HEALTH PSYCHOLOGY | RESEARCH ARTICLE

Theory of Planned Behaviour and Health Belief Model: females’ intention on breast cancer screening

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Abstract: Today, breast cancer incidence rates show a marked increase globally due to the delay on breast screening among females. Given that, the purpose of this study is to investigate females’ intention towards breast cancer screening. During data collection, 600 questionnaires were distributed to Malaysian females who are above 18 years old. Subsequently, the findings reveal that perceived benefits and knowledge have the highest influence towards females’ breast screening intention. Therefore, this study seeks to justify the interference of the moderator (cues to action) towards the relationships between the variables and contribute practical recommendations to health practitioners. To support this, Health Belief Model, Theory of Planned Behaviour and Social Cognitive Theory are used in this research.

Subjects: Health Psychology; Quantitative Methods; Women; Cancer; Global Health

Keywords: breast screening; intention; Health Belief Model; Theory of Planned Behaviour; Social Cognitive Theory; awareness

1. Introduction
Breast cancer is the most common cancer among females and it is the second-highest death rate globally. Epidemiological data revealed that breast cancer showed a marked increase of incidence rates for the past 10 years. Accordingly, the estimated breast cancer new cases in 2018 are over...
two million worldwide, which stands at a percentage of 15.3% of all new cancer cases (National Cancer Institute, 2018). Moreover, breast cancer incidence rates have been found to increase gradually to approximately 5.9% annually (World Cancer Research Fund, 2018). Although breast cancer death rates reported a marked decline (almost 40%) for the past two decades, it is still not parallel with the breast cancer incidence rates.

Accordingly, advanced medical technology and a wide range of breast screening options such as 3D mammography, ultrasound and Magnetic Resonance Imaging (MRI) drastically reduced breast cancer mortality rates (National Cancer Institute, 2018). In addition, breast cancer awareness campaigns and public health announcements were held regularly in health-care centres, universities/colleges and public places like shopping malls (Gall & Bilodeau, 2018; Ganga, Yamile, Ifeanyi, Silvia, & Campbell, 2018; Lee, Kim, Park, & Choy, 2018).

Diametrically opposed, breast cancer incidence rates are still increasing among females globally (World Cancer Research Fund, 2018). Limited studies show the event outcomes as well as little details regarding the participants’ responses towards the campaigns/programs held (Alotaibi, Rezk, Julianna, & Id, 2018; Tamayo et al., 2018; Viviana et al., 2018). Also, there is inconsistent literature review on females’ behavioural changes and cognitive reactions towards breast cancer screening (Francis et al., 2018; Hisam et al., 2018; Nyblade, Stockton, Travasso, & Krishnan, 2017). In line with this, the purpose of this research is to evaluate the factors that influence females’ intention towards breast screening. It also seeks to contribute to the health practitioners and social change scholars to provide better predictions on females’ attitude and suggestions to encourage them to go for breast screening. Therefore, in this study, Health Belief Model, Theory of Planned Behaviour and Social Cognitive Theory are employed as grounded theories as follows.

2. Literature review
Health Belief Model (HBM) is defined as a health behaviour change model and it is used to predict individuals’ responses and change in their behaviour to prevent diseases. Further explaining, this model was conducted by social psychologists at the U.S. public health service in the 1950s. Today, Health Belief Model is the best-known model which is frequently used in behavioural health-related research and to predict health-promoting behaviour (Bay, Dönmez, & Arabac, 2017; Farajzadegan et al., 2016; Sari, 2018).

According to HBM, there are six core constructs: 1) perceived severity, 2) perceived susceptibility, 3) perceived benefits, 4) perceived barriers, 5) cues to action and 6) self-efficacy (Dadipoor, Mehraban, Aghamolaei, & Ramezankhani, 2017; Morowatisharifabad, Amani, Kaseb, & Namayandeh, 2018; Tafti, Rahaei, Shahi, & Hakimi, 2018). To clarify, perceived severity refers to the impact or consequences of a disease brought to a person. The potential impact of a disease could be a disability, long-term medication, mental illness, financial problem or even death (Cal & Bahar, 2018; Chin & Mansori, 2018; Didarloo, Nabilou, & Khalkhali, 2017). As such, if the person believes the health issues as severe, he/she is most likely to execute into the intended behaviour to prevent or reduce the severity.

