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Cognitive Distortions: Predictors of Medical Adherence and Health Behaviors Among Women at Risk for Breast Cancer

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COGNITIVE DISTORTIONS: PREDICTORS OF MEDICAL ADHERENCE AND HEALTH BEHAVIORS AMONG WOMEN AT RISK FOR BREAST CANCER

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Abstract

This study examined the relationship between cognitive distortions and health behaviors among women at risk for breast cancer. Sixty-eight participants completed an online survey consisting of demographic information, the Inventory of Cognitive Distortions (ICD), and the Health Adherence Behavior Inventory (HABIT). Results of the study indicate that health behaviors decrease as thinking becomes more distorted. The data also suggest that various cognitive distortions predict worse adherence, including fortune telling, minimization, and magnification. These findings have implications for the role of clinical psychologists in healthcare settings, and for the utility and implementation of cognitive behavioral interventions to increase early detection and promote prevention strategies among women at risk for breast cancer.

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Introduction

Statement of the Problem

Breast cancer is the most commonly diagnosed cancer in women, as approximately 10% of women will develop breast cancer in their lifetimes (Siegel, Miller, & Jemal, 2015). Women with a familial risk of breast cancer—especially a first-degree relative—are about twice as susceptible to developing breast cancer, with a lifetime prevalence of 20% (Kuhl et al., 2005). Even with modern technology and various treatments available today, breast cancer is secondary to lung cancer as the leading cause of cancer deaths among women in the United States, and the primary cause of death for women ages 35 to 50 (Siegel et al., 2015; Yarbrough & Braden, 2001). Breast cancer screening is recommended for all women, especially high-risk women, but research indicates that adherence to physician recommended screening procedures remains low, as less than half of women between the ages of 35 and 50 get screened (Donovan & Tucker, 2000; Siegel et al., 2015). These findings exemplify the importance of determining factors that influence adherence to screening procedures in order to increase early detection and decrease the mortality rate for women diagnosed with breast cancer.

Medical adherence encompasses a range of physician recommended health behaviors, including taking medications as prescribed, attending appointments, and following recommended lifestyle guidelines related to diet and exercise (DiTomasso, Chiumento, Singer, & Bullock, 2009). Because poor health behaviors, such as smoking and living a sedentary lifestyle, have been identified as risk factors for breast cancer, it is crucial for high-risk women to engage in health behaviors, which include any behaviors

that serve to improve health or prevent illness (DiTomasso et al., 2009). Research has examined numerous variables, such as socioeconomic status (SES), cancer worry, and cognitive appraisals of breast cancer, to identify and understand potential factors that can predict medical adherence in this population (Molina, Ceballos, Dolan, Albano, & McGregor, 2014; Verkooijen et al., 2009).

Understanding cognitive distortions—unhelpful thought patterns that alter an individual's perception of the self, others, or future—related to perceived risk of illness and disease susceptibility has been influential in predicting medical adherence and health behaviors for individuals who suffer from various mental health disorders and medical illnesses such as major depressive disorder (MDD) and diabetes mellitus (DM; J. S. Beck, 2011; Christensen, Moran, & Wiebe, 1999).

Cognitions such as perceived risk of illness and cancer worry have been studied in women diagnosed with breast cancer. Existing literature examining perceived risk of illness has been inconsistent. Research by Milhabet, Duprez, Krzeminski, and Christophe (2013) demonstrated that individuals with higher perceived risk of breast cancer were more likely to be overseekers of cancer screening procedures. Other studies indicate that perceived susceptibility did not predict the rates of genetic counseling or mammography for individuals with a family history of breast cancer, although having a family history of cancer has been shown to increase the rates of mammography (Cameron & Reeve, 2006; Cohen, 2006).

Research on breast cancer worry and anxiety has been relatively consistent and indicates that cancer worry and anxiety are correlated with greater rates of early detection practices (EDPs), such as breast self-examination, genetic counseling, and health

behaviors (Cameron & Reeve, 2006; Cohen, 2006). Interestingly, perceived risk only partially accounted for the variance in cancer worry, which indicates that other cognitions contributing to cancer worry have yet to be identified. This dearth of research examining cognitive distortions in high-risk women exemplifies the importance of evaluating other cognitions that may predict adherence to physician recommended health behaviors, which can lower the incidence of breast cancer and improve prognosis through detecting cancer in its earlier stages.

Because cognitive distortions have been studied widely and are useful in predicting medical adherence for both underusers and overusers of health services, it is probable that they also influence medical adherence for women who are highly susceptible to breast cancer. In the effort to decrease the incidence of breast cancer and increase early detection practices, which is associated with a better prognosis, it is important to determine whether high-risk women maintain cognitive distortions that influence their health adherence behaviors.

Purpose of the Study

Despite extensive research on adherence to physician recommended health behaviors among women who are considered "high risk" for breast cancer, the literature is lacking a comprehensive understanding of factors that predict adherence and nonadherence. Because behaviors such as smoking, drinking alcohol, being physically active, and getting regular medical screening can alter an individual's risk for breast cancer, it is especially important to identify the underlying mechanisms for adherence and nonadherence to physician recommended health behaviors (Danaei, Vander Hoorn, Lopez, Murray, & Ezzati, 2005; McTiernan, 2003).

