




# Perceived Causes of Cancer and Corresponding Behavioral Changes: A Qualitative Study on Breast Cancer Survivors in Taiwan

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## Abstract

**Objectives:** Breast cancer is the most common cancer among women in Taiwan, and treatment and coping with the disease become prominent features in a survivor's life. Here, we examined Taiwanese survivors' perceived causes of breast cancer, the influence of support networks on their perceptions, and the behavioral changes they made to prevent recurrences.

**Methods:** In this qualitative study, we used an explanatory approach involving semi-structured in-depth interviews based on grounded theory. We recruited (via physician referrals) 29 survivors aged  $\geq 20$  who had received their initial diagnosis at least 6 months earlier.

**Results:** Although the participants had made behavioral changes in many areas of their lives after diagnosis, most still believed that "stress and emotions" were the most crucial factor in causing cancer. They strongly emphasized reducing stress levels to prevent recurrences. However, when maintaining healthy behaviors became stressful, they chose to level off healthy lifestyles for the sake of their emotional well-being. They made career changes to improve their quality of life yet continued to experience a deep fear of recurrence. Adopting behavioral changes leading to healthy lifestyles and following regular follow-ups helped to reduce their anxiety concerning recurrence.

**Conclusion:** The participants' behavioral changes were strongly associated with the perceived causes of cancer. Health-promotion programs aimed at breast cancer prevention should focus on participants' subjective perception of the cause of cancer.

## Keywords

survivorship, cancer prevention, decision-making, healthcare, women

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## Introduction

According to the World Health Organization (WHO), 2.3 million women were diagnosed with breast cancer, and 685 000 women died from this disease globally in 2020. As of the end of 2020, there were 7.8 million women alive who had been diagnosed with breast cancer in the previous 5 years, making this the world's most prevalent cancer.<sup>1</sup> Based on the 2018 annual report of the Health Promotion Association

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(H.P.A.) of the Ministry of Health and Welfare, Republic of China (R.O.C., or Taiwan), female breast cancer became the third-most-common type of cancer among new cases in Taiwan in 2018. Age-standardized breast cancer incidence was 69.1 new cases per 100,000 women in that year, the highest incidence among the leading cancers in women. The 10-year change in breast cancer incidence rates from 2006-2015 was an increase of 46%.<sup>2</sup> Breast cancer is a serious public health concern for women in Taiwan.

The most commonly reported risk factors for breast cancer in Taiwan are inherited factors (eg, mutations in BRCA1 and BRCA2), diet, age of menarche, reproductive history (eg, having given birth or not), hormone replacement therapy (ie, use of combined estrogen and progestin menopausal hormones), use of contraceptive pills, body type, and weight.<sup>3</sup> The Centers for Disease Control and Prevention indicates that treatment involving radiation therapy of the chest or breasts before the age of 30 can increase the risk for breast cancer later in life.<sup>4</sup> The American Cancer Society reported that about one-third of postmenopausal breast cancers are thought to be caused by modifiable lifestyle factors, such as postmenopausal obesity, physical inactivity, use of combined estrogen and progestin menopausal hormones, alcohol consumption, and not breastfeeding.<sup>5</sup> Research shows that people in Taiwan have more access to meat and fats than those in other Asian countries, and larger quantities of such foods in the diet are associated with obesity and cancer.<sup>6</sup> Further, according to Taiwan's cancer registry data, overweight and obese people are 1.6 times more likely to contract breast cancer than people of a healthy or low weight.<sup>6</sup> The association between breast cancer and health behaviors is noted in the medical literature.

However, the illness perceptions of women with breast cancer are significantly associated with major outcomes during the illness. Despite a lack of causal evidence, many survivors believe that stress caused cancer.<sup>7,8</sup> In addition to stress, other themes common in beliefs about the causes of breast cancer among Chinese, Korean, and Mexican American survivors are diet and fatalism.<sup>9</sup> A study conducted in Taiwan reported that survivors tended to attribute cancer to psychological factors or causes associated with local beliefs and practices, such as fatalism, "paying one's debt from a previous life", and stress.<sup>10</sup> Another study found that cancer survivors most frequently reported genetic factors, smoking, environmental factors (eg, pollutants and occupation), and psychosocial factors (eg, stress) as causes of their type of cancer.<sup>11</sup> Respondents underestimated the importance of lifestyle factors that are scientifically known to be associated with increased cancer risk, such as obesity and physical inactivity, and overestimated the importance of stress and environmental pollution.<sup>11</sup> These views differ substantially from those of experts.<sup>11,12</sup>