In the case of breast cancer, the female will most probably to go for breast screening if she perceives that the consequences of being diagnosed with breast cancer are very serious. Instead, if the female feels that breast cancer impact is not a serious condition, highly likely, she will not tend to perform breast screening, supported by the Theory of Planned Behaviour (TPB) (Brooks et al., 2018; Ensan, Babazadeh, Aghamohammadian, & Aghaei, 2018). Briefly explained, TPB consists of 1) attitude towards behaviour (subjective assessment towards a behaviour), 2) subjective norm (influenced by the third party) and 3) perceived behavioural control (ability to overcome self-perceptions to execute a specific behaviour). As such, it is widely used to predict a person’s intention and behaviour (Araujo-soares, Hankonen, & Presseau, 2018; Aycinena et al., 2017; Langford et al., 2018). Therefore, to evaluate the relationship between perceived severity and females’ breast screening intention, the hypothesis is developed:
Hypothesis 1: There is a relationship between perceived severity towards females’ breast screening intention.

Perceived susceptibility is termed as a person’s perception of the risk of developing into a disease. Given that, if the person perceives that he/she has a high risk of getting a particular disease, most probably, he/she will execute into the intended behaviour to reduce the risk or to advert it (Marmarà, Marmarà, & Hubbard, 2017; Wang, Hsu, Wang, Huang, & Hsu, 2014). Likewise, breast cancer risks could be due to being a female, family history of breast cancer, alcohol consumption, obesity and ageing (Agbonifoh, 2016; Johns & Moyer, 2018; Manika & Gregory-Smith, 2017). In this viewpoint, if a female has the tendency of developing breast cancer, she will most likely perform this suggested behaviour. Hence, to study the influence of perceived susceptibility towards breast screening intention, the hypothesis below is designed:

Hypothesis 2: There is a relationship between perceived susceptibility towards females’ breast screening intention.

Utilising Health Belief Model (HBM), perceived benefits refer as a person’s evaluation on a value gained from an intended behaviour (Akhondali, Dianat, & Radan, 2015; Soriano et al., 2018). Further clarifying, if the person believes that he/she will gain positive returns from his/her outcome expectancy, this person will most likely engage into the recommended behaviour (Darvishpour, Vajari, & Noroozi, 2018; Figueiredo et al., 2017). Based on the subjective norm in Theory of Planned Behaviour (TPB), if a female is motivated by third party (close ones such as family members, friends or siblings) and they tell her about the benefits of breast screening, sharing with her regarding their positive screening experiences, then, it will increase the female’s likelihood to go for breast screening (Araujo-soares et al., 2018; Aycinena et al., 2017; Langford et al., 2018). Thus, to test the relationship between perceived benefits and females’ breast screening intention, the hypothesis is conducted as below:

Hypothesis 3: There is a relationship between perceived benefits towards females’ breast screening intention.

On the other hand, perceived barriers are defined as a person’s obstacles or challenges to perform intended behaviour. As such, the person will perceive a particular behaviour as unfavourable and he/she refrains from doing it (Dadipoor et al., 2017; Ganga et al., 2018; Tafti et al., 2018; Viviana et al., 2018). Along with the environmental factors in Social Cognitive Theory (SCT), the barriers could be an inconvenience, price, limited information on a particular event, fear of unknown and many more. Reflecting this, one of the main possible breast cancer screening barriers could be cultural beliefs. Due to a different cultural background/social stigma, some females resist to accept breast cancer knowledge, taboo to talk about it and have misconceptions that breast cancer development is due to the locations they stay (Chin & Mansori, 2018b; Tweneboah-Koduah, 2018). Likewise, other possible breast screening barriers could be fear of knowing the result, low perceived susceptibility, misconceptions on the diagnosis process and many more (Magnan, Shorey Fennell, & Brady, 2017; Stacey, James, Chapman, & Lubans, 2016; Van Der Heijden, Mulder, Poortvliet, & Van Vliet, 2017). With that being said, if the female perceives the barriers as low, it will increase the likelihood of engaging in breast screening behaviour and vice versa. Given that, to justify the relationship between perceived barriers and females’ intention towards breast cancer screening, the hypothesis is hypothesised as below:

Hypothesis 4: There is a relationship between perceived barriers towards females’ breast screening intention.

