



# Personality Types as Predictors of Breast Cancer Screening Compliance in Korean Patients: A Mixed-Method Approach

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**Objective** The purpose of this study is to identify personality types that can influence breast cancer screening (BCS) compliance among Korean women with breast cancer using a mixed-method approach.

**Methods** The participants consisted of 93 women who underwent surgery for breast cancer between July 2010 and March 2012. The demographic and medical characteristics of the participants were evaluated through structured interviews. To identify personality types, in-depth interviews were performed and the transcribed interviews were evaluated using interpretive phenomenological analysis. The participants were categorized into two groups (compliance and non-compliance) based on compliance with the Korean Breast Cancer Society recommendations for BCS.

**Results** Five personality types were identified through phenomenological analysis. There were significant differences in the chi-square test results for the BCS compliance and non-compliance groups according to age ( $p=0.048$ ), cancer stage ( $p<0.001$ ), and personality types ( $p=0.018$ ). Logistic regression showed that the odds ratio for compliance with BCS was 9.35 ( $p=0.01$ ) for individuals with a cautious-organized personality type, 9.38 ( $p=0.02$ ) for those with a cautious-dependent personality, and 10.58 ( $p=0.04$ ) for those with a sensitive-downcast personality compared to those with a cautious personality type.

**Conclusion** Participants with cautious-organized, cautious-dependent, and sensitive-downcast personality types were less likely to follow the BCS recommendations than those with a cautious personality type. This study provides a basis for the future development of an effective questionnaire to investigate the personality types of individuals with breast cancer in order to predict compliance with BCS.

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**Key Words** Breast cancer screening, Compliance, Mixed-method approach, Personality type.

## INTRODUCTION

Breast cancer is the second most prevalent cancer among Korean women, accounting for 18.9% of cancer prevalence in Korean women in 2015.<sup>1</sup> Breast cancer incidence is steadily rising, from 26.3 cases per 100,000 in 2000 to 88.1 cases per 100,000 in 2015. In 2016, breast cancer had the highest incidence of all cancers among Korean women.<sup>2</sup>

There are many factors that contribute to the increased incidence of breast cancer. Some of them are related to the west-

ernization of traditional lifestyles, leading to increased fat intake and obesity. Other factors include exposure to hormone-related risk factors.<sup>3</sup> However, the age of diagnosis differs in Korea compared to that in western countries: the incidence of breast cancer in women under the age of fifty is much higher in Korea. The importance of early detection has been strongly emphasized in Korea because breast cancer is often curable when detected at an early stage, and because the incidence is high in younger Korean women.

Since 1999, The National Cancer Screening Program (NCSP) in South Korea has provided free screening services for the five most common cancer subtypes in Korea, which includes breast cancer, for Medical Aid recipients and National Health Insurance (NHI) beneficiaries. In South Korea, over 99% of people are beneficiaries of NHI or Medical Aid. Consequently, almost every South Korean woman over the age of 40 receives a free mammography screening every two years.<sup>4</sup> According to the Korean National Cancer Screening Survey, the

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introduction of free screening has led to a steady increase in breast cancer screening (BCS) for Korean women. Specifically, the lifetime screening rate increased from 55.9% in 2004 to 83.1% in 2013.<sup>5</sup> Moreover, higher screening rates have correlated with increased relative survival rates, which underlines the effectiveness of free screening in Korea compared to other countries.<sup>3</sup>

The health belief model (HBM)<sup>6</sup> is the most commonly used theoretical framework for examining variables related to women's beliefs about breast cancer and screening behaviors. An extensive review of related literature identifies some common themes. Women who undergo BCS share certain characteristics including younger age, higher level of education, and higher socioeconomic status. They also tend to be more realistic, more accepting of life's limitations, have more health-promoting behaviors, and are more informed about BCS guidelines.<sup>7-9</sup> Women who do not undergo BCS tend to view the screening clinic as a place of risk, are afraid that the screening will detect cancer, and feel that screening is unnecessary.<sup>10,11</sup> However, many of the variables associated with non-compliance remain unexplained.<sup>12</sup>

