



## Promoting Breast Self-Examination Practices for Early Cancer Detection among Women: Loss-Frame Message Framing Interface

Azizah Omar<sup>1\*</sup>, Siti Nur Khairunnisa Mohamad Tahir<sup>2</sup>

<sup>1,2</sup>Universiti Sains Malaysia.

Email: <sup>1</sup>[aziemar@usm.my](mailto:aziemar@usm.my), <sup>2</sup>[nurkhairunnisa@student.usm.my](mailto:nurkhairunnisa@student.usm.my)

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### Abstract

The occurrence of Breast Cancer (BCa) among women worldwide is increasingly alarming. Studies have reported that 1 in 20 women have a chance of getting BCa in their lifetime. At present, the number of women who undertakes Breast Self-Examination (BSE) is considerably low due to a lack of awareness and ignorant behaviour. This study investigates the effect of promotional health material's messages as a stimulus that emphasises the direction of the loss frame messaging, the tonality of the message, and the focus (either on oneself or others) in encouraging early cancer detection practices. Quantitative data were collected from 378 women aged above 18 years in Malaysian public universities. We used structural equation modelling (SEM) to analyse the data and test the hypotheses. Our results revealed the direction and focus of loss-framed messages have positive effects on the practice of BSE's intention. Interestingly, tonality was observed with no positive effect on the intention.

Index Terms—Breast Cancer, Breast Self-Examination (BSE), Early-Cancer Detection, Framing Strategy, Loss-Frame Message, Malaysia.

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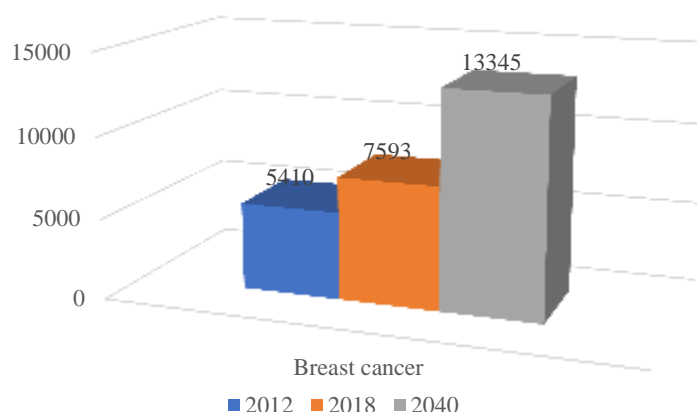
### 1. Introduction

Breast cancer (BCa) is the most common cancer (Ca) and the leading cause of Ca related deaths among women worldwide.[1],[2] Previous studies identified four major contributing factors for late detection of BCa as the lack of awareness of the i) risk factors, ii) BCa screening methods, iii) cultural taboos, and iv) feeling ashamed to talk about BCa.[3]. Previous research have shown that processed foods may involve in causing disease as one of the risk factors, specifically cancer and diet is viewed to may have a significant impact on BC outcomes [37], [38]. The World Health Organization (WHO) reported America as the country with the most extensive programme and guidelines for identifying symptoms for BCa; however, it has a low acceptance rate at only 74% [4]. This is worrying because the projected number of BCa cases since 2012, as presented in Figure 1, does not show any sign of slowing down. This situation could be reasoned by the late presentation of BCa in clinics, leading to a higher mortality rate [5]. WHO also predicted that the number of BCa would almost double in 2040 compared to 7,593 cases in 2018. Most cases and deaths are potentially preventable if women participate in early screening programmes,[6] for instance, breast self-examination (BSE), mammography, and clinical breast self-examination (CBSE)