Based on the cognitive factors (personal factors) in Social Cognitive Theory (SCT), knowledge is an understanding or awareness on a specific event/activity, which is derived through a person’s
education, experience, learning from third party or observation (Adams et al., 2017; Devlin & Dillard, 2016). In the case of breast cancer, if a female has the awareness about the high survival rate of breast cancer if she is diagnosed at the early stage, or the importance of breast cancer early diagnosis, her knowledge and attitude will align with the outcome expectancy (behavioural factors), which she perceives that breast screening could save her life (Mama et al., 2015; Pope, Zeng, Zhang, Lee, & Gao, 2018; Stacey et al., 2016). As such, both personal and behavioural factors will increase the female’s self-efficacy as she believes that she is capable of performing the breast screening behaviour, supported by the Health Belief Model (HBM) (Gall & Bilodeau, 2018; Lee et al., 2018; Morowatisharifabad et al., 2018). Briefly, to evaluate the relationship between females’ knowledge and the intention of breast cancer screening, the hypothesis is drawn:

Hypothesis 5: There is a relationship between knowledge towards females’ breast screening intention.

2.1. Moderation effect

Moderating variable is a third variable which occurs in a relationship between two variables. To further illustrate, the moderating variable (moderator) is used to evaluate the strength between the independent variables and dependent variable. In this research, cues to action is employed as the moderating variable to justify the influence level between the independent variables towards females’ breast cancer screening intention. Associated with Health Belief Model (HBM), cues to action refers to the readiness of a person to engage into a particular action (Francis et al., 2018; Hisam et al., 2018; Tamayo et al., 2018). To illustrate further, cues to action can be either internal or external cues. Given an example, internal cues (physiological) for breast cancer symptoms include skin dimpling, nipple retraction, pain or scaliness of breast skin. In relation to external cues, it can be information gained from the third party, social media or health-related campaigns/programmes. In the case of breast cancer, if the female observes that her breast is in an abnormal condition (lump, nipple retraction, skin peeling), it will significantly trigger and urge her to perform breast cancer screening. Therefore, cues to action is employed as a moderating variable in this study to evaluate the factors that trigger females’ breast cancer screening intention and the hypotheses are designed as follows (Figure 1):

![Figure 1. Inclusion of cues to action as a moderator to test the strength effect on the breast screening intention.](https://doi.org/10.1080/23311908.2019.1647927)
Hypothesis 6: Cues to action moderates the relationship between perceived severity and females’ breast screening intention.

Hypothesis 7: Cues to action moderates the relationship between perceived susceptibility and females’ breast screening intention.

Hypothesis 8: Cues to action moderates the relationship between perceived benefits and females’ breast screening intention.

Hypothesis 9: Cues to action moderates the relationship between perceived barriers and females’ breast screening intention.

Hypothesis 10: Cues to action moderates the relationship between knowledge and females’ breast screening intention.

3. Methods and results

To facilitate data collection, Malaysian females who are 18 years old and above were selected as the sample size of this research. Subsequently, the data were collected at the public hubs, for instance, Kuala Lumpur International Airport, Terminal Bersepadu Selatan (southern zone main bus station) and Kuala Lumpur Sentral railway station. Throughout the process, 600 questionnaires were distributed in every state of Malaysia using non-probability sampling approach (known as convenience sampling approach). On top of that, the data were also collected via online platforms such as LinkedIn, Facebook, WhatsApp and WeChat using snowball sampling approach. After filtering out the missing value and incomplete questionnaires returned from the survey, 507 questionnaires (84.5%) were finalised for data analysis.