One possible mechanism to help identify barriers to adherence in this population is to evaluate health beliefs and cognitive distortions or misperceptions related to breast cancer. Cognitive distortions were conceptualized originally to help treat individuals with anxiety and depression but, more recently, have been used to predict health adherence in behavioral health settings (Stankiewicz, 2008). Nevertheless, the literature lacks adequate information on the influence of cognitive distortions on health behaviors for women at risk for breast cancer.

The purpose of the study was to determine whether cognitive distortions, as measured by the Inventory of Cognitive Distortions (ICD), are correlated with health adherence behaviors, as measured by the Health Adherence Behavior Inventory (HABIT), among women who are highly susceptible to breast cancer. Understanding adherence is especially important because the rate of compliance to health behaviors, such as getting medical screening, is still low despite efforts to provide psychoeducation to communities and increase the accessibility of services (Cohen, 2006).

Chapter 2: Literature Review

Women with a breast cancer mutation gene and women with a first-degree relative with a history of breast cancer are at an increased risk for developing breast cancer (American Cancer Society [ACS], 2014). Because women of all ages are being diagnosed with breast cancer, it is especially important for high-risk women to engage in health behaviors associated with decreasing the probability of getting cancer. More specifically, adhering to physician recommended medical screening to increase early detection of breast cancer is crucial, as early detection improves prognosis (McPherson, Steel, & Dixon, 2000). Recommended health behaviors that have been identified for women at risk for breast cancer include adhering to screening procedures such as mammograms, performing monthly breast self-examinations, attending annual checkups, maintaining a healthy lifestyle, engaging in regular exercise, and eating a balanced diet (Danaei et al., 2005). Conversely, poor health behaviors have been identified as risk factors for developing breast cancer and include behaviors such as smoking, alcohol consumption, living a sedentary lifestyle, and eating a high calorie diet (McPherson et al., 2000).

Because health behaviors are crucial in the prevention and treatment of many medical illnesses including breast cancer, it is important to determine which factors predict adherence and nonadherence, as well as the degree to which these factors predict adherence. The literature suggests that understanding cognitive distortions has been useful in predicting patient adherence to health behaviors in behavioral health settings for individuals with chronic illnesses such as diabetes (Stankiewicz, 2008). Although there is some existing literature that has identified a few cognitive variables associated with

health seeking behaviors in women at risk for breast cancer, such as breast cancer worry and perceived cancer susceptibility, research is limited on the range and specificity of cognitive distortions in this population (Molina et al., 2014).

Existing literature indicates that women with a family history of breast cancer are not necessarily more knowledgeable about breast cancer than individuals without a family history. Research suggests that breast cancer knowledge varies based on factors such as race, ethnicity, SES, and culture (Donovan & Tucker, 2000). Nevertheless, the rate of medical screening and examinations for women is disconcerting, as research indicates that over 40% of women with a family history of breast cancer have never gotten a mammogram (Cohen, 2006). With such statistics, the need to disseminate knowledge pertaining to both genetic vulnerabilities and lifestyle factors contributing to breast cancer is evident, especially for women who are highly susceptible to breast cancer. Therefore, in order to help further understand predictors of health adherence, it is important to determine whether high-risk women maintain certain cognitive distortions that are predictive of their rates of medical adherence, as these are potential areas for intervention and prevention.

Breast Cancer Risk Factors

Genetics factors. There is evidence for both biological and environmental risk factors in the etiology of breast cancer, in congruence with the majority of other mental health and medical conditions (Danaei et al., 2005; King, Marks, Mandell, & New York Breast Cancer Study Group, 2003). The diathesis-stress model states that each person has a genetic susceptibility to a given illness, and it is the combination of his or her genetic predisposition and his or her interaction with the environment that predicts

whether a person develops an illness (Zuckerman, 1999). The model states that there cannot be an illness without a predisposition to the illness; however, the greater the predisposition, the less environmental stress is needed for the illness to manifest and vice versa.

The diathesis-stress model can be applied to breast cancer, as women with a family history of cancer or women who test positive for one of the breast cancer mutation genes are more susceptible to developing breast cancer than other women in the general population (King et al., 2003). According to this model, it would take fewer environmental factors for women with genetic susceptibility to develop breast cancer. Because there is strong evidence supporting that genetic susceptibility, psychosocial factors, and behavior interact and can alter an individual's susceptibility to cancer, it is especially important to monitor the psychological well-being and behavioral risk factors for women who are genetically predisposed (Eysenck, 1994).

Furthermore, cancer risk increases with age, especially in postmenopausal women (McTiernan, 2003). These genetic predispositions interact with behavioral and environmental factors that contribute to the etiology of breast cancer. For example, women who are both postmenopausal and obese have a greater risk of developing breast cancer than premenopausal women (McTiernan, 2003). For this reason, it is recommended that women get regular medical screenings starting at age 40 irrespective of family history (ACS, 2014). For individuals with a family history of breast cancer, the ACS recommends screening procedures at an earlier age and at a higher frequency. Therefore, it is essential to target women who are considered "high risk" for breast cancer in order to provide psychoeducation about behavioral and environmental factors that can

improve or exacerbate their genetic vulnerability.