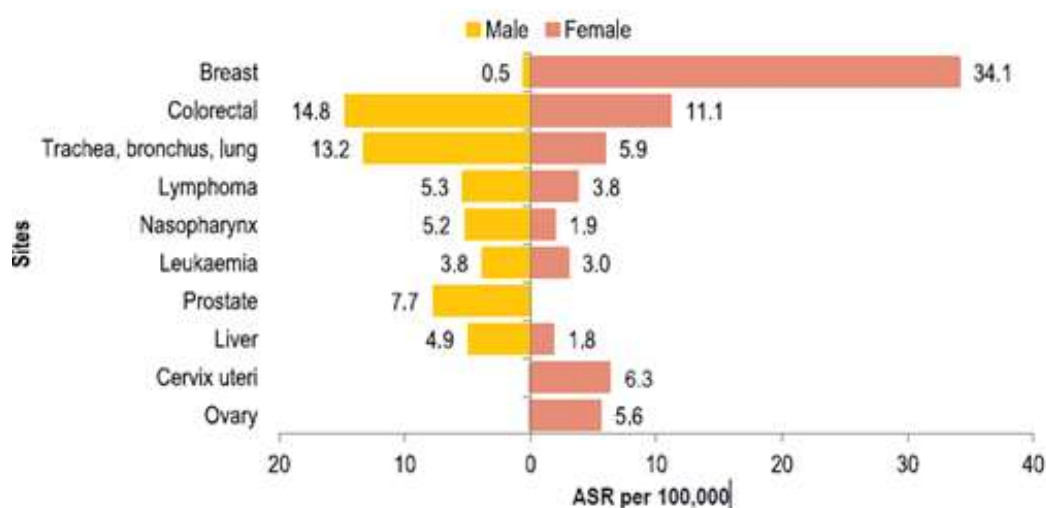
[7]. Hence, early detection is vital to increase survival chance and screening interventions is proven to detect breast cancer at the earlier stage [34].

In Malaysia's context, it also records BCa as the leading Ca case where it estimates that 1 out of every 19 women has a chance of being diagnosed during their lifetime [8]. Malaysian women have greater pervasiveness of breast cancer at the age of 40 – 49 years compared to women in the west age of 50 – 59 years old [33]. It is also noted that based on the Age-Standardized Incidence Rate (ASR) from 2012-2016, the likelihood of being diagnosed with BCa among Malaysian women was 34.1 per 1000,000 population. Among the ethnicities, the Chinese comprised the highest segment, followed by Indians and Malays [9]. With the increasing numbers, the Malaysian Ministry of Health has continuously promoted BSE and annual breast examination as part of the breast health awareness campaigns since 1995. Since then, monthly BSE practice in Malaysia has recorded some increase in the number ranging from 19.6% to 36.7% [10],[11]. However, despite much publicity and encouragement from the health authorities concerning the prevention and early detection of BCa, Malaysian women still present BCa at a later stage compared to other developing countries [5]. On this note, the knowledge and practice of BSE remain relatively low, despite awareness campaigns continuing aggressively throughout the year. Previous research found that there is a lack of awareness among women in Malaysia about ordinary symptoms of breast cancer as only 34% of women acknowledged 'painless breast lump' as the symptom for breast cancer [35]. Absence of organized screening programs, lack of public awareness as well as accessibility for treatment have resulted to cases of late detection [36]. The inadequate knowledge of BCa and the importance of BSE triggers a concerning question of whether women in Malaysia receive the right, relevant, useful, effective and consistent message encouraging them to react towards BSE [12]. This also leads to an alarming call for researchers in public health to examine the appropriate and applicable message framing strategy when designing health messages.

To date, the evaluation of health messages framing strategies on BCa awareness materials based on the Western context of demographic, psychographic, and culture. The applicability and effectiveness of health message framing in Malaysia are questionable, with little change in attitude to date [13]. Therefore, this research extends the message framing models by utilizing the loss-frame to test the relevancy and effectiveness of BCa awareness campaigns through educational materials. The goal is to understand how subtle alterations in the loss-frame message could affect Malaysian women's intended health behaviour. In the context of food consumption among women, it is crucial to understand that dairy products contained saturated fatty acids, contaminants (carcinogenic pesticides), endogenous IGF-1 (promote BC growth) might influence BC incidence [38]. The World Cancer Research Fund concluded that with the reduce intake in fast food, processed food, red meat, and alcohol can reduce the risk of cancer [39]. Subsequently, this research findings would recommend relevant and appropriate health promotional messages to raise BSE awareness for early BCa detection.



**Fig. 1** Estimated Past and Future Trends of Breast Cancer in Total Cases Per Year



**Fig. 2** The Age-Standardized Incidence Rate for The Ten Most Common Cancers In Malaysia from 2012-2016

### Message Framing

Explanations and predictions of choices are often formed on the assumption of human rationality. One must act, including choosing the possible outcomes or consequences, and the conditional probabilities that relate the outcomes to acts are called the decision frame. The frame is controlled by the formulation of the problem and the norms, habits, and personal characteristics. The differential impact of message frames on BCa detection and prevention behaviours is explained in terms of the degree of perceived risk associated with performing the behaviour rather than the features intrinsic to these behaviours. The perceived risk associated with BCa and BSE behaviour is conceptualized as the subjective perception that leads to an unpleasant outcome. Thus, within the BSE behaviour, the framing effects may depend on an individual's perception of risk or uncertainty associated with performing the behaviour itself. There are two types of message framing. A gain-frame helps people perceive behaviour as being safe and less risky, whereas a loss-frame lets people perceive performing behaviour to be risky or uncertain [14]. This explains the differences between what people

perceived about risk (gained) instead of what people sought on risk (loss) [15]. Having observed earlier studies about health communication that examined the gain-frame, the loss frame strategy that less favoured in communicating diseases is tested.