Different perceptions regarding illnesses lead to different approaches to coping with diseases. Breast cancer survivors commonly experience a range of emotions, which lead to

coping behaviors according to the stage of the process of fighting the disease. During the first stage, from the initial diagnosis until surgery, survivors are in shock, and they require the largest amount of emotional support. They turn to neighbors, family, and friends for information about treatment options. Later, they feel anxious, depressed, or angry, but prepare for their long-term treatment. During this stage, they turn to medical professionals; for instance, they ask doctors for information about rehabilitation, what to do after the surgery, and other healthcare issues.<sup>13</sup> Finally, they change their lifestyles, rebuild their confidence, and increase their physical strength to prevent recurrences.<sup>13</sup> Survivors' behaviors are easily affected by their perceptions of the disease, and studies show that what they believe to have caused cancer leads them to change their behavior accordingly to prevent recurrence. For example, many women report making efforts to improve their diet and manage their stress because they believe that these factors caused cancer.<sup>9</sup> Similarly, some research indicates that women who attribute the development of cancer or its recurrence to health behaviors or stress are more likely to report improvements in diet or physical activity and reductions in alcohol consumption or stress.<sup>7,14</sup>

Information sources and support networks also influence survivors' perceptions. As in comparable research on illness perceptions in other diseases, clinical and sociodemographic characteristics are hardly, if at all, associated with illness perceptions. This is consistent with the self-regulation model, which explains how illness perceptions are shaped and influenced by how people perceive and make sense of the world around them.<sup>15</sup> Chinese people typically have a range of beliefs about the role food plays in the process of cancer. They will not consult medical professionals if they think they will give them advice that conflicts with what they had known from the traditions.<sup>16</sup>

Research shows that family and peer support is associated with health behaviors.<sup>17</sup> For those who are employed and have children, they generally choose to prioritize their families over their work, due to the social expectations placed on women. If they make career changes, factors they must consider include adjusting their expectations about the support they receive from their family members and colleagues, and their ability to manage their work-family balance.<sup>18</sup> It is likely that people with greater resources, such as those who are married or have a partner, have productive support systems that they can readily access to aid their efforts to change their behavior.<sup>19</sup> The presence of family relationships and support networks can help counteract the experience of loneliness and isolation.<sup>20</sup>

People with cancer tend to feel a sense of loss in their lives, even after they have completed their treatment.<sup>21</sup> Being identified as a "survivor" represents several ideas for them, some of which may be contradictory. If they accept the fact that they have survived, it can help them to accept their illness, seek more information about it, and become accustomed to post-treatment life; however, survival of cancer also comes

with the threat of recurrence.<sup>22</sup> The stressors affecting survivors include fear of the future, physical limitations, pain, and problems with family or friends due to cancer. Fear of the future—more specifically, fear of recurrence—is the most severe of these stressors.<sup>23</sup> Some survivors hold fatalistic beliefs and expect the disease to recur and their remaining life to be short. Such beliefs cause them to feel less able to change their behavior, although at the same time they embrace the uncertainties and move on with their lives.<sup>23</sup> To fight against cancer, survivors tend to adjust their lifestyles by adopting a healthier diet, performing regular exercise, or using herbal medicine.<sup>23</sup> Some survivors also focus on other factors and behaviors that are modifiable. To these survivors, undergoing regular follow-ups, eating a healthy diet, adopting a positive attitude toward life, increasing their level of physical activity, and following their doctor's prescriptions are considered the most critical actions for prevention.<sup>14</sup> Ninety-two percent of the participants of 1 study felt that being optimistic plays a crucial role in preventing recurrence.<sup>14</sup>

Few studies focus on the association between cancer survivors' perceived causes of cancer and their parallel behavioral changes. This study aims to (1) examine the perceived causes of breast cancer among survivors in Taiwan, (2) discuss the influence of survivors' support networks on their perceived causes of cancer, and (3) understand how they change their behavior to prevent a recurrence.

## Methods

### *Qualitative Approach*

In this qualitative study, we used an explanatory methodology. We conducted semi-structured in-depth interviews based on the grounded theory,<sup>24</sup> using a well-designed interview guide. This study aimed to understand survivors' behavior and perceptions regarding breast cancer. First, we discuss the context of the formation of survivors' perceptions regarding the causes of cancer to understand how they attribute breast cancer to various causes. We then discuss survivors' behavioral changes and examine the association between these and the perceived causes of cancer, considering the influence of their support networks and information-seeking behaviors. Finally, we examine the survivors' attitudes towards recurrence and how they cope with this threat.