According to the ACS (2014), women considered "high risk" for breast cancer include women with at least one first-degree family member or more than two second-degree relatives with a history of breast cancer, as well as women with a BRCA1 or BRCA2 mutation gene. Familial risk is differentiated from genetic risk in that research indicates that women having a first-degree family member with breast cancer are about twice as susceptible to getting breast cancer than the average woman, with a lifetime prevalence of 20% (Kuhl et al., 2005). Women with a BRCA1 or BRCA2 mutation are even more susceptible to getting breast cancer, having a lifetime risk of 82%, which is comparable to women with a family history of three second-degree family members with breast cancer. (King et al., 2003).

Breast cancer and ovarian cancer. Women with a family history of ovarian cancer are at an increased risk of developing breast cancer and vice versa (Antoniou et al., 2003). Ovarian cancer occurs in about 1% of the general population of women, whereas women with a breast cancer mutation gene have a lifetime prevalence of 8% (King et al., 2003). This statistic is especially significant, as ovarian cancer is one of the most lethal types of cancer (King et al., 2003). Research by King, Marks, Mandell, and the New York Breast Cancer Study Group (2003) evaluated the cumulative risk for breast cancer and ovarian cancer individuals with the breast cancer mutation genes. This study concluded that by age 70, women with the BRCA1 mutation gene had an average cumulative risk of 65% for developing breast cancer and 39% for ovarian cancer, which tremendously exceeds the rates for women who are not breast cancer mutation carriers. This study also indicated that the average lifetime cumulative risk of individuals with the

BRCA2 mutation gene was 45% for breast cancer and 11% for ovarian cancer, both also exceeding the average rates in the general population. Interestingly, this study found that breast cancer risk for BRCA1 mutation carriers decreased significantly after age 70, but did not find the same results for women with the BRCA2 mutation gene (King et al., 2003).

These studies exemplify the importance of genetic testing, as individuals with the BRCA1 and BRCA2 genes are at a much higher risk for breast and ovarian cancers than women in the general population. Despite the utility of genetic testing, the rate of testing for individuals with a family history of breast and ovarian cancer remains low. Therefore, it is important to understand cognitive factors can influence whether an individual pursue genetic testing.

Genetic Testing. Research has identified some factors that have predicted whether individuals choose to get genetic testing, although some findings have been inconsistent. Cameron and Reeve (2006) conducted a study that evaluated the relationship between cancer worry and perceived susceptibility in relation to the frequency of genetic counseling in female university students with a family history of breast cancer. As anticipated, individuals who endorsed more breast cancer worry were more likely to seek out genetic testing. An interesting finding indicated that perceived risk of breast cancer did not affect an individual's decision to get genetic screening; however, perceived benefits of genetic testing predicted higher rates of genetic testing for individuals low in worry, but not for individuals with high worry. These results suggest that psychoeducation on genetic testing alone is insufficient to increase the rate of testing for women at risk for breast cancer; therefore, alternative methods for intervention must

be considered.

Studies have also identified racial and cultural variables related to the probability of seeking out genetic counseling. Overall, it appears that African American women with a family history of breast or ovarian cancers are less likely to seek out genetic testing than their Caucasian counterparts (Armstrong, Micco, Carney, Stopfer, & Putt, 2005). This difference may be attributed to factors including a gap in psychoeducation and access to medical services, in addition to cultural variables such as differences in attitudes about risk or the utility of screening procedures (Donovan & Tucker, 2000).

Screening procedures. Women who test positive for the breast cancer mutation genes are advised by physicians to obtain regular medical screening procedures, such as mammography and clinical breast examinations. These screening procedures are recommended strongly because they are able to detect breast cancer in its early stages, which improves the prognosis (Kerlikowske, Grady, Rubin, Sandrock, & Ernster, 1995). Research by Cohen (2006) compared early detection practices (EDPs) of women with and without a family history of breast cancer. Specifically, this study examined the relationship between health beliefs and cancer worries on EDPs in both groups. Findings indicated that there was no difference in the number of clinical breast examinations or the rate of mammography between the two groups. Consistent with other studies, perceived susceptibility did not predict more EDPs, but it was correlated with slightly higher rates of breast self-examinations (Cohen, 2006). Also consistent with other studies, high cancer worry was the highest predictor of EDPs. Of concern, this study indicated that young women were low in EDPs regardless of their family history. This finding exemplifies the need for strategies to increase the rate of EDPs in high-risk women under

40 years old, especially because there is research that indicates higher rates of breast cancer for individuals born after 1940 (King et al., 2003)

To further increase early detection and identify risk factors for breast cancer, genetic counseling is available to women and their families. Genetic counseling provides psychoeducation and assesses an individual's risk for developing breast cancer based on family history and genetic testing, and also informs patients about preventative methods and medical management (Cohen, 2006). The literature on the utility of genetic counseling is unclear. Research suggests that genetic counseling can increase preventative behaviors such as breast self-examinations in women with and without a family history of breast cancer (Lloyd et al., 1996). Conversely, there is also evidence showing that after genetic counseling, individuals still misperceived their risk of developing breast cancer (Lloyd et al., 1996). This finding is of significance because it indicates that genetic counseling may not be effective in giving patients a better understanding of their actual perception of risk. Furthermore, although genetic counseling is beneficial in informing individuals about their risk for breast cancer, genetic counseling has been controversial due to the potential adverse psychological effects it can have on individuals and their families (Lerman & Croyle, 1994).