In the context of BSE, women would be less likely to take a risk in response to secure the good things they already have. Because of that, the gain-framed message is associated with the prevention of motive or behaviour [16]. Yet, women would be more likely to take risks when they feel that they are likely to experience or already experience some loss and that taking the risk might reduce or eliminate the loss. Because of that, loss-framed messages are associated with detection motive or behaviour [16]. Different message framing enhances different health motives and behaviours. Many Ca awareness campaigns used gain-frame to evaluate positive outcomes from performing early detection behaviour; however, scant studies connect early detection behaviour with the loss-frame that highlight the adverse effects.

#### **Direction of Loss Frame Message**

For a BCa campaign, the related health personnel who want to develop a loss-framed direction of a message can write the wording like, "Not doing exercise regularly and failing to maintain a healthy weight increases the risk of BCa". The objective of the awareness message framing is to highlight the consequences of failing to engage in a particular behaviour and the outcome it would cause (loss-frame) [17].

#### **Tonality of the Loss Frame Message**

Framing messages conveying gains and losses can be emotional or rational [18]. Rational appeal/information appeal displays are objective and logical, whereas emotional appeal develops feelings and creates an environment that impacts the attitude and behaviour [19]. Brennan and Binney [20]. indicated that social marketers must consider the use of fear, guilt and shame as negative emotional appeals to obtain voluntary compliance.

#### **Focus of the Loss Frame Message**

The focus of messages usually includes egoistic (self-oriented), altruistic (other-oriented), or bio-spheric (other-oriented) messages, and testimonial dimensions, which contain celebrity, expert, and volunteer testimonials [18]. Egoistic messages emphasise self and self-oriented goals, such as health, prosperity, and convenience. The altruistic messages focus on other people, such as family, community, and humanity. In contrast, the bio-spheric messages focus on the well-being of living things, such as plants, animals, and trees. The self-focused appeal is also called self-serving, which focuses on the monetary or other benefits gained through the behaviour [21] The other-focused appeal, also known as altruistic and public-serving, is usually associated with making a societal contribution and helping people out.

## **2. Materials and Methods**

### **Participants**

In this study, we employed non-probability purposive sampling. The population and sampling of this research comprise (i) women aged 18 and above, (ii) Malaysian citizen, and (iii) had encountered any BCa campaigns in the past. The research was conducted in various universities in Malaysia. The student and staff population are considered to be an appropriate

sample as the university represents individuals from different states within the country. A total of 378 respondents were recruited for this study.

### **Procedures**

We created a stimulus in the form of awareness pamphlets distributed together with the survey question. Using the headlines of "Fight Breast Cancer: Early Detection Saves Lives", it consists of (i) information on BCa, (ii) steps for performing BSE, (iii) consequences of not performing, (iv) factors that increase the risk of BCa, (v) symptoms of BCa, and (vi) impact of BCa. Before developing the stimuli, we collected 31 existing printed materials (e.g., brochures, booklets, pamphlets) on BCa campaigns available in Malaysia and produced by authorized and credible sources (e.g., Ministry of Health, National Cancer Malaysia, and National Cancer Institute). The content of the collected promotional materials, including colours, wording, phrases, pictures, diagrams, logos, and other displayed graphics, were reviewed and evaluated using the message framing strategy elements that are: (i) direction, (ii) tonality, and (iii) focus. All information related to loss-frame messages were grouped for the development of the stimuli. The pamphlet was then sent to the (i) oncologists and (ii) health communication researchers for content expert opinion and validation. Further refinement and improvement were made based on the feedback. The stimuli have also been pre-tested and pilot tested to eliminate any potential misunderstanding and to keep the message as realistic as possible.

### **Measures**

Self-administered questionnaires were developed in four parts. Part A focuses on the respondent's demographic profile; Part B consists of 24 questions related to loss-framed messages, [22] tonality, [23] and focus [22]; Part C comprises 10 questions on BCa awareness; [24] and Part D consist of 4 questions about the BSE intention. All the items were measured using a five-point Likert scale to indicate the level of agreement. This study also underwent an ethical review board and received human ethics approval before the survey was distributed [USM/JEPeM/18050250]. The data were collected over two months.