It has been argued that there are consistencies in how people respond to certain situations and that personality types are relatively stable across place and time.<sup>13</sup> Familiarity with these personality traits can help physicians predict how a psychologically well-functioning individual will typically react to a stressful, anxiety-producing situation, such as a cancer screening.<sup>14</sup> The personality types that might be useful for explaining health-related behaviors were therefore investigated in this study. In most studies, personality measurements are based on self-reporting via questionnaires.<sup>15-18</sup> However, this approach is insufficient for the in-depth analysis that is essential when exploring personality types. Interviews are considered more reliable and valid diagnostic tools for personality assessments because unclear, inconsistent, or defensive responses can be clarified.<sup>19</sup>

There are few studies on the relationship between personality types and BCS compliance using interviews. This scarcity of empirical studies underscores the difficulty of capturing the construct of personality types in clinical-psychiatric empirical research. Qualitative research approaches are needed for more direct assessments of personal identity using narratives.<sup>20</sup>

The goal of this study is 1) to analyze the personality of individuals with breast cancer using a qualitative research approach, and based on these results, 2) to evaluate the influences of personality types on BCS compliance through quantitative analysis. This mixed-method approach will help researchers categorize the personalities of individuals with breast cancer in the real world and to quantitatively study the correlation between specific personality types and BCS compliance.<sup>21,22</sup>

## METHODS

### Participants

The cohort consisted of 105 women newly diagnosed with breast cancer who underwent surgery and participated in the psychodynamic-psychotherapeutic intervention program at the Kyungpook National University Hospital between July 2010 and March 2012.

Patients were eligible to participate if they met the following inclusion criteria: were diagnosed with primary breast cancer, underwent breast surgery, had no other major disabling medical or psychiatric conditions, were women aged 30 years and over, were able to give written informed consent, and were able to read and write Korean. This study was approved by the Institutional Review Board of Kyungpook National University Hospital (KNUH IRB file no. 2012-07-020). All participants provided written informed consent after the study had been fully explained. Overall, 93 women were included in the analysis after excluding 12 women who had a history of psychiatric disorders.

### Data collection

#### Structured interview for demographic

Chart reviews were performed to obtain information about the cancer stages of the participants. The following topics were covered in a pre-interview: age, education level, marital status, current employment status, past medical or psychiatric history, family history of breast cancer, and compliance with BCS. An investigator who was not involved in the in-depth interview portion of the study performed this pre-interview.

#### Evaluation of compliance with BCS

The Korean Breast Cancer Society offers early screening recommendations for breast cancer.<sup>3</sup> The recommendation for women aged 30 years and over is to perform monthly breast self-examination (BSE). Women aged 35 years and over should undergo a biennial clinical breast exam (CBE) by a health professional with monthly BSE. Starting at age 40, women should have a CBE and mammography every 1 or 2 years, with monthly BSE. During the pre-interview, the participants answered questions about past BCS behaviors at various ages. The respondents were then sorted into compliance and non-compliance groups.

#### Compliance group

Those who are informed about the BCS recommendations and followed the recommendations correctly. In the pre-interview, participants were asked the following question, "How often did you perform the breast self-examination for last 5

years?” If the answer was either ‘almost every month’ or ‘more than once every two months,’ they were considered as compliant to the BSE.

Participants were also asked an age-dependent question. Participants who were less than 40 years of age were asked “How often did you go to a clinic for breast exam in last 5 years?” Participants who were greater than or equal to 40 years of age were asked “How often have you gotten a clinical mammogram performed since turning 40 years of age?” If the participant answered, ‘more than once every two years,’ they were considered compliant to the clinical CBE or mammography.

#### *Non-compliance group*

Those who are informed about the recommendations but did not follow the recommendations correctly or had never undergone a BCS.

### **Assessment of personality type**

#### *Interview settings*

One psychiatrist with expertise in analyzing personality interviewed the participants for about one and a half hours. The interviews were conducted in a private room at the hospital. The interviews were analyzed to identify participant personality traits and understand their psychodynamics.

In addition, the interview was conducted in a psychotherapeutic manner leading to uncovering personality traits. All participants agreed to allow the interviews to be audiotaped and transcribed verbatim.

### **The phenomenological approach**

Phenomenology is a research method used to gain an understanding of personality types based on participants’ experiences. Phenomenology is the study of phenomena, meaning structures of consciousness as experienced from the first-person point of view.<sup>23</sup> This method can be used to uncover the ‘essential structure of phenomena.’<sup>24</sup> In a Husserlian phenomenological study, researchers are required to place their own ideas in ‘brackets,’<sup>25</sup> which means that the interviewer should withhold explicit knowledge, judgments, and experiences during the patient interview to allow participants to describe their experiences without influence from interviewer bias. This reductive process was applied throughout the study in order to elicit a pure and rich description of the phenomenon. The ‘revealed personality traits’ were captured from the interview and analyzed with a phenomenological approach.