Although medical screening procedures and genetic counseling are valuable methods that are conducive to early detection, individuals have little power to change their genetic susceptibility. It is possible, however, to assert control over their health behaviors—many of which are also implicated in the etiology of breast cancer.

Behavioral factors. Given that individuals are able to exert control over their health behaviors, psychoeducation is essential in promoting adherence to health

behaviors that can affect susceptibility. Lifestyle factors such as diet, exercise, and medical adherence are variables that can increase or decrease risk for breast cancer (Danaei et al., 2005). Research indicates that smoking, obesity, alcohol consumption, and living a sedentary lifestyle increase the probability of developing breast cancer (McTiernan, 2003). Furthermore, obesity and physical inactivity have been attributed to about 25% of breast cancer cases (McTiernan, 2003), which exemplifies the importance of behavioral health in the etiology of breast cancer. For these reasons, according to the ACS, it is recommended strongly that women who are highly susceptible to breast cancer take extra precautions and comply with recommended health behaviors.

The ACS (2014) recommends that women at risk attend regular medical appointments for breast examinations and mammography. Many factors influence whether a person is adherent to these recommendations, such as access to transportation, social support, cultural factors, and cognitions pertaining to medical screening (Janssen, Osch, Lechner, Candel, & Vries, 2012; O'Malley, Forrest, & Mandelblatt, 2002). Interestingly, there have been mixed findings about the role of anxiety in adherence to medical procedures (Weaver, Thompson, Weaver, & Hopkins, 2009). Although some research suggests that breast cancer worry is correlated with higher health-seeking behaviors (Janssen et al., 2012), other findings indicate that cancer anxiety in high-risk women lowers the rate of screening procedures such as clinical breast examinations (Weaver et al., 2009).

Because health behaviors can alter an individual's risk for illnesses, it is crucial to evaluate these factors in high-risk women to help reduce maladaptive behaviors that can further increase their risk of developing breast cancer (McTiernan, 2003). The

implications of health behaviors on disease susceptibility convey the importance of understanding variables that affect adherence to health behaviors, as health behaviors are an avenue for both prevention and intervention. Although obesity is a general risk factor for breast cancer, it becomes a more salient risk factor in postmenopausal women, emphasizing a need for psychoeducation about diet and exercise in an older population that may not be as knowledgeable about the risks and benefits of these health behaviors (Dolan, Lee, & McDermott, 1997; McTiernan, 2003). Furthermore, despite evidence that alcohol such as wine in moderate amounts can be beneficial for maintaining health, research suggests that consuming two or more alcoholic beverages per day increases the risk of cancer in both premenopausal and postmenopausal women (Danaei et al., 2005).

Psychoeducation pertaining to the behavioral risk factors for breast cancer is crucial to increase awareness of available options to high-risk women in order to help decrease the incidence of breast cancer and promote early detection. Nevertheless, the solution is not simplistic, as there are many barriers that influence medical adherence, such as misperception of risk and cultural influences (Johnson, Mues, Mayne, & Kiblawi, 2008). For this reason, research has explored the influence of health beliefs to identify cognitions that influence adherence to physician recommended health behaviors.

Health Beliefs and Adherence

Numerous models have attempted to explain the connection between beliefs and health behaviors. For example, the health belief model (HBM) has been utilized to identify beliefs that affect adherence to breast cancer screening procedures, but has yielded inconsistent findings. According to the HBM, an individual's choice to engage in health promoting behaviors depends on the extent to which an individual values health, in

combination with his or her perception of disease severity and belief that engaging in health behaviors can improve health outcome (Strecher & Rosenstock, 1997).

Research by Cohen (2006) evaluated health beliefs of women with and without a family history of breast cancer. Perceived susceptibility and cancer worry were the outcome variables measured. The results demonstrated that women with family histories of breast cancer had higher perceived susceptibility, more cancer worry, and perceived fewer barriers to early detection practices than women without a family history of breast cancer; however, there was no statistically significant difference in the rate of clinical breast examinations between these groups, as about one third of both groups had a clinical breast examination in the past year. There was also no significant discrepancy in the rate of mammography screenings for women over 40 years old, although women with a family history under 40 years old had slightly higher rates of mammography. These results are particularly perplexing because, although there was a difference in perceived susceptibility and cancer worry, there was little difference in adherence behaviors between groups, suggesting that there may be other factors not accounted for by the HBM that affect medical adherence.

Another study had similar results, and indicated that engaging in health behaviors such as eating fruits and vegetables, getting a mammography, and engaging in exercise were not influenced by family history or perceived breast cancer susceptibility (Bowen, Alfano, McGregor, & Andersen, 2004). Although this study found a correlation between perceived cancer worry and breast self-examination, these variables in the HBM fail to provide an adequate and comprehensible framework that accounts for the differences in health behaviors both between and within groups. As a result, it is necessary to examine

other factors, such as cognitions, to help to explain and understand possible underlying mechanisms for adherence behavior.