### *Researcher Characteristics and Reflexivity*

Among the researchers in this study are family members of breast cancer survivors, a university medical sociologist, and physicians in a university-affiliated medical center. We designed the study and analyzed the data based on our clinical experiences and experiences as caregivers of people with breast cancer. Further, we engaged in reflexivity by jotting field notes about the participants' comments and the researcher's thoughts during and after the interview.

## Context

We recruited participants for the study via referrals from the study's authors, who are physicians at a university-affiliated medical center. The participants chose the place and time of their interview and made an appointment with the interviewer. Some participants agreed to the interview at the medical center, while others chose places near their homes.

### *Sampling Strategy*

We recruited breast cancer survivors over the age of 20 who received initial diagnosis over 6 months earlier, and lived in Taipei City or New Taipei City, whether they were undergoing treatment or not and regardless of the stage of cancer. Based on the grounded theory,<sup>24</sup> we achieved information saturation after interviewing 29 breast cancer survivors.

### *Statement of Ethical Approval and Informed Consent*

Before recruitment, the study was approved by the Research Ethics Committee (committee approval number: 201807HS004). The participants' written informed consent was obtained before the interviews started. We also ensured that they were fully informed about the study, including its purpose, the research methods and procedures used, and the possible benefits and risks of participating.

### *Data Collection*

*Survey regarding the survivors' perceived causes of cancer.* At the beginning of the interview, the participants were asked to complete a simple survey about the perceived causes of cancer. They selected one or more listed factors and ranked them according to the extent of relevance to breast cancer. The factors listed were common risk factors cited in medical research and studies on survivors' beliefs. They were ordered randomly within the following 4 categories: (1) "women-specific factors," comprising factors commonly perceived as causing breast cancer, such as "inherited factors," "hormone medication," "early menarche or late menopause," and "nulliparity or first childbirth after the age of 30"; (2) "lifestyle factors," comprising "obesity," "eating sugary foods," "physical inactivity," and "not keeping regular hours"; (3) "environmental factors," comprising "prolonged exposure to radiation"; and (4) "psychological factors," comprising "stress or emotions" and "bad luck or fatalism."

If participants wished to specify factors that were not listed, they could write these down. If the participants spoke about other factors not listed in the survey, these would be recorded and analyzed. The "alcohol or cigarette consumption" factor was not included in the survey but was asked about during the interview. The survey was used as an aid for the interviewer and not for quantitative research. After the participants had taken the survey, they were asked why they had selected the factors they had, why these factors were relevant to breast cancer, and how these factors affected or were affected by their lives.

*The interview.* The interview, structured according to the interview guide, was divided into 4 parts: (1) the participants' breast cancer history, including age at initial diagnosis and what kind of treatment they had received; (2) the risk factors the participants had selected, explanations for their answers, and the context of these explanations; (3) lifestyle and behavioral changes, including diet, career, and interactions with others; and (4) influences in the participants' environment, such as how they sought information and how people around them affected them.

At the end of the interview, the participants were asked about their attitude toward recurrence. However, to avoid making them feel uncomfortable, they were asked what they would say to another survivor who was anxious about it. Interviews were audio-recorded with the permission of the participants.

### Data Processing and Analysis

The recordings of the interviews were transcribed verbatim and checked by the interviewer. Field reports were used to record the participants' emotions and body language during the interviews.

Codes representing a category or theme found in the data were inserted directly into the transcripts by attaching them to text segments. The coding process was checked and verified. One of the authors did the coding and created a code book, and all the authors approved the analysis. Linkages among specific categories were fully explored. We analyzed the data based on the grounded theory.<sup>24</sup> We did not use coding software, and we did not measure inter-rater reliability.

## Results

### The Participants' Demographic and Clinical Characteristics

The sample comprised 29 breast cancer survivors aged 39-70 years, with a mean age of 55.48 (Table 1). The mean number of months since their initial diagnosis was 60.03, or approximately 5 years. Of all the participants, 45% were initially diagnosed in their forties and 41% in their fifties. Concerning the cancer stage, 1 participant had stage 0 in 1 breast and stage 1 in the other; all the others had only 1 cancer stage recorded. All the participants had been employed before their initial diagnosis. Regarding marital status, 2 of the participants were single, 1 was married without children, and the rest were married and had raised children.