### **Interpretative phenomenological analysis**

Methods for the analysis of descriptive phenomenology were developed by Colaizzi, Giorgi, and Van Kaam, and are all based

on Husserl’s philosophy.<sup>26-28</sup> The goal of these methods is to find common patterns among the experiences shared by individuals across specific instances. Van Kaam’s method was selected because it works well for moderate to large amounts of data.<sup>29</sup> The method includes a subtheme and theme, and the categories are defined using refined expert language rather than participants’ literal expressions; hence, the method requires the confirmation of intersubjectivity by expert judges.<sup>30</sup>

Following a review of the literature about personality, Cloninger et al.’s Temperament-Character dimensional approach, which consists of four temperament dimensions (novelty seeking, harm avoidance, reward dependence, persistence) and three character dimensions (self-directedness, cooperativeness, self-transcendence) was also selected.<sup>31-33</sup>

Before analysis, the recorded interviews were extensively reviewed and the contents were directly transcribed without adjustments. Next, the contents were analyzed as follows:

1) Preliminary groups were created based on the descriptive expressions of participants.

2) Concrete, vague, and overlapping expressions were summarized under more descriptive terms. Intersubjective agreement among expert judges was necessary for this step.

3) Elements that were not inherent to the phenomenon being studied were eliminated. A hypothetical identification and description of the phenomenon was developed. In this step, the Temperament-Character dimensions (Cloninger et al.<sup>31-33</sup>) were applied. The contents were classified according to ‘Temperament-Character dimensions (Cloninger et al.<sup>31-33</sup>)’ due to various advantages of the concept. Cloninger’s theory of personality has been broadly applied to a number of important topics over the last 30 years.<sup>34</sup> Considering variations in ‘normal personality,’ the concept suggests that people from culturally diverse societies manifest similar personality traits. In addition, the concept’s dimensional approach improves both the diagnostics of personality disorders and understanding of normal or deviant behaviors.<sup>35</sup> These theoretical characteristics fit well with our research.

4) Three groups of participants with similar temperaments were identified through application of Cloninger’s temperament cube model. Due to character dimension differences in one group with the same temperament (Cautious), Cloninger’s character cube was applied to the group to create three subgroups and personality types were defined based on all groups. The name of each personality type was based on Cloninger’s cube designation, with the character dimension following the temperament dimension. If a group with a certain characteristic was not apparent, the characteristic was omitted.<sup>36</sup>

5) Hypothetical descriptions were applied to randomly selected cases from the sample.

6) Finally, five categories of personality types were identi-

fied representing common character/temperament dimensions in the participants.

The results obtained from the Van Kaam's analysis were translated from Korean into English and consensus regarding the translated version was established.

**Statistical analysis**

Data were analyzed using the statistical package SPSS Statistics (IMB), version 12.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were obtained for the sociodemographic and clinical characteristics.

The chi-square test was used to compare differences between the two groups related to compliance with BCS. Bivariate logistic regression was carried out to identify predictive factors for the likelihood of being in the non-compliance with BCS group, beginning with variables that were found to have significant differences in the chi-square test. Significance was set at the 0.05 level. To select the independent variable and confounder of the logistic regression model, we used a more re-

laxed Type I error rate ( $p \leq 0.25$ ).<sup>37</sup>

**RESULTS**

**Participants' sociodemographic and medical characteristics**

The total number of participants was 93 and the mean age was 50 (range: 31 to 70, SD=7.15). The majority of participants were married (76.3%), unemployed (59.1%), had a high school education or less (80.6%), had no breast cancer family history (88.2%), and had no other medical comorbidities (53.8%). There were 58 women (62.4%) in the non-compliance with BCS group (Table 1).