Cognitive Distortions and Adherence

Cognitions have been extremely influential in psychotherapy, and cognitive behavioral therapy (CBT) is an empirically supported treatment that is based on the cognitive model, which demonstrates how cognitions affect thoughts and behaviors (A. T. Beck, 1976). CBT involves identifying cognitive distortions—which can be conceptualized as inaccurate ways of thinking that reinforce negative emotions or beliefs—which cause the individual to perceive the self, future, and world inaccurately (Burns, 1990).

Cognitive distortions have been studied widely to help understand predictors of health behaviors for various illnesses such as DM and asthma, but there is a dearth of research in the literature examining cognitive distortions in relation to health behaviors of women at risk for breast cancer (Christensen et al., 1999; DiMatteo, Haskard, & Williams, 2007). Given that cognitive distortions have been implicated in other chronic illnesses, identifying cognitive distortions in relation to health behaviors can be instrumental to further understand factors that predict health behaviors and attitudes in this population.

Because thoughts and perceptions can influence behavior, cognitions of patients in primary care and behavioral health settings have been examined in relation to medical adherence. The literature suggests that identifying possible cognitive distortions in patients with behavioral health problems can be useful in predicting medical adherence and health behaviors. Research indicates that cognitive distortions can influence

adherence behaviors by creating inaccurate perceptions about the importance of health behaviors, such as monitoring blood sugar levels and engaging in exercise (Christensen et al., 1999). Findings that cognitions have been of utility in predicting adherence behaviors illustrate the importance of the role of mental health professionals in behavioral health settings, as research indicates the importance of identifying cognitive distortions and reframing these inaccurate thoughts in a more realistic way that allows individuals to function more adaptively in their environments (Greenberger & Padesky, 1995).

There is evidence that cognitive distortions, such as magnification and minimization—either overreacting to something inconsequential or minimizing things of importance—can influence health-seeking behaviors such as getting medical screening (Burns, 1990; Finney Rutten,& Iannotti 2003). Research has shown that an individual's beliefs about his or her susceptibility and risk for diseases can have a profound influence on his or her health behaviors and level of medical adherence (Bowen et al., 2004). For example, individuals who minimize health problems tend to adhere less to medical screening, whereas magnifying problems can lead to anxiety and excessive health seeking behaviors (Milhabet, Duprez, Krzeminski, & Christophe, 2013).

The literature on breast cancer has focused on cognitive factors such as cancer worry and perceived cancer susceptibility in predicting adherence to medical screening procedures. The majority of evidence suggests that cancer worry is associated with increased medical screening, although some studies found that worry predicted lower adherence (Cohen, 2006; DiMatteo et al., 2007). Nevertheless, research by Kash, Holland, Halper, and Miller (1991) found that high anxiety was associated with lower rates of clinical breast examinations, indicating that cognitive defenses, such as

minimization, may play a role in the avoidance behaviors.

Due to the inconsistent findings, it is important to understand the variables that predict both medical adherence and nonadherence. Adherence literature suggests that individuals are nonadherent to medical screening for many reasons, such as lack of transportation, lack of available resources, lack of social support, and avoidance. Because there is minimal research on the cognitive variables impacting adherence behaviors, it is important to understand the underlying spectrum of cognitive distortions that may impact behavioral decision-making that can further increase an individual's susceptibility to developing breast cancer.

Chapter 3: Research Questions & Hypotheses

Research Question 1

Does the frequency of cognitive distortions among women with a high risk of breast cancer predict adherence to physician recommended behaviors?

Hypothesis 1. It was expected that as the frequency of cognitive distortions increased, adherence would decrease.

Research Question 2

Do specific cognitive distortions predict poor adherence to physician recommended health behaviors?

Hypothesis 2. It was hypothesized that individuals who engaged more frequently in the cognitive distortion of minimization (ICD Scale 10, items 45 and 68) would report poorer health adherence than individuals who endorsed magnification, (ICD Scale 3, items 8, 20, 24, 27, 30, 32, and 69).

Hypothesis 3. It was hypothesized that individuals who engaged more frequently in the cognitive distortion of fortune-telling (ICD Scale 2, items 2, 9, 22, 23, 26, 34, 36, 38, 48, 51, and 55) would report poorer health adherence.

Hypothesis 4. It was expected that individuals who engaged more frequently in the cognitive distortion of emotional reasoning (ICD Scale 7, items 40, 56, 60, and 64) would report poorer health adherence.

Research Question 3

Are there differences in health adherence behaviors among women who have tested positively for a breast cancer mutation gene versus women with a familial risk of breast cancer?

Hypothesis 5. Research indicates that the lifetime prevalence of breast cancer for women with a breast cancer mutation gene is exceedingly higher than for women with a family history of breast cancer who do not have a breast cancer mutation gene (King et al., 2003; Kuhl et al., 2005). Therefore, it was expected that women who have tested positively for the BRCA1 or BRCA2 mutation gene would be more adherent to health behaviors than women with a familial risk of breast cancer.

Research Question 4

Does the frequency of cognitive distortions among women who have tested positively for a breast cancer mutation gene differ from women with a familial risk of breast cancer?