### Self-Rated Perceived Causes of Cancer and the Corresponding Behavioral Changes

Only about 30% of the participants attributed breast cancer to the risk factors commonly found to cause breast cancer in medical studies, and approximately 50% attributed breast cancer to lifestyle factors (Table 2). Additionally, diet and eating habits featured strongly among the perceived causes, and about

**Table 1.** Participants' demographic and clinical characteristics.

Characteristic	Number (%)
Age at interview	
<40	1 (3)
40-49	4 (14)
50-59	18 (62)
60-69	4 (14)
≥70	2 (7)
Age at diagnosis	
<40	1 (3)
40-49	13 (45)
50-59	12 (41)
60-69	3 (11)
Cancer stage	
0	6 (21)
I	15 (52)
II	8 (27)
Time since initial diagnosis	
<1 year	4 (14)
1-4 years	16 (55)
5-9 years	3 (10)
≥10 years	6 (21)
Marital status	
Single	2 (7)
Married	27 (93)
Employment status before diagnosis	
Employed	29 (100)

31% of the participants mentioned unhealthy eating habits that were not listed in the survey. However, 93% of them considered "stress and emotions" to be the primary cause of breast cancer.

Even though only about 50% of the participants attributed breast cancer to their previous unhealthy lifestyles, most of them reviewed their lifestyle history. They primarily discussed the changes they had made to their stress levels, diet, exercise habits, and daily routines to prevent recurrence and how these factors are closely related. Approximately 76% of the participants had changed their previous habits to healthier ones (Table 2).

### Qualitative Evaluation of the Participants' Attribution and Behavioral-Change Processes

*Adherence to a healthy lifestyle to reduce fear after surgery.* Almost 80% of the participants changed their behavior concerning their diet, exercise habits, routines, and stress, even though not all of them attributed breast cancer to lifestyle factors. For these women, leading a healthy life did not mean solving the problems that had caused their illness; instead, it was a way of managing their anxiety concerning recurrence caused by a wide range of factors. The changes they had made tended to start with whatever was "the easiest and most feasible behavior" (B, 6 years since initial diagnosis) for them to change.

**Table 2.** Participants' ranking of the perceived causes of breast cancer and the associated behavioral-change strategies.

2-1 Survivors' Perceived Causes of Cancer	Number (%)
1. Stress or emotions	27 (93)
i. Career women trying to balance work and family life	
ii. Having the personality trait of perfectionism	
2. Physical inactivity	16 (55)
i. Not developing a habit of regular exercise	
ii. Being too busy to exercise	
3. Not keeping regular hours	13 (45)
i. Staying up late to finish work	
ii. Not going to bed early because of taking care of children	
4. Eating sugary foods	11 (38)
i. Having a preference for sweets	
ii. Eating sugary foods as comfort foods	
5. Other unhealthy eating habits	9 (31)
i. Too much eating out	
ii. High-calorie diet	
iii. Too much starch or protein	
6. Obesity	8 (28)
i. Having an abnormal body mass index (B.M.I.)	
ii. Being unable to keep fit or in shape	
2-2 Survivors' Behavioral-Change Strategies	Number (%)
1. Diet	19 (66)
i. Reduce consumption of processed foods and increase that of raw foods	
ii. Increase vegetable and fruit intake	
iii. Increase protein intake	
iv. Reduce intake of high-fat, high-sugar, and high-sodium foods	
2. Exercise	27 (93)
i. Develop an exercise plan	
ii. Engage in low-impact exercise	
iii. Join an exercise class	
3. Routines	10 (34)
i. Reduce working hours	
ii. Adjust job	
4. Stress release	27 (93)
i. Develop a regular exercise habit	
ii. Change attitude towards life	

*Change in Attitude to Maintaining a Healthy Lifestyle.* However, as time passed after they had made their lifestyle changes, some of the participants reported a shift in attitude toward maintaining a healthy lifestyle:

I used to be aware of sticking to a healthy diet during my therapy. For example, I tried my best to eat raw food. But I have gradually returned to my previous diet 6 months after the treatment. (P, 11 months since initial diagnosis)

After the mastectomy, I went to bed at 10 PM, but now I stay up until 12 AM (X, 2 years and 9 months since initial diagnosis)

Some participants believed that breast cancer should be attributed to many factors and that they would never know what had caused cancer. As a result, they felt that adhering to 1 behavioral change may be pointless:

In the beginning, I tried my best to eat organic food, but as time passed, I forgot to do that because I will never know whether it was a lack of organic food that caused my breast cancer. (E, 14 years since initial diagnosis)

Some of the participants believed that regular follow-ups were the most effective way to prevent recurrence:

After I finished the 2-year hormonal therapy, I returned to my previous lifestyle from before I was diagnosed with breast cancer. And I held a party to celebrate my surviving breast cancer for 5 years. For me, regular follow-ups are best for relieving the anxiety about recurrence. (B, 6 years since initial diagnosis)

On the other hand, even after the shock of being diagnosed with breast cancer disappeared, most participants still tried to manage their stress levels and lead happier and more comfortable life. Their beliefs that stress was responsible for both the occurrence and the recurrence of cancer were more substantial than their beliefs that lifestyle factors were responsible:

I became more relaxed and loved myself more. Now I do whatever I want to do instead of what I should do. For example, I eat something simply because I want to eat it, not because I should eat it. (I, 2 years since initial diagnosis)

*Preference for professional advice over popular opinion regarding managing post-cancer life.* The participants sought all sorts of information about breast cancer to improve their understanding of the illness and healthcare options. The participants trusted medical professionals such as doctors, nurses, and nutritionists the most, and these professionals provided them with information mainly about treatments. When they encountered conflicting information from different sources, the participants chose to believe the medical professionals' knowledge:

The nurses explained a lot about my therapy and healthcare. They seemed to have a lot of relevant experience with breast cancer cases, which increased my confidence in fighting against breast cancer. (C, 10 years since initial diagnosis)

I didn't look for the information myself! I just took the doctor's advice. If I have questions, I still go to the hospital. (G, 22 years since initial diagnosis)

Support networks also impacted the participants' perceived causes of cancer and their behavioral changes depending on their roles. Most of the participants' family members and close friends had shared their thoughts about what had led to breast cancer and what the participants should do. The participants exhibited a significant degree of autonomy in managing their lives. Some of the relevant responses are as follows:

My sister often shares information like "what kind of foods fight cancer most effectively." (F, 10 years since initial diagnosis)

I had grown up and needed to take responsibility for myself, so my family and friends just told me to take care of myself after they knew I had breast cancer. Sometimes they ask me how I am, and I tell them I attend follow-ups on my condition regularly, so they don't worry so much. (K, 3 years since initial diagnosis)

People around me show more concern about my health status. They don't discuss the causes with me. (T, 1 year since initial diagnosis)

**Career and environment change.** Most of the participants who attributed cancer to stress reported that their career was the primary source of their stress. Now that they needed to take better care of themselves, they had taken action in various ways to reduce their stress levels. For example, some participants were close to the legal age of retirement, so they took early retirement:

I was experiencing substantial side effects from the chemotherapy, and I was so weak that my son told me not to work. (I, 2 years since initial diagnosis)

Alternatively, if they continued working, they changed their work environment by asking for a transfer to reduce their workload, or they reduced their number of working hours to ensure a better balance between their health and their working life:

After finishing my therapy, I went back to my previous job. But I felt a bit overloaded after a year, and I was scared of recurrence. So I left that company and moved to my current job. (F, 10 years since initial diagnosis)

I asked for a transfer to another department where I wouldn't need to rush my work. (AB, 2 years and 11 months since initial diagnosis)

However, some of them were unable to change their working situation for economic reasons. Instead, they tried to reduce their stress levels by adopting other behavioral changes:

My stress came from my work, but it's a bit hard for me to quit my job. If I can make additional changes to lead a better life, I will try my best. (A.C., 2 years since initial diagnosis)

I couldn't change my schedule or the pace of my work, so I decided to change my attitude toward it. I usually ask myself to take a deep breath when I need to deal with a considerable amount of work. (E, 14 years since initial diagnosis)

**Fear of recurrence.** Although most of the participants had actively changed their behavior to reduce their risk of recurrence, some of them nevertheless expressed anxiety and fear concerning recurrences because of the uncertain nature of cancer:

I think my breast cancer has cast a shadow on my mind. I don't feel confident that cancer will not return. (A, 7 years since initial diagnosis)

For a while, I refused to think about recurrence. I even thought about how I would die. I thought it would be due to accidents or diseases. (M, 1 year and 11 months since initial diagnosis)

Most of the participants remained optimistic, however, and were trying to live their lives to the full rather than be anxious about something uncontrollable:

I don't worry about recurrence because cancer cells always exist in human bodies. I think it was stress that stimulated the growth of the cancer cells, not that the cancer cells showed up from nowhere. So just stay positive and relaxed! Don't worry too much! (S, 4 years since initial diagnosis)

It is so difficult to stop thinking that recurrence might happen! I can't control all the things happening to me. If all this is predestined, I can only accept it. (Y, 2 years and 9 months since initial diagnosis)

**Sense of loss.** In addition to fear of recurrence, some participants experienced a sense of loss. Some relevant responses are as follows:

Follow-ups are just like annual exams. At first, I couldn't accept what I had become (a breast cancer patient), but now I do. However, now I have this added worry about recurrence and other side effects, and I feel a bit stressed about it. (J, 2 years and 3 months since initial diagnosis)

I feel like I'm waiting for a death sentence during follow-ups. Since I was diagnosed with breast cancer, I have not and never will be a healthy person. (W, 3 years since initial diagnosis)

It is well said that we never know which will come first—tomorrow or accidents. Sometimes we can't control our schedules. (X, 2 years and 9 months since initial diagnosis)

They used to be confident with their health and physical strength, but since their diagnosis, they have lost control of their health. Even if the shock of being diagnosed with cancer had faded over time, and even though they had reviewed their previous lifestyles and adjusted their behaviors and



environment, the participants often felt uncertain about their future. “Nothing is permanent in life” had become their motto. As a result, they had learned to seize the day.

**Fear management by different coping strategies.** The participants’ most crucial and practical approaches to preventing recurrence can be divided into 3 categories. First, they maintained good habits to ensure a healthier environment for their body’s cells:

I exercise, reduce my intake of sweets, and stick to a more regular routine, which are feasible and controllable ways to manage my health. (D, 3 years since initial diagnosis)

I would rather know how I would die instead of receiving a horrible shock, and I found that learning about breast cancer helped to reduce my anxiety. Therefore, I concentrate on what I can and want to do instead of worrying about the uncertainties in the future. (X, 2 years and 9 months since initial diagnosis)

Second, they found that remaining positive and relaxed was indispensable; reducing their stress levels improved their mental health, which may also have promoted their physical health:

Let go of thinking about death! (H, 10 years since initial diagnosis)

Embrace and love yourself more! Don’t care too much about what others think about you or their opinions. (I, 2 years since initial diagnosis)

Finally, they felt that regular follow-ups helped to ease their uncertainties and anxieties:

I think cancer screenings are the most important. I recommend that breast cancer survivors and those with a family history of cancer or belonging to high-risk populations have cancer screening examinations. Therapies have improved a lot. Early diagnosis can improve one’s chance of a full recovery and leading a good life. (J, 2 years and 3 months since initial diagnosis)

However, we found that while the participants were likely to make optimistic statements during the interview, they thought in other ways. For example, participant O admitted that she hoped it would not be that long until the next follow-up visit so that she could check the report less often. In addition, after the interview, participant Q sighed about contracting many diseases, and participant A emphasized her anxiety and concern about recurrence and hoped she could understand more about the illness.

## Discussion

Similar to the findings in previous studies,<sup>7,8</sup> more than 90% of the participants felt that “stress and emotions” had played an

essential role in causing breast cancer and changed their health behaviors accordingly. However, what they have done seems to contrast with what the medical expert suggested: lifestyle-related factors were the key to cancer causation.<sup>11,12</sup> Further, even though some of the participants did not believe that an unhealthy lifestyle had caused breast cancer, they nevertheless reviewed their lifestyles carefully after their diagnosis and adjusted them to become healthier to reduce the risk of recurrence.

The participants’ behavioral changes, however, seemed to parallel the perceived causes of cancer less than in previous studies.<sup>7,9,14</sup> For them, leading a healthy life did not merely mean solving the problems that had caused the illness; instead, it was a way of managing their anxiety concerning recurrence caused by a wide range of factors. This situation confirmed the finding that because of improvements in breast cancer detection and survival in recent years, breast cancer patients are usually diagnosed in the early stages and then face late toxicities in later years.<sup>20</sup> Physical problems such as fatigue and functional disability, as well as psychosocial issues, due to the illness and its aggressive treatment often continue for years. Therefore, breast cancer was viewed as a chronic illness, as was the case in other studies.<sup>25,26</sup> Most of the participants perceive their illness not so much as temporary but more as a chronic condition. They still believe the illness was never over, even though a substantial proportion of our sample had been diagnosed more than 5 years previously.<sup>27</sup>