**Personality types of the participants**

Five personality types were identified using Van Kaam's qualitative research method: cautious-organized [n=35 (37.6%)], methodical [n=23 (24.7%)], cautious-dependent [n=19 (20.4%)], cautious [n=8 (8.6%)], and sensitive-downcast [n=8 (8.6%)]

**Table 1.** Sociodemographic and medical characteristics and results of chi-square test in compliance and non-compliance groups

Variables	Compliance (%)	Non-compliance (%)	Total number (%)	Chi-square p
Age (yr)				0.048*
30-39	1 (14)	6 (86)	7 (7.5)	
40-49	14 (36)	25 (64)	39 (41.9)	
50-59	19 (51)	18 (49)	37 (39.8)	
>60	1 (10)	9 (90)	10 (10.8)	
Education				0.471
<High school	18 (35)	33 (65)	51 (54.8)	
High school	8 (33)	16 (67)	24 (25.8)	
>High school	9 (50)	9 (50)	18 (19.4)	
Marital status				0.278
Single	0 (0)	3 (100)	3 (3.2)	
Married	30 (42)	41 (58)	71 (76.3)	
Divorce/separated	3 (33)	6 (67)	9 (9.7)	
Widow	2 (20)	8 (80)	10 (10.8)	
Current employment				0.464
Employed	15 (39)	23 (61)	38 (40.9)	
Unemployed	20 (36)	35 (64)	55 (59.1)	
Cancer stage				0.0001*
Stage 0, 1	32 (76)	10 (24)	42 (45.2)	
Stage 2, 3, 4	3 (5)	48 (95)	51 (54.8)	
Comorbidity of medical illness				0.285
No	19 (44)	24 (56)	50 (53.8)	
Yes	16 (32)	34 (68)	43 (46.2)	
Family history of breast cancer				0.398
No	30 (37)	52 (63)	82 (88.2)	
Yes	5 (45)	6 (55)	11 (11.8)	
Total BCS compliance	35 (37.2)	58 (62.8)	93 (100)	

\*p<0.05. BCS: breast cancer screening

**Table 2.** Results of Van Kaam's analysis

Significant statement	Subtheme	Theme	Cluster
<b>1. Cautious-organized personality type (N=35)</b>			
I prefer to be uncomfortable rather than to disregard the suffering of others.	Responsibility	High persistence	Cautious-
Since my husband passed away 10 years ago, I have raised my children. Due to a sense of responsibility, I have worked more than others.	Self-sacrificing	High reward dependence	organized
I cannot afford to take care of myself because I must care for other family members.	Hard-working	High self-directedness	Personality
My mother was a harsh and cold person. I tolerated my mother's character because I was the eldest daughter. She took her martial problems out on me. It seems that my husband treats me like his mother. It is a kind of repetitive history and it is my duty to be tolerant.	Warm	High cooperative	
My husband is dependent on alcohol and causes trouble such as violence and financial difficulties. Because I worry and want to protect my children from these problems, I have endured all his alcohol-related problems by myself.	Self-sacrificing	Low novelty-seeking	
My mother passed away when I was very young. My older sister and brother left home early. When I was still a child, I was the head of the household and took care of my younger brothers. After marriage, I am still the head of the household because of my husband's incompetence.	Perseverant	High harm avoidance	
	Responsibility	Low self-transcendent	
	Tolerant	High persistence	
	Responsibility	High reward dependence	
		High self-directedness	
<b>2. Methodical personality type (N=23)</b>			
I always think that I should behave well and I earnestly attempt to do that.	Conventional	High persistence	Methodical
I cannot compromise. I never accept anything that I think is wrong.	Reserved	High self-directedness	personality
I tend to take more time than other people to make decisions because I consider too many things.	Rigid	Low novelty-seeking	
I am obsessed with achievement. I become anxious when I am doing nothing.	Overachiever	Low reward-dependence	
I am desperate to perfectly fulfill my roles as worker, wife, and mother. I know I am always overloaded but I cannot give up my perfectionism.	Industrious	High harm avoidance	
Since I was 6-7 years old, I watched my parents' obsessive behaviors. They kept cleaning until they found no dust.	Perfectionism	High persistence	
That has had an enormous effect on me. I continuously check things and pursue perfectionism.	Checking	High self-directedness	
Over the past 3 years, I have thrown all of my energy into my work to be the best at my job. I cannot afford to pay any attention to my health.	Perfectionism	High harm avoidance	
I always have to plan ahead. If work does not go according to plan, I start to become anxious and depressed.	Hard working		
	Cautious		
<b>3. Cautious-dependent personality type (N=19)</b>			
I am fearful and very conscious of others so I do not insist on what I want.	Sensitive to social cues	High reward dependence	Cautious-
I always try to please others. People seem to think of me as a very supportive person.	Passive	High cooperativeness	dependent
My mother is very critical so I am always conscious of her opinion. I have been submissive.	Fear of abandonment	Low novelty seeking	personality
I am afraid of being abandoned.	Dependent	High harm avoidance	

**Table 2.** Results of Van Kaam's analysis (continued)

<p>Until I graduated university, my mother bought my clothes. I am married to the man that my mother wanted me to marry. I cannot express any disagreement due to fear of my mother's disappointment. I become very distressed when I have to lead and be responsible for something. I always ask my husband and my children to perform these duties for me. I am timid. My husband handles everything. He even did my breast self-examination for me.</p>	<p>Submissive Not resourceful Dependent Inactive Inept</p>	<p>Low persistence Low self-directedness Low self-transcendent</p>
<p>4. Cautious personality type (N=8)</p>		
<p>I worry about things before they happen.</p>	<p>Anxious</p>	<p>High harm avoidance</p>
<p>I get easily stressed out over very small things, like other people's reactions.</p>	<p>Easily fatigued</p>	<p>Low novelty seeking</p>
<p>I cannot concentrate on work because of worrying, so I only finish work when the deadline is imminent.</p>	<p>Sensitive to social cues</p>	<p>High reward dependence</p>
<p>I worry a lot and suffer from nightmares frequently.</p>	<p>Not carefree</p>	<p>Low persistence</p>
<p>Although I finish important tasks and promised obligations, it usually takes me a long time to finish because of hesitation stemming from excessive worrying about the results.</p>	<p>Anxious</p>	<p>High harm avoidance</p>
<p>I visited the local clinic because I found lumps in my breasts. Although a general doctor recommend that I visit the hospital for further evaluation, I delayed due to fear of cancer.</p>	<p>Avoidant</p>	
<p>My father had alcohol dependence. He was very violent and aggressive when he got drunk. I was always petrified. Actually, I am still petrified. I am afraid of all the processes involved in cancer treatment and I do not know what will happen to me.</p>	<p>Anxious Pessimistic worrying Anxious Fear of uncertainty</p>	
<p>5. Sensitive-downcast personality type (N=8)</p>		
<p>I blame my failures on others.</p>	<p>Blaming</p>	<p>Low self-directedness</p>
<p>I have never done something that I did not want to do.</p>	<p>Not empathic</p>	<p>Low cooperativeness</p>
<p>I become irritable and explosive when I cannot control everything.</p>	<p>Quick tempered</p>	<p>Low self-transcendence</p>
<p>My husband has a successful career but my job is not good. I feel intensely jealous of my husband's success and this causes marital conflict.</p>	<p>Manipulative Jealousy</p>	<p>High novelty-seeking Low persistence</p>
<p>I was the youngest child. I received all of my parents' affection and took it for granted. People call me a snob.</p>	<p>Low self-esteem</p>	<p>Low self-directedness</p>
<p>I suffer from an inferiority complex because of my low education level. My father believed that daughters did not need to be educated so he did not support my education. Because of my sense of inferiority, I try to hide my education level and try to be seen as self-confident.</p>	<p>Spoiled Inferiority</p>	<p>High reward dependence High harm avoidance</p>
<p>I believe this statement: "I am perfect and everything is OK and cancer has nothing to do with me." When I was diagnosed with breast cancer, I felt like I became a physically-challenged person. It damaged my ego.</p>	<p>Extravagance Dependence on approval by others Optimistic denial Difficulty in accepting cancer</p>	<p>Low self-transcendence</p>

BCS: breast cancer screening

(Tables 2 and 3).

These personality types were classified with the assumption that they are not at the level of psychopathy; however, it may be easier to understand the classifications with the assumption that they are at the level of personality disorder according to the Diagnostic and Statistical Manual of Mental Disorders (DSM). Mulder et al.<sup>38</sup> suggests a comparison of DMS-III-R personality disorders and Temperament and Character Inventory (TCI). As a result, Cluster A personality disorders were correlated with low reward dependence, high harm avoidance, and low self-directedness and cooperativeness. This type of personality disorder has similar characteristics to the Methodical personality type classified in our study. Cluster B personality disorders were related to high novelty seeking and low self-directedness and cooperativeness. This type of personality disorder has similar characteristics to the Sensitive-downcast personality group. Cluster C personality disorders were correlated with high harm avoidance, low novelty-seeking, and low self-directedness. This type of personality disorder is similar to the Cautious-dependent personality in our study.

### Comparison of the two groups (compliance with BCS, non-compliance with BCS)

In the chi-square test, there were no significant differences in sociodemographic factors or medical characteristics between the two groups except for age ( $p=0.048$ ) and cancer stage ( $p<0.001$ ). There were significant differences in personality types between the two groups, however ( $p=0.018$ ) (Table 3).

### Logistic regression predicting non-compliance with BCS according to personality types

Logistic regression analysis was employed to predict the probability that the participants would show non-compliance with BCS. The predictor variables were age and four dummy variables coding the personality types, using the group with cautious personality type as the reference group. Cancer stage was excluded from the analysis since it is a possible outcome variable of breast cancer compliance.<sup>39</sup>

At a significance level of 0.05, age had no significant effect. However, three of the personality type dummy variables had significant effects. The odds ratio (OR) for each personality type, when all other variables were held constant, indicated that individuals with a cautious-organized personality (OR=9.34,  $p=0.01$ ), cautious-dependent personality (OR=9.38,  $p=0.02$ ), and sensitive-downcast personality (OR=10.58,  $p=0.04$ ) were more likely to be non-compliant than those with a cautious personality (Table 4).

## DISCUSSION

### Characteristics of the participants

Most of the participants were in their 40s and 50s (81.7%), and 45.2% had stage 0 or 1 breast cancer. These distributions were similar to those reported in previous epidemiologic studies.<sup>2,3</sup>

**Table 3.** Chi-square test results for personality types in compliance and non-compliance groups

Personality type	Compliance (%)	Non-compliance (%)	Total number (%)	Chi-square p
Cautious-organized	9 (26)	26 (74)	35 (37.6)	0.018*
Methodical	13 (57)	10 (43)	23 (24.7)	
Cautious-dependent	5 (26)	14 (74)	19 (20.4)	
Cautious	6 (75)	2 (25)	8 (8.6)	
Sensitive-downcast	2 (25)	6 (75)	8 (8.6)	
Total BCS compliance	35 (37.2)	58 (62.8)	93 (100)	

\* $p<0.05$ . BCS: breast cancer screening

**Table 4.** Logistic regression predicting non-compliance with BCS (adjusted by age)

Predictor	B	S.E	p-value	Odds ratio	95% CI
Cautious-organized	2.23	0.91	0.011*	9.34	1.56–56.00
Methodical	0.95	0.93	0.314	2.56	0.42–15.98
Cautious-dependent	2.24	0.98	0.021*	9.38	1.37–64.39
Sensitive-downcast	2.36	1.17	0.043*	10.58	1.06–105.71
Age	0.52	0.47	0.277	1.68	0.671–4.22

Model chi-square=13.13,  $df=5$ ,  $p=0.02$ .  $R^2=0.96$  (Hosmer & Lemeshow), 0.13 (Cox & Snell), 0.18 (Nagelkerke). Reference group: cautious personality type. \* $p<0.05$ . BCS: breast cancer screening

### Comparisons between the compliance group and the non-compliance group

Our results revealed statistically significant differences in age, cancer stage, and personality type between the two groups. Participants between 40 and 59 years of age showed higher proportion of compliance compared to the participants in their 30s or in their 60s and older. This finding shows that women at an age of higher breast cancer prevalence are more likely to undergo BCS compared to those at an age of lower prevalence; this trend was similar to previous epidemiological research.<sup>2</sup>

In the present study, the majority of the participants with cancer stage 2, 3, or 4 (95%) were non-compliant with the recommendations for BCS. According to the World Health Organization (WHO), getting regular screening tests is the best way to lower the risk of dying from breast cancer.<sup>40</sup> The results of the study reemphasize the importance of BCS as individuals who did not undergo screening tended to be diagnosed at a later stage.

In this study, personality type was significantly related to compliance with BCS (Table 3). Among the five personality types investigated, the group with a cautious personality type topped the list with 75% BCS compliance, followed by the group with a methodical personality type (57% BCS compliance). This finding was unexpected because individuals with a cautious personality type are more likely to use avoidance as a coping strategy when confronted with anxiety-provoking situations. Cosedine et al.<sup>41</sup> identified the aspects of cancer and the screening processes that women find to be most fear-inducing. The study suggested that in terms of screening outcomes, undifferentiated fear or anxiety regarding “getting cancer” may generally motivate patients to undergo screening if the fear remains within manageable limits. Participants with psychiatric pathology were excluded from the current study. Therefore, even if the participants with a cautious personality type expressed pervasive and undifferentiated anxiety, especially regarding “getting cancer,” the anxiety was likely within manageable limits.