Hypothesis 6. It was hypothesized that individuals with a family history of breast cancer would endorse a greater frequency of cognitive distortions than women with a breast cancer mutation gene.

Research Question 5

Are there differences in patient adherence for women ages 18 through 39 versus women ages 40 through 89?

Hypothesis 7. It was expected that women between the ages of 18 and 39 would be less adherent than women between ages if 40 and 89 because breast cancer risk increases after age 40 and EDPs such as mammography are recommended for all women of this age.

Chapter 4: Method

Participants

Participants were adult women between the ages of 18 and 89 with a family history of breast or ovarian cancer and/or women who have tested positively for one or more of the breast cancer mutation genes (BRCA1 or BRCA2). This study utilized a convenience sample, as participants were recruited at sites accessible to the researcher. This sample was obtained by posting the survey link on social media websites, sending a recruitment e-mail to a Philadelphia region graduate school database, distributing recruitment flyers at a breast cancer fundraising event in the Philadelphia area, posting the link in cancer support groups, and displaying recruitment flyers at a women's gym in the Philadelphia area. The study was reviewed and approved by the researcher's graduate school's Institutional Review Board (IRB) prior to participant recruitment.

Power analysis was conducted in order to obtain 80% power at .05 for a medium effect size. The study sought 360 participants, as it was expected that of those recruited, not all would be eligible for the study or would complete the survey in its entirety.

Inclusion criteria. Inclusion criteria to participate in the study were being an English-speaking female between the ages of 18 and 89, having at least one first-degree family member with a history of breast or ovarian cancer, or having at least three second-degree relatives with a history of breast or ovarian cancer. Participants who had tested positive for the BRCA1 or BRCA2 mutation gene were also eligible to participate in the survey, regardless of their family history of breast or ovarian cancer, because women with these mutation genes are automatically considered "high risk" (ACS, 2014).

Exclusion criteria. Individuals with a current or past cancer diagnosis were

excluded from participating in the study because a cancer diagnosis would likely impact both cognitions and health behaviors, which may have confounded the results of the study. Individuals not fluent in English were also excluded from the study, as proficiency in English is required in order to understand and complete the survey.

Research Design

This study employed a cross-sectional correlational design that used SurveyMonkey, an online survey format designed to administer questionnaires, to evaluate eligible participants' beliefs about breast cancer and medical adherence. Demographic data were collected and analyzed.

Measures

Inventory of Cognitive Distortions (ICD). The ICD is a self-report, 69-item questionnaire that utilizes a Likert Scale to identify cognitive distortions that can be used to assess psychological and behavioral risk factors for adults with a variety of psychological and medical disorders (Yurica & DiTomasso, 2002). The survey takes approximately 10 to 15 minutes to complete. Participants are asked to indicate the degree to which these statements apply to them, choosing "N" for Never, "R" for rarely, "S" for sometimes, "O" for often, or "A" for always. There are 10 cognitive distortions on which these questions load, including externalization of self-worth, fortune telling, labeling, magnification, minimization, perfectionism, comparison to others, emotional reasoning, arbitrary inference/jumping to conclusions, and mind reading (Yurica & DiTomasso, 2002). It also encompasses a subscale on emotional decision-making. This scale has been used with clinical samples in psychiatric and medical settings, as well as nonclinical samples.

As stated, the ICD measures 10 cognitive distortions: (a) externalization of self-worth is when an individual's self-worth is attributed to external factors, (b) fortune telling is the belief that one knows what will happen in the future, (c) labeling involves attributing negative qualities to oneself based on perceived shortcomings or a negative outcomes, (d) magnification occurs when one blows small negative outcomes out of proportion, (e) minimization is to undermine the importance of something to the point that it is considered insignificant, (f) perfectionism is the idea that making a mistake makes you a "total loser" or failure, (g) comparison to others is the tendency to magnify one's shortcomings and other people's strengths and minimizing one's strengths and other people's weaknesses or vice versa, (h) emotional reasoning is the idea that because one feels a certain way, one "must be" that way, (i) arbitrary inference/jumping to conclusions occurs when one draws a conclusion about an outcome without evidence to support it; and (j) mind reading occurs when one thinks one knows what others are thinking (Burns, 1999).

The ICD has a high test-retest reliability of .998, indicating that it is useful in identifying cognitive distortions that are correlated with psychological and behavioral health risks (Yurica & DiTomasso, 2002). Research by Uhl (2007) also provided strong evidence for the relationship between cognitive distortions as measured by the ICD and psychological and behavioral risk factors. Criterion and content validity of this inventory have been tested and are considered valid. Further assessment of this measure indicates that cognitive distortions have accounted for half of the variance in the quantity and severity of maladaptive psychological and behavioral functioning (Rosenfield, 2004).

Health Adherence Behavior Inventory (HABIT). The HABIT is a

questionnaire consisting of 50 true/false statements that was developed to target individuals in primary health care settings who are at risk for poor health outcomes due to nonadherence to physician recommended treatment (DiTomasso, 1997). Individuals are asked to mark "true" if the statement typically describes their behavior, and to mark "false" if the statement does not typically describe their health behavior. Of the 50 questions, 48 contain health adherent statements, which are given a score of 1 if marked "true" or a 0 if marked "false." The other two questions are nonadherent health statements and, therefore, are scored inversely (true = 0, false = 1).