Most participants considered breast cancer to be uncontrollable and more strongly related to psychological factors than an unhealthy lifestyle. Crucially, they still had a deep sense of loss, fear of recurrence, and impression of breast cancer as a fatal disease.<sup>21</sup> Before their diagnosis, they had been confident in their health and physical strength, but at the time of the interviews, it seemed to them that they would suffer from anxiety for the rest of their lives. As stated above, most participants of this study and others viewed breast cancer as a chronic illness. Since their initial diagnosis, they had faced various negative emotions, including stress related to their work or family life, anxiety concerning the uncertainty of life, fear of recurrence, and a sense of loss. The combination of these negative feelings created new stress, and the participants would always have to manage this. More importantly, based on our field notes, some participants may have been reluctant to reveal their anxiety and worries about recurrence. Nardin et al.<sup>20</sup> stated that the experience of anxiety and fear related to the perceived risk of disease recurrence and death is expected in 20-30% of patients. More research is required to investigate cancer survivors’ perceptions and attitudes toward the uncertainties of life and recurrence.

Even though some participants held fatalistic beliefs about the disease recurring and ending their lives prematurely, such views also led them to embrace the uncertainties and move on with their lives simultaneously.<sup>23</sup> Our study confirmed previous findings that the negative thought patterns that emerge immediately after primary care affect the survivors’

psychological traits, but these women ultimately return to more positive thought patterns in their daily lives, improving their psychological wellness.<sup>28</sup> Some participants believed that remaining optimistic played a crucial role in preventing recurrence, as has been found previously.<sup>14</sup> Therefore, uncertainties concerning the future positively and negatively affected the participants' mental health. This finding confirms a previous result that breast cancer survivorship is one of the most challenging aspects to address in dedicated clinical follow-up settings.<sup>20</sup> Early detection and high survival rates increase the complexity of breast cancer survivors' perceptions.

Behavioral change leading to a healthier lifestyle, together with regular follow-up visits, helped to reduce the survivors' anxiety concerning recurrence. The changes they made tended to begin with the ones that would be easiest and most feasible for them. However, although many took active steps early to prevent a recurrence, as time went by and the shock of the diagnosis faded, some of them reduced their efforts. This result confirmed that the sustainability of behavioral changes remains a critical issue in behavioral research.<sup>29</sup> Nevertheless, the participants had achieved a new balance in their post-cancer lives, which may have been an improvement relative to their pre-cancer lives. Nevertheless, of all the perceived risk factors, the participants were most concerned about the impact of stress. Whatever unhealthy behaviors they had previously exhibited, they all strove to manage their stress. Coping with stress was a common strategy for them, even though medical literature evidenced that maintaining physically active, a healthy weight, and avoiding smoking and excessive alcohol use can reduce the risk of cancer recurrence.<sup>30-33</sup> The health-promotion programs aimed at breast cancer prevention should focus on the impact of lifestyle factors on the likelihood of contracting breast cancer. Interventions could also focus on reducing distress and emotional problems by discussing the perceived chronicity of the illness and its impact on patients' lives and by resolving possible misconceptions.<sup>27</sup>

Concerning their working lives, because of the social expectations placed on women, it was difficult for the participants to find a balance between their health, family lives, and career. Fortunately, our study participants had a considerable amount of autonomy for the health-related behaviors they considered responsible for breast cancer. They also trusted medical professionals more than other sources of information or opinions about their illness. When the participants encountered conflicting views regarding their healthcare and treatment, they chose to take the professionals' advice rather than that of traditional healthcare providers, which is a marked difference from a previous study on Chinese women with breast cancer.<sup>16</sup> However, most of the participants had family members and close friends who provided emotional support, showed concern about their health status, and discussed health-related issues with them. Although some of them shared their thoughts about what had caused the breast cancer and what the participants should do, the participants exhibited a significant degree of autonomy in managing their

lives. In this respect, these participants were more independent than participants in previous studies.<sup>15,16,18</sup>

A sense of achievement had helped to build their confidence, enabling them to move on, and it somewhat counterbalanced their sense of loss and their anxiety about cancer recurring. However, it could be that the participants' high level of autonomy made it difficult for them to adhere to their new healthier lifestyles. A study based on Japanese breast cancer patients found that irrespective of whether the patients were in the perioperative period or not, those who had emotional support from family and friends had better psychological well-being.<sup>34</sup> Hence, when designing long-term health-promoting programs involving follow-up care for breast cancer survivors, experts should consider the impact of social support on survivors. Behavioral changes to adopt healthier lifestyles may be more effective with higher levels of emotional support.

Overall, the participants put the most strong emphasis on "stress and emotions" as being responsible for both the occurrence and the recurrence of breast cancer. Indeed, when maintaining a healthier lifestyle became a source of stress, they chose to return to their previous behaviors to increase their enjoyment of life. In the abovementioned Japanese intervention study,<sup>34</sup> the researchers helped the patients to establish their own specific goals for resolving their problems or concerns rather than suggesting general coping strategies. When people can practice self-determination (rather than being told what to do), they experience a greater sense of choice concerning their actions and less conflict and pressure, which helps patients to modify their behaviors and develop a more positive attitude.<sup>34,35</sup> Nevertheless, a prospective cohort study in Japan failed to find any significant association between the psychological traits examined and breast cancer incidence; the authors concluded that those psychological traits are unlikely to be an essential risk factor for breast cancer.<sup>36</sup> On the other hand, another study found that causal attributions to certain breast cancer risk factors may have beneficial effects on the patient's later psychological state.<sup>37</sup> Further research is necessary to confirm the potential benefits of forming causal attributions to risk factors.

However, breast cancer survivors' most appropriate coping strategies vary across cultures and settings. A study that explored the coping strategies of Chinese American, Korean American, and Mexican American breast cancer survivors revealed that "benefit finding" was more commonly referenced as a coping strategy by the Chinese American survivors than by the 2 other groups.<sup>38</sup> Coping models must therefore consider the diversity of cancer survivors and the variability in coping strategies among different ethnic groups.<sup>38</sup> As another example, studies that included breast cancer survivors in Japan, the Netherlands, and Indonesia found that Indonesian participants focused much less on personal and treatment control than the other 2 groups.<sup>39</sup> Furthermore, cultural differences in beliefs about the efficacy of various treatments shape patients' illness perceptions.<sup>40</sup> Therefore, further research on cross-cultural relationships between illness perceptions and effective coping strategies is required.



This study has some limitations. First, the research focused on survivors' subjective perceptions concerning the causes of cancer and subsequent behavioral changes. Still, it was impossible to verify whether the participants had changed their behavior immediately after identifying the perceived causes of cancer, as stated during the interviews. This question remains unresolved and requires further study. Additionally, we did not include genetic testing in the interview guide, which could have changed their perceptions. Second, the participants were recruited via physicians' referrals, so they presumably tended to be active in their healthcare, information-seeking, and behavioral change. They probably had more faith in modern medicine than in alternative therapies. The study thus necessarily excluded survivors who refused to participate or had turned to alternative treatment and had little faith in modern medicine. Therefore, we were unable to evaluate the connection between these survivors' perceived causes of cancer and their behavioral change, and the study population was subject to a selection bias. Third, this was a qualitative, retrospective study that aimed to provide more detail concerning and explanations of the survivors' perceptions and behaviors. However, quantitative research is required to develop causal explanations for the relationships between survivors' perceptions and behavioral changes. Finally, this study focused on breast cancer survivors in Taiwan. The generalizability of the findings to other patient populations and cultural contexts is unclear and requires further research. Further, all the participants came from either Taipei City or New Taipei City, where medical resources are highly accessible. Whether the accessibility of medical resources affects survivors' illness perceptions should also be explored.

## Conclusion

The breast cancer survivors' behavioral changes were strongly associated with the perceived causes of cancer. Most of them had improved their health behaviors to minimize the risk of recurrence, whether this affected their diet, exercise habits, routines, or career. However, they attributed their illness mainly to "stress and emotions," so they searched for ways to reduce the stress levels that were most feasible for them. In general, they sought advice from medical professionals. Nonetheless, when they found that improving their health behaviors became stressful, they chose not to maintain their new healthier lifestyles for the sake of their emotional well-being. Health-promotion programs aimed at breast cancer prevention should focus on the association between lifestyle factors and the risk of breast cancer and consider the application of these findings to different cultural contexts.

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## Ethical Approval

Before recruitment, the study was approved by the Research Ethics Committee of National Taiwan University (committee approval number: 201807HS004).

## Statement of Informed Consent

Written informed consent was obtained from the participants for their anonymized information to be published in this article.

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