### **Statistical Analyses**

We used structural equation modelling (SEM) to analyse the data and test the hypotheses. SEM is a statistical technique that incorporates factor analysis (from the measurement model) and path analysis (from the structural model). The advantages of SEM compared to other statistical techniques include more flexible assumptions and less measurement error. In particular, we tested the model through partial least squares (PLS) using SmartPLS version 3.3.2.

## **3. Analyses and Results**

### **Sample Characteristics**

The respondents' demographic background is all women (N=378), and most of them are between 18 and 27 years old (89.2%). Only 5.3% are aged 38 years old and above. Most of them are Malay (77.8%), single (89.7%), and had obtained or are completing a first degree (51.3%). They represent women from all over Malaysia, but Selangor (18.0%) noted the highest and Sarawak (0.3%) the lowest. The detailed demographic profile is displayed in Table I.

**Table I:** Summary of Respondents' Demographic Profile (N=378)

Demographics	Frequency	Percentage	Demographics	Frequency	Percentage
<b>Age</b>			<b>Race</b>		
18-27	337	89.2	Malay	294	77.8
28-37	21	5.6	Chinese	67	17.7
38-47	8	2.1	Indian	12	3.2
48-57	9	2.4	Others	5	1.3
Above 57	3	0.8			
<b>Occupation</b>			<b>Marital Status</b>		
Student	332	87.8	Single	339	89.7
Employed	46	12.2	Married	38	10.1
			Others	1	0.3
<b>Locality</b>			<b>Education</b>		
Northern Malaysia	73	19.3	SPM/STPM/ Certificate	84	22.2
Central Malaysia	127	33.6	Diploma	75	19.8
Sothern Malaysia	100	26.5	Degree	194	51.3
Eastern Malaysia	68	18	Masters	17	4.5
Sabah & Sarawak	10	2.6	PhD.	8	2.1
<b>Family with BCa History</b>			<b>BCa Related Activities</b>		
Mother	9	2.4	Public Education	149	30.3
Cousin	1	0.3	Exhibition	187	38.1
Aunty	29	7.7	Free	48	9.8
			Mammogram		
Grandmother	10	2.6	None of The	107	21.8
			Above		
Sister	2	0.5			
None	327	86.5			

### Measurement Model Assessment

The exogenous latent variables are direction (loss frame), tonality (negative emotion and rational appeal) and focus (self-focused and other-focused), where BSE intention works as the endogenous variable. The goodness of the measurement model is calculated based on the reliability and validity of the measurement items. Construct validity is computed through convergent and discriminant validity [25]. Convergent validity is measured by assessing: (i) the loadings, (ii) composite reliability (CR), and (iii) average variance explained (AVE). Discriminant validity is tested using the Fornell-Larcker criterion. The results disclose that AVE's square root for each of the constructs is larger than the correlation for each construct, indicating adequate discriminant validity, as explained in Table II. The AVE for each variable is discovered to be higher than the minimum threshold of 0.5 and ranged between 0.623 and 0.815. Table III shows a summary of the construct validity and reliability.

**Table II:** Discriminant Validity of Constructs

	BSE Intention	Loss Frame	Negative Emotion	Rational Appeal	Self-Focused	Other Focused
BSE Intention	<b>0.876</b>					
Loss Frame	0.190	<b>0.790</b>				
Negative Emotion	0.144	0.306	<b>0.880</b>			
Rational Appeal	0.112	0.409	0.337	<b>0.824</b>		
Self-Focused	0.165	0.521	0.241	0.414	<b>0.862</b>	
Other Focused	0.231	0.452	0.219	0.416	0.482	<b>0.903</b>

**Table III:** Results of Measurement Model

Constructs	Loadings	AVE	CR	Constructs	Loadings	AVE	CR		
BSE Intention	0.841	–	0.768	0.93	Rational Appeal	0.834	–	0.744	0.897
Loss Frame	0.708	–	0.623	0.831	Self-Focused	0.882	–	0.815	0.898
Negative Emotion	0.795	–	0.774	0.872	Other Focused	0.773	–	0.68	0.864
Emotion	0.958				Focused	0.809			

The structural model signifies the cause and effect association between the latent variables [26]. The assessment of the structural model includes the estimation of the path coefficients and  $R^2$  values. In particular, Table 6 reveals that four hypotheses were supported, which are loss-framed ( $p = 0.018$ ), negative emotion ( $p = 0.015$ ), self-focused ( $p = 0.015$ ), and other-focused ( $p = 0.017$ ). The remaining one hypothesis was not supported. The rational appeal message was found to be insignificant ( $p = 0.069$ ), which was contrary to our prediction and remained an interesting discovering phenomenon. The explained variance of  $R^2$  is another important indicator of the predictive power of the path model. The results indicate that the model explained 61% of the variance in BSE ( $R^2=0.61$ ). Table IV shows the path coefficients,  $t$ -values, and significance  $p$ -value between the variables.