### Predictors for compliance with breast cancer screening and personality types

Logistic analysis was performed to determine the OR for each personality type by adjusting for age (Table 4). In the analysis, the group with cautious personality type was used as a reference group because this group showed the highest rate of BCS compliance among the five personality type groups. In terms of compliance with BCS, participants with a cautious-organized personality type (OR=9.34,  $p=0.01$ ), cautious-dependent personality type (OR=9.38,  $p=0.02$ ), and sensitive-downcast personality type (OR=10.58,  $p=0.04$ ) were more likely to be non-compliant than those with a cautious personality type.

### Cautious-organized personality type

The results showed that participants with a cautious-organized personality type were approximately nine times more likely to have poor compliance than those with a cautious personality type (Table 4). The results also indicated that high self-directedness is a prominent character trait among participants with a cautious-organized personality. Theoretically, individuals with this personality type would be expected to be in good compliance with BCS.<sup>31-33</sup> However, the results indicated they were not. This discrepancy may be explained by two theories. First, a tendency towards responsibility may backfire against compliance with BCS. In the interviews, some core dynamics were identified in this group. Individuals with this personality type often martyred themselves to sustain dysfunctional family dynamics, and this tendency could contribute to the decreased rate of BCS compliance. Second, external factors could have played a role. Most of the participants in this group experienced family violence, had little social or family support, and suffered from financial problems (Table 2). The environments of the participants could have influenced their decreased compliance with BCS. To clarify these results, further studies controlling for economic status and support systems should be conducted.

### Cautious-dependent personality type

The results indicated that participants with a cautious-dependent personality type are nine times more likely to be in non-compliance than those with a cautious personality type. The participants with a cautious-dependent personality type exhibited high harm avoidance and low persistence temperaments, similar to those with a cautious personality type, but low self-directedness was more predominant in this group (Table 2). People who have lower self-directedness are described as immature, weak, blaming, destructive, ineffective, irresponsible, and unreliable compared to others when they do not conform to the directions of a mature leader. They tend not to accept responsibility for their actions and to wait for others to take the lead in getting things done.<sup>36,42</sup> The tendency towards lower self-directedness may hinder the motivation for health-promoting behaviors.

### Methodical personality type

No significant OR was detected with respect to compliance with BCS for the group of participants with a methodical personality type (Table 4). This could be interpreted to mean that there are no significant differences between the cautious personality type group and the methodical personality type group with regards to compliance with BCS. This result can also be attributed to the temperament-character style of these individuals, as both personality types have high harm avoidance



and high persistence.

Van Kaam's analysis (Table 2) showed that the high harm avoidance in this personality type group is mostly related to anticipatory worry and pessimism. Participating in screening may serve to reduce worries about cancer, as mentioned above.<sup>41</sup> In addition, individuals who rate high on the persistence dimension are more industrious and enthusiastic,<sup>43</sup> which may buffer against the potential negative outcomes of high harm avoidance. Moreover, persistence is found to have positive associations with assertive action and to be negatively related to avoidant coping behavior.

### Sensitive-downcast personality type

The participants with a sensitive-downcast personality type were about ten times more likely to be non-compliant than those with a cautious personality type. Thomson and Ting<sup>44</sup> identified the two important distinct denial orientations: optimistic denial and avoidance denial. Optimistic denial involves an optimistic belief regarding one's vulnerability to future threats and a tendency to downplay or deny the self-relevance of potential threats without making behavioral changes. In the current study, participants with a sensitive-downcast personality type showed optimistic denial in response to the risk of breast cancer and expressed a self-exempting belief in denying the dangers of breast cancer.

### Comparing study results with other studies that examined the relationship between BCS compliance and personality

A few previous studies have evaluated the relationship between BCS compliance and personality. Most of these studies were based on the Five-Factor Model (FFM) of personality traits and used a questionnaire-based model.

Unlike some previous studies, the Cloninger's Temperament-Character dimensions were applied in this study. While Cloninger's model is regularly used in current psychiatric practice, the FFM has received more attention from psychologists. An interesting feature of Cloninger's model is the association between personality dimension and monoaminergic pathway activity. Although the five factors have proven to be cross-cultural common denominators that accurately represent individual differences, the model is often criticized for being only descriptive and not explanatory.<sup>45</sup>

Additionally, while Cloninger's model and FFM have a different basis, the two models have several characteristics in common.

De Fruyt et al.<sup>45</sup> studied the relationship between TCI<sup>42</sup> and Revised NEO Personality Inventory (NEO-PI-R)<sup>46</sup> based on the FFM, and find out all TCI scales correlate significantly with at least one of NEO-PI-R domain scale through the cor-

relation analysis. Moreover, through multiple regression analysis, this study suggests that between 23 to 51% of the variance of the TCI scales is explained by the FFM. This means all NEO-domains were considerably predicted by the TCI scales. When this study examined correlations among domains, Harm Avoidance was strongly positively correlated with Neuroticism and negatively related to Extraversion, Openness, and Conscientiousness. Novelty seeking was positively associated with Extraversion and Openness and negatively with Conscientiousness. Persistence was found to be highly correlated with Conscientiousness. Reward dependence primarily related to Extraversion and, secondarily, to Openness. Self-directedness was positively correlated with Conscientiousness and Extraversion and inversely related to Neuroticism. Cooperativeness related to Agreeableness with minor correlations with Extraversion and Openness. And Self-Transcendence was primarily related to Openness and, secondarily, to Extraversion. By identifying these correlation, we can compare our results with previous studies using FFM.

Siegler and Costa<sup>47</sup> investigated the relationship between personality traits and the mammography and BSE behavior of women using NEO-PI-R. In the Siegler and Costa<sup>47</sup> study, women who never had a mammogram were self-described as less extraverted and conscientious but more open. Moreover, women reported not performing BSE were more neurotic and less extraverted, agreeable, conscientious, and open. In the research presented here, we found that people with cautious-organized, cautious-dependent or sensitive downcast personality types were more likely to be non-compliant than those who had a cautious personality type, had low Self-Transcendence compared with cautious personality, and had a methodical personality type. Our results indicate that low Self-Transcendence is related to low Openness and low Extraversion, which is in agreement with findings of BSE non-compliant women in Siegler's study. Sensitive-downcast personality, which was found to be about ten times higher in the non-compliant than in those with a cautious personality type, had higher Novelty-seeking than other personality types. In contrast to Siegler's results, Novelty-seeking is positively related to Extraversion and Openness and negatively to Conscientiousness. However, this tendency can be diluted, as other temperaments also work with this personality type.

Another previous study used NEO-PI to analyze predictors of mammography acceptance in women under the age of 50.<sup>48</sup> In this previous study, Extraversion and Conscientiousness were significantly related to the adoption of mammography. As mentioned above, Low Self-Transcendence is related to low Openness and low Extraversion, and this was the common characteristic of the three personalities with lower BCS compliance in our study.

Griva et al.<sup>49</sup> discussed the role of personality factors in the acceptance of mammography screening. In this previous study, the authors included optimism as a factor in governing acceptance of mammography screening; however, the results indicated that optimism did not affect mammography screening behavior. However, optimism can have quite a different meaning from optimistic denial, which is discussed above.

Recently, a study that focused on Type A personality traits, such as having a sense of urgency, high job involvement, and competitiveness, predicted mammography use among postmenopausal women.<sup>50</sup> However, the comparison of the result of this previous study focused on Type A personality from our study is difficult because the relationship between Cloninger's model and Type A personality is unclear; thus, further study is needed to understand compare these results.

### Limitations

This study has some limitations that should be taken into consideration. First, this study had issues with sample selection bias. The cohort consisted of women who underwent breast cancer surgery and participated in the psychodynamic-psychotherapeutic intervention program. This population may be different from the general breast cancer population and the bias could impact the results and conclusions of our study. Second, this study did not include all of the sociodemographic factors that can potentially influence BCS behaviors. Finally, there is a potential for bias in the BCS compliance data collection due to the dependence on the respondents' memory. In spite of these limitations, this mixed-method approach can help clinicians better understand the subtle differences in the impact of personality types among individuals with breast cancer and to improve internal validation.

### Conclusion

It is generally understood that personality traits are not easily assessed in the clinical setting. The findings from this study should contribute to the development of an effective questionnaire for evaluating personality types and compliance with BCS. Understanding personality types can lead to better communication between health professionals and their patients, resulting in more efficient treatment and better adherence to treatment.

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### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

### Author Contributions

Conceptualization: Eunhee Sohn, Hyo Deog Rim, Jungmin Woo. Data curation: Eunhee Sohn, Hyo Deog Rim. Formal analysis: Eunhee Sohn,

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