0.001$
Media recall	1.97 (0.97)	2.33 (1.05)	$t = -15.19$, $P < 0.001$

Prediction of differences in disease perceptions

Table 3 presents means, standard deviations and differences between disease perceptions. Perceptions of susceptibility, preventability and controllability were rated higher for heart disease and perceptions regarding seriousness, fearfulness and extent to which family history determines disease development were rated lower for heart disease compared with breast cancer. More breast cancer-related media were recalled.

The final regression models are presented in Table 4. Multicollinearity was not an issue in any model. The media recall model showed no significant predictors. Therefore, independent of demographic factors, risk factors for heart disease or health behaviors, women reported seeing more media about breast cancer than heart disease. The model predicting the difference between perceived susceptibility shows that older age and the presence of a heart disease risk factor were associated with a greater perceived susceptibility for heart disease, while greater consumption of fruits and vegetables was associated with lower perceived susceptibility for heart disease compared with breast cancer. Heart disease risk factors predicted greater perceived seriousness and fear of heart disease relative to breast cancer. There were no significant predictors of preventability or control. Heart disease media recall significantly predicted perceptions of the role that family history plays in the development of heart disease over breast cancer.

Discussion

This research determined differences in perceptions of heart disease compared with breast cancer among women and if the differences are reflected in how the media present the two diseases. The hypothesis that there would be more articles and advertisements about breast cancer than heart disease was supported. This was mirrored by the survey data that showed women recalled seeing significantly more breast cancer than heart disease media. However, the content analysis showed few differences in how the diseases were presented in the media. Thus, it is likely the amount of media rather than how the media present the information that influences recall. As hypothesized, there were lower perceptions of seriousness and fear of heart disease compared with breast cancer and participants felt heart disease was more preventable, and more in control of heart disease than breast cancer. The content analysis showed that all articles about heart disease discussed prevention, compared with about half of breast cancer items. Contrary to the stated hypothesis, women felt more susceptible to heart disease than breast cancer. However, this difference was strongly related to the number of heart disease risk factors present.

The hypotheses regarding possible relationships of demographic factors to perceptions of the two diseases were largely not supported. Of the few significant relationships found, older age was related to greater perceived susceptibility for heart disease compared with breast cancer. Heart disease images were more likely to contain images of women over 40 years than were the breast cancer images. This may reinforce the idea that heart disease is only of concern for older women. Others have also found that younger women are less aware of heart disease as the leading cause of death.[7] Fruit and vegetable intake was also related to lower perceived susceptibility for heart disease relative to breast cancer. All of the heart disease articles discussed prevention and three specified the importance of a healthy diet. It is possible that this imparts a sense of immunity to the disease among women who consume more fruits and vegetables. However, media consumption was not related to perceptions of prevention or controllability in the survey. This raises an important question regarding the relationship of health behaviors to disease risk perceptions that should be followed up.

Who is presented in newspaper articles and advertisements about diseases should be considered. Research with the Heart Truth campaign showed that women of diverse racial, ethnic

Table 4 Standardized β coefficients (from final models after all variables entered) showing relationship between predictors and the difference between heart disease and breast cancer perceptions (breast cancer scores subtracted from heart disease scores)

Disease perception variables	Demographics			HD risk factors	Health behaviors				Media	R^2 adjusted
	Age	Education	Income		Smoking status	Fruit and vegetable	Work PA	LTPA		
Media	−0.01	−0.06	0.04	0.01	0.01	−0.04	0.03	0.02	—	0.003
Susceptibility	0.11**	−0.04	−0.01	0.24**	0.05	−0.10**	−0.002	−0.05	−0.03	0.113
Seriousness	0.01	−0.006	0.03	0.08*	0.01	0.01	0.03	−0.01	0.01	0.002
Fear	−0.01	−0.04	−0.04	0.08*	0.02	−0.01	−0.01	−0.001	0.06	0.01
Preventability	−0.04	0.01	0.06	−0.02	−0.01	−0.03	−0.02	0.01	0.004	0.001
Controllability	−0.02	−0.02	0.07	−0.01	−0.001	−0.01	−0.06	0.01	−0.02	0.003
Family history	−0.003	−0.04	−0.01	0.02	0.02	−0.02	0.04	−0.05	0.08*	0.009

HD, heart disease; PA, physical activity.

*$P < 0.007$.

**$P < 0.001$.

and sexual orientation backgrounds had difficulty relating to the campaign materials and felt their identities were excluded from the messages.[23] Though the content analysis for the present research showed greater representation of African American and Asian women in images of heart disease items, 69% of images were still of Caucasian women. This limited representation of women in heart disease and breast cancer images from newspapers and magazines may influence perceptions of disease among non-Caucasian women. Participant ethnicity should be collected in replication studies as there are differences in ethnicity in awareness of risk for heart disease.[8]

Limitations of this research include a sample of women who were members of a survey panel who had already agreed to participate in surveys which limits generalizability. Further, the findings with small effect sizes should be treated with caution. The wording of the question regarding 'media heard or seen' in Study 2 could be ambiguous. Although this question was created with the intention of determining broad media exposure, from briefly seeing an image to concentrated reading, the nature of the question does not allow for determination of specific effects. Finally, this research is correlational but is a necessary step in the development of theories regarding causal effects of media on health perceptions and behaviors.[17]

In conclusion, these studies identified specific populations of women who should receive targeted disease risk information. For example, increased effort should be made to target heart disease prevention and awareness messages at younger women. Women also hold different threat perceptions for experiencing heart disease and breast cancer over their lifetime. Mainstream media is an important cue to action and likely influences women's perceptions of disease.

How articles are constructed and their subsequent impact on disease perceptions is an important area for future research, which can help inform the development of future campaigns. This research is an important step in that process.

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