**Table IV:** Relationships of the Variables in The Study

Path	Beta	$p$ -value	$t$ -value	Results
Loss Frame → BSE Intention	0.084	0.018	4.791*	Supported
Negative Emotion → BSE Intention	0.085	0.015	5.839*	Supported
Rational Appeal → BSE Intention	-0.010	0.069	0.567	Not Supported
Self-Focused → BSE Intention	0.130	0.015	8.488*	Supported
Other Focused → BSE Intention	-0.069	0.017	3.997*	Supported

\*Significance at  $p < 0.05$

#### **4. Discussion**

This study sought to investigate the influence of loss frame messages (including direction, tonality, and focus) on Malaysian women's BSE practice intention. The results showed that the loss frame message positively impacts the BSE practice intention at 61% variance. The study of Bertoni, Corazzini & Robone [27] supported this finding that manipulated loss-framed information in an invitation letter to influence people to have mammography, which successfully increased the take-up. Although the study aimed at different BCa screening and using an invitation letter, not a pamphlet, it shows that loss-frame messages effectively encourage a change of behaviour. This result is also similar to a study by Kim, [28], who found that the message's loss frame direction was more effective in creating awareness of the negative consequences, such as BCa. The assumption on the effect of the loss frame message on BSE intention is consistent with past research that confirmed a significant positive relationship between the loss frame and other early Ca detection activities [29].

On the effect of tonality (negative emotional appeal & rational appeal) on BSE intention, the results discovered a significant relationship between negative emotional appeal on BSE intention, but, otherwise, with the rational appeal. The significant result for the negative emotional appeal denotes a similarity with other studies [30] that found a positive association between negative emotional appeal and early Ca detection behaviour. Interestingly, the rational appeal was found to have an insignificant relationship with BSE intention. This finding is contradictory to past literature that found that rational appeal influences individuals to perform BCa screening [31]. This could be due to the pervasiveness of the negative emotional appeal in the BCa pamphlet that dominates the rational appeal. When individuals are exposed to both negative emotional appeal and rational appeal simultaneously, it can be seen that emotions play a more significant role in influencing behaviour. Therefore, this justifies the insignificant result between rational appeal and BSE intention.

Similarly, for the last exogenous variable, the focus was self-focused and other-focused as positively linked to BSE intention. This result is also consistent with a previous study, [22] which stressed that both individuals and the people around play a vital role in developing particular behaviour concerning whether to take up a specific behaviour or avoid it. One of the encouraging factors is indebted to the pressure and encouragement women get from support and peer groups through online communities [32]. However, many also pointed out that they are willing to do monthly BSE due to the self-awareness that they believe that the efforts should start with themselves, not through others. Nevertheless, they do not deny the intervention of their loved ones on influencing BSE intention. Due to strong belief and faith, women are less scared of dying if compared to the negative consequences that they presume might occur to themselves and their families, such as financial difficulties, mental breakdown, and career destruction. In a nutshell, findings from this study found that loss frame, negative emotional appeal, self-focus messages, and other-focused messages effectively increase the BSE intention among women in Malaysia.

This study permits all stakeholders related to breast health communication, such as the Ministry of Health Malaysia, government and private hospitals and hospices, non-governmental organizations (NGOs), societies, and individuals, to examine their current



health awareness programme's effectiveness. This action could impact further decision planning to continue with the current breast health communication strategies or draft and implement new strategies and needs.

Nonetheless, the study has limitations, since its focus concentrates on women-only even though, according to the statistics, some men have been diagnosed with BCa, the assumption of variables in that it examines the role of the negative emotional appeal and rational appeal without including the fear, shame, guilt, and other appeals. Future studies are encouraged to consider exploring the impact of the loss and gain framing strategy on BSE as a whole. Comparatively, the findings will give more insight and directive measures on future planning of BCa awareness campaigns.

## 5. Conclusion

The manipulation of loss-framed persuasive message framing developed in this study shows a significant effect on women's BSE practices. Thus, creating awareness health campaigns utilizing negative consequences enables women to detect the earlier possibility of BCa development and as part of their health prevention strategy. It appears to merit further study in designing a full framing study incorporating persuasive elements from negative and positive message anchors. The authors wish to thank all the women who contributed to this study.

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