This instrument measures the degree to which individuals adhere to standard physician recommended health behaviors, such as smoking, alcohol consumption, and level of activity. The higher the score on the HABIT, the more likely it is that the individual has positive health outcomes, because a high score predicts adherence to physician recommended behaviors (DiTomasso, 1997). Alternatively, lower scores are suggestive of poor health outcomes, as low scores indicate poor adherence (DiTomasso, 1997). This measure is particularly relevant to this study because many of the variables that it assesses are also physician recommended behaviors for individuals at risk for breast cancer. The HABIT has been tested in relation to other reliable questionnaires, such as the Health Risk Assessment and results indicated that it is both reliable and valid in identifying individuals with poor health outcomes due to nonadherence (Parke, 2004).

Procedure

Participants were asked to partake in a study about thoughts and behaviors among women at risk for breast cancer. Participants were recruited through various avenues, including postings on social media, breast cancer fundraising events, recruitment e-mails,

and flyers in fitness facilities. The researcher posted the recruitment flyer (see Appendix A) on Facebook, which included information about the study and confidentiality, as well as a link to the survey. Viewers were encouraged to consider sharing the link on their own social media pages in order to produce a desired snowball effect and reach more potential participants and increase sample variability.

The researcher attended a breast cancer fundraising event in Philadelphia, Pennsylvania. The researcher was granted permission by her graduate school to hand out recruitment flyers to potential participants at the event. Potential participants were approached with a recruitment flyer after the event and were given a brief description of the study. Individuals interested were given a recruitment flyer with information and the link to access the survey.

The researcher and principal investigator were given permission to send a recruitment e-mail (see Appendix B) to the researcher's graduate school faculty and students, which provided information about the purpose of the study and eligibility. The e-mail included a description of the study, eligibility criteria, information about informed consent and confidentiality, and a link to the survey. The e-mail was sent to individuals in both the Philadelphia and Georgia regions.

Individuals who chose to participate clicked the survey link or entered the web address that was provided in the recruitment e-mail and flyers. The survey link brought participants to a page, which included a letter of solicitation (see Appendix C) that reiterated the purpose of the study, voluntary participation, and confidentiality. The participants were then screened for eligibility. Ineligible individuals were taken out of the survey, informed they did not quality, and thanked for their interest in the study.

Eligible participants were able to continue with the survey and were provided a series of demographic questions. Additionally, information was collected to identify the last time each participant got a mammogram, whether they received genetic testing, and if so, whether they had tested positively for the BRCA1 or BRCA2 breast cancer mutation gene and if they had received genetic counseling. Participants were also asked to specify whether their relatives with breast and/or ovarian were first-degree or second-degree family members, and to specify the relation to the relative(s). Following responding to demographic questions, participants were given the ICD followed by the HABIT. Participants who completed the survey were given the option to provide their e-mail addresses in order to enter a raffle to win a $25 Amazon gift card. Participants' names in the raffle were not linked to their responses, in order to ensure confidentiality.

Chapter 5: Results

Statistical analyses were computed to determine the relationship between cognitive distortions, as measured by the ICD, and health behaviors, as measured by the HABIT. Additional analyses were run to determine whether particular cognitive distortions accounted for the variance in adherence behaviors.

A total of 181 participants entered to participate in the survey. Of the 181 participants, 88 did not meet eligibility criteria and 25 participants did not complete the survey. A total of 68 eligible participants completed the survey.

Descriptive Statistics

The distribution of family history of breast and ovarian cancers for the total sample (N=68) is shown in Table 1. The distribution for receiving genetic testing and genetic counseling for the total sample (N=68) is shown in Tables 2 and 3, respectively. The distribution for participants who tested positively for a breast cancer mutation gene for the total sample (N=68) is shown in Table 4. The distribution of time since last mammogram for the total sample (N=68) is shown in Table 5. The distribution of age for the total sample (N=68) is shown in Table 6. The distribution of education for the total sample (N=68) is shown in Table 7. Finally, the distribution of ethnicity for the total sample (N=68) is shown in Table 8.

Table 1

Frequency Table of Family History

Relative	Frequency	Percent
Parent (BC)	37	54.4
Child (BC)	0	0
Sibling (BC)	10	14.7
Parent (OC)	4	5.9
Child (OC)	1	1.5
Sibling (OC)	2	2.9
Aunt (BC)	26	38.2
Cousin (BC)	13	19.1
Half-Sibling (BC)	1	1.5
Niece (BC)	1	1.5
Aunt (OC)	7	10.3
Cousin (OC)	2	2.9
Half-Sibling (OC)	2	2.9
Niece (OC)	0	0

BC = breast cancer, OC= ovarian cancer

Table 2

Frequency Table of Genetic Testing

Genetic Testing	Frequency	Percent
Yes	14	20.6
No	54	79.4

Table 3

Frequency Table of Genetic Counseling

Genetic Counseling	Frequency	Percent
Yes	14	20.6
No	54	79.4

Table 4

Frequency Table of BRCA Mutation Gene

BRCA Mutation Gene	Frequency	Percent
BRCA1	2	2.9
BRCA 2	5	7.4

Table 5

Frequency Table of Time Since Last Mammogram

Years	Frequency	Percent
0-1 year ago	28	41.2
2-3 years ago	3	4.4
4-5 years ago	2	2.9
More than 5 years ago	1	1.5
Never	34	50