To ease the participants during their answering sessions, English and Malay language were employed in this survey. The Malay version of the questionnaire was translated using back-translation techniques and it was translated back and reviewed by two independent individuals. In addition, this questionnaire encompasses two sections: section A and section B. To further describe, Section A consists of questions regarding all the independent variables and dependent variable whereas Section B is the demographic information of participants. In this questionnaire, the 6-point Likert scale was employed and the range of the scale was 1 = Strongly disagree; 2 = Disagree; 3 = Slightly disagree; 4 = Slightly agree; 5 = Agree and 6 = Strongly agree.

3.1. Data analysis

Based on Table 1, 35.9% of the participants are aged between 18 and 30. For ages between 31–40 and 41–50, both stand at a similar percentage (23.7% and 23.5%) whereas, for the age range above 50, there are merely 17%. Next, more than half of the participants are married (63.1%) whilst 32.7% are still single. On top of that, 56.8% of the participants are Muslim and it is then followed by Buddhism (22.7%) and Christianity (11.4%).

In this research, the purpose of reliability and validity test is to justify the good fit of this developed measurement. To further illustrate, the model will be considered as fit if the reliability and validity test falls within the acceptable level. In line with this, Table 2 validates that factor loading is within the acceptable range as factors with load lesser than 0.5 were removed (0.681–0.913). On the other hand, the values in average variance extracted (AVE) demonstrate the figures ranging from 0.573 to 0.704, and thus, are acceptable (more than 0.5). Composite reliability (CR) below reports that all the values are within 0.843–0.919 (greater than 0.7) whereas Cronbach’s Alpha describes the values from 0.751 to 0.890 (more than 0.7) and consequently, both are within the level of acceptance.
According to Table 3, hypothesis 1 \((H1)\) reveals an insignificant relationship between perceived severity towards females’ breast cancer screening intention \((\beta = 0.006, p-value = 0.462)\). Correspondingly, perceived severity has little influence on females’ intention and behavioural change towards breast screening and thus, it is not supported. Diagonally opposed, there is a direct significant relationship between perceived susceptibility and breast screening intention \((H2)\) and hence, it is supported \((\beta = 0.128, p-value = 0.000)\). This explains that the higher the level of the risk of developing into breast cancer, the higher the likelihood of a female to engage in breast screening.

With regard to hypothesis 3 \((H3)\), it exhibits a significant relationship between perceived benefits and females’ breast screening intention with the value of \(\beta = 0.208, p-value = 0.000\) (supported). As such, with the benefits gained from breast cancer early diagnosis, females will most likely go for breast check-up. As for \(H4\), there is a significant negative relationship between perceived barriers and intention \((\beta = -0.084, p-value = 0.019)\) and therefore, this hypothesis is supported. Relatively, the lower the level of perceived barriers, the higher the level of breast screening intention. Hypothesis 5 \((H5)\) also illustrates that there is a significant relationship between knowledge and females’ breast screening intention with the value of \(\beta = 0.197, p-value = 0.000\) (supported). With that being said, with the escalation of a female’s breast cancer-related knowledge/awareness, the higher are the levels of her intention to perform the breast screening behaviour. In essence, R square of the intention demonstrates that there is a 61\% \((0.610)\) variance can be explained by the independent variables.

Drawing from Table 4, all of the hypotheses \((H6–H10)\) epitomize an insignificant moderation effect (cues to action) towards females’ breast cancer screening intention. From this viewpoint, the figures shown in P-value are 0.306, 0.126, 0.356, 0.053 and 0.132, which are all greater than 0.05 (not supported). Given that, cues to action has little impact to moderate the factors towards breast screening intention.

### 4. Findings and discussion

The primary purpose of this research is to investigate females’ breast cancer screening intention via the Health Belief Model, Theory of Planned Behaviour and Social Cognitive Theory with the inclusion of moderator (cues to action). Drawing from the findings, perceived benefits \((H3)\) presented the highest
influence towards females’ breast screening intention ($\beta = 0.208$, p-value = 0.000). Secondly, it falls to hypothesis 5 (H5), which is the relationship between knowledge and intention with the value of $\beta = 0.197$, p-value = 0.000. It is then followed by perceived susceptibility (H2) ($\beta = 0.128$, p-value = 0.000) and perceived barriers (H4) ($\beta = -0.084$, p-value = 0.019). The lowest ranking goes to hypothesis 1 (H1) with an insignificant impact between perceived severity towards females’ breast screening intention.

By adhering to this, perceived benefits and knowledge are the prominent factors that influence and urge females to go for breast screening. As such, females’ knowledge/awareness could be enhanced by organizing more breast cancer awareness campaigns at the public places (shopping malls, public transportation hubs, hospitals, universities) or during sport events (marathon, biking, mountain climbing) (Alotaibi et al., 2018; Chin & Mansori, 2018b;

Table 2. Reliability and validity test

| Item               | Factor loading | Average variance extracted (AVE) | Composite reliability (CR) | Cronbach’s Alpha (CA) |
|--------------------|----------------|----------------------------------|-----------------------------|-----------------------|
| Perceived severity |                |                                  |                             |                       |
| S1                 | 0.779          | 0.587                            | 0.876                       | 0.825                 |
| S2                 | 0.710          |                                  |                             |                       |
| S3                 | 0.844          |                                  |                             |                       |
| S4                 | 0.681          |                                  |                             |                       |
| S5                 | 0.803          |                                  |                             |                       |
| Perceived susceptibility |            |                                  |                             |                       |
| P1                 | 0.752          | 0.643                            | 0.878                       | 0.817                 |
| P2                 | 0.855          |                                  |                             |                       |
| P3                 | 0.767          |                                  |                             |                       |
| P4                 | 0.828          |                                  |                             |                       |
| Perceived benefits |                |                                  |                             |                       |
| F1                 | 0.842          | 0.702                            | 0.904                       | 0.857                 |
| F2                 | 0.906          |                                  |                             |                       |
| F3                 | 0.791          |                                  |                             |                       |
| F4                 | 0.808          |                                  |                             |                       |
| Perceived barriers |                |                                  |                             |                       |
| B1                 | 0.851          | 0.704                            | 0.904                       | 0.874                 |
| B2                 | 0.913          |                                  |                             |                       |
| B3                 | 0.884          |                                  |                             |                       |
| B4                 | 0.692          |                                  |                             |                       |
| Knowledge          |                |                                  |                             |                       |
| K1                 | 0.732          | 0.573                            | 0.843                       | 0.751                 |
| K2                 | 0.841          |                                  |                             |                       |
| K3                 | 0.721          |                                  |                             |                       |
| K4                 | 0.728          |                                  |                             |                       |
| Intention          |                |                                  |                             |                       |
| I1                 | 0.829          | 0.696                            | 0.919                       | 0.890                 |
| I2                 | 0.754          |                                  |                             |                       |
| I3                 | 0.827          |                                  |                             |                       |
| I4                 | 0.866          |                                  |                             |                       |
| I5                 | 0.889          |                                  |                             |                       |
Nyblade et al., (2017). The implementation of these breast cancer awareness campaigns is crucial as it will help to reduce both external and psychological obstacles, refresh the participants’ knowledge, facilitate the breast screening access and guide the members of society at large to the right direction.

Furthermore, breast cancer survivors could be invited to the campaigns/public events to share their experiences or testimonies to the audiences. This is because the experience sharing could inspire, motivate and eventually trigger the female audiences to go for breast screening (Ensan et al., 2018; Sari, 2018; Tamayo et al., 2018). Additionally, health practitioners should guide and perform Breast Self-Examination (BSE) during the breast cancer awareness campaigns and also share with the audiences about other breast screening options such as mammography, ultrasound and Magnetic Resonance Imaging (MRI).

Likewise, breast cancer-related content could be broadcasted on the televisions, along with some posters or brochures exhibited at the waiting area in the hospitals or health-care divisions. This action could encourage the patients to read the brochures during their waiting time and cue them to ask questions upon visiting the doctors. Moreover, health specialists/experts should also motive the patients to take up breast screening during their consultations/routine body check-up by sharing with them about the benefits gained from breast screening. Similarly, the risk of developing breast cancer should also be shared to the patients as some of them are still not aware of their own vulnerabilities towards cancer, such as a family history of breast cancer or symptom occurrence (Morowatisharifabad et al., 2018; Stacey et al., 2016). Furthermore, breast cancer educational strategy could be implemented in secondary schools and universities. Teachers, physical education teachers, school nurses or health workers should emphasize the

| Hypothesis | Sample mean β | Standard deviation | T statistics | P values | Supported |
|------------|---------------|--------------------|--------------|----------|-----------|
| H1: Perceived severity → Intention | 0.006 | 0.034 | 0.094 | 0.462 | No |
| H2: Perceived susceptibility → Intention | 0.128 | 0.031 | 4.122 | 0.000 | Yes |
| H3: Perceived benefits → Intention | 0.208 | 0.047 | 4.519 | 0.000 | Yes |
| H4: Perceived barriers → Intention | −0.084 | 0.039 | 2.081 | 0.019 | Yes |
| H5: Knowledge → Intention | 0.197 | 0.052 | 3.741 | 0.000 | Yes |

Intention’s $R^2 = 0.610$ (61%)

| Hypothesis | Sample mean β | Standard deviation | T statistics | P values | Significant |
|------------|---------------|--------------------|--------------|----------|-------------|
| H6: Cues to action*perceived severity → Intention. | −0.014 | 0.029 | 0.507 | 0.306 | No |
| H7: Cues to action*perceived susceptibility → Intention | −0.035 | 0.032 | 1.147 | 0.126 | No |
| H8: Cues to action*perceived benefits → Intention | −0.013 | 0.044 | 0.370 | 0.356 | No |
| H9: Cues to action*perceived barriers → Intention | 0.047 | 0.029 | 1.712 | 0.053 | No |
| H10: Cues to action*knowledge → Intention | 0.048 | 0.045 | 1.115 | 0.132 | No |
importance of breast cancer early diagnosis to the students, provide them some general health information during classes and instruct the students to discuss their perceptions on the next day.

Paralleling with this, government and health-related policymakers should revise and implement a more affordable breast screening package bundling up with other health-care services, for example, blood test, pap smear, hepatitis B vaccination, pregnancy check-up and many more. Also, breast screening service should be made accessible everywhere, including rural areas (Ganga et al., 2018; Lee et al., 2018). On the other hand, social media (Facebook, Twitter, Instagram, YouTube) should be employed by health-care divisions as breast cancer awareness platform to deliver the intended message to the audiences. For instance, BSE guidance could be shared on YouTube, e-book download websites, e-mail subscriptions and updates for the females who opt-in for the breast cancer information. Breast screening reminder could be done through email notifications, health apps, phone calls/messages to motivate and increase females’ breast screening compliance. Influencers or ambassadors could be invited on breast cancer-related events/activities to deliver the awareness message to the potential target audience, influence them, change their perceptions and eventually, perform breast screening behaviour. Besides that, the consequences of being diagnosed with breast cancer should be consistently reminded to the females in order to prevent them from procrastinating preventive behaviour. To achieve this, health practitioners could highlight its severity through social media, campaigns and during the patients’ routine breast check-up.

Ultimately, throughout the findings in this research, it is suggested that health professionals/practitioners should highly emphasis on the benefits accrued and knowledge towards females’ breast cancer screening intention. This is due to the reason that people nowadays prefer to understand a particular situation first, be motivated, feel comfortable, and subsequently, perform the suggested behaviour willingly. Hence, this study proposes that, with the support of the Health Belief Model, Theory of Planned Behaviour and Social Cognitive Theory, females’ attitude and intention towards breast screening could be more accurately predicted. Given that, a more intensive conceptual framework is the imperative first step to deliver the health message to the right audience, at the right place, with the right approach.

5. Limitations for further research
Mindful of all the above, there are some limitations in this study. First, due to time constraint and financial budget, non-probability sampling approach was selected throughout the data collection process. Thus, with such a limitation, data should be generalised in this research. Besides that, as mentioned earlier, R square of the intention should not indicate the overall prediction of the results. This is because insignificant variables could also influence the figure change of the intention’s R square. On the other hand, another limitation is the research methodology approach selection. In this study, a quantitative approach was selected and this tends to provide unclear and limited information as the report was mainly presented in numbers. Hence, a mixture of quantitative and qualitative approach (interview and focus group) should be adopted in future research.
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