Table 6

Frequency Table of Age

Age	Frequency	Percent
18-29	25	36.8
39-39	18	26.5
40-49	9	13.2
50-59	10	14.7
60-60	6	8.8

Table 7

Frequency Table of Educational Background

Education	Frequency	Percent
Doctoral degree	13	19.1
Master's degree	24	35.3
Bachelor's degree	24	35.3
Associate degree	2	2.9
Some College, but no degree	5	7.4

Table 8

Frequency Table of Ethnicity

Ethnicity	Frequency	Percent
Caucasian	59	86.8
African American	3	4.4
Asian/Pacific Islander	2	2.9
Hispanic/Latino	1	1.5
Other	3	4.4

Results of Hypothesis Testing

Hypothesis 1 predicted that as the frequency of cognitive distortions increased (indicated by higher scores on the ICD), the degree of adherence would decrease (indicated by lower scores on the HABIT). As shown in Tables 9 and 10, a simple regression was conducted and was significant (R = -.328, $p < .01$), indicating that as thinking becomes more distorted, adherence decreases. The coefficient of determination (R^2 = .107) indicates that 10.7% of the variance in health behaviors is explained by the frequency of cognitive distortions.

Table 9

H_1 Simple Regression Analysis Summary for Frequency of Cognitive Distortions and Health Behaviors[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.328[a]	.107	.094	4.34701

a: Predictors: (Constant), ICD Total Score
b: Dependent Variable: HABIT Total Score

Table 10

ANOVA[a]

Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	150.052	1	15-.052	7.941	.006[b]
Residual	1247.169	66	18.896		
Total	1397.221	67			

a: Dependent Variable: HABIT Total Score
b: Predictors: (Constant) ICD Total Score

Correlations were also conducted to determine whether specific distortions, as measured by the ICD, predict scores on the HABIT. Hypothesis 2 predicted that individuals who more highly endorsed the cognitive distortion minimization would have lower scores on the HABIT, suggesting poor health adherence, whereas magnification would predict higher scores on the HABIT, indicating good adherence. It was also expected that individuals who engage in fortune telling and emotional reasoning would be lower in health adherence.

A significant negative correlation between scores on the HABIT and ICD subscales of minimization was found (R = -.296, p < .01) and fortune telling (R = -.308, p < .01). The data suggest that the more individuals minimize problems or predict negative outcomes, the less they engage in health behaviors. The coefficient of determination (R^2 = .087) indicates that minimization accounts for 8.7% of the variance in health adherence. The coefficient of determination (R^2 = .095) for fortune telling indicates that predicting negative events accounts for 9.5% of the variance in health behaviors. The hypothesis that magnification would predict better health behaviors was not supported; however, a significant negative correlation was found (R = -.331, p < .01), suggesting that the more individuals magnify their problems, the less they engage in health behaviors. The coefficient of determination (R^2 = .110) indicates that 11% of the variance in self-reported health behaviors is attributable magnification. No significant correlation was found between emotional reasoning and health adherence behaviors. Correlations between cognitive distortions and health behaviors are found in Table 11.

Table 11

Correlations between Cognitive Distortions and HABIT Scores

	Pearson's Correlation	Sig. (1-tailed)	r^2
Minimization	-.296*	p<.01	.087
Fortune Telling	-.308*	p<.01	.095
Magnification	-.331*	p<.01	.110

*Correlation is significant at the .01 level

To test hypotheses 3 and 4, a *t*-test was planned originally to determine whether there is a difference in health adherence behaviors or cognitive distortions between individuals with a breast cancer mutation gene and high-risk individuals without a breast cancer mutation gene. Based on the fact that individuals had to get tested to know they have a breast cancer mutation gene, it was anticipated that women with the BRCA1 or BRCA2 gene would have better health adherence than individuals with a family history of breast cancer. Analyses could not be conducted because most participants did not test positively for the BRCA1 or BRCA2 mutation genes.

A *t*-test was going to be conducted to determine whether health adherence differs between individuals ages 18 to 39 versus individuals ages 40 to 89. Because older women tend to have more health conditions and become higher risk with age, it was predicted that older women, especially women who are postmenopausal, would have higher scores on the HABIT, indicating greater levels of medical adherence to physician recommended health behaviors. Unfortunately, the data output did not allow for this test to be run and, therefore, there are no results to report for hypothesis 5.

Chapter 6: Discussion

Implications

The purpose of this study was to examine the utility of cognitive distortions in predicting adherence to physician recommended health behaviors among women at risk for breast cancer, as breast cancer is the second leading cause of cancer deaths in women and the first leading cause of cancer deaths in women ages 35 to 50 (Siegel et al., 2015; Yarbrough & Braden, 2001). Research on the epidemiology of breast cancer indicates that there are both strong genetic and behavioral components that influence a woman's risk of breast cancer (McPherson et al., 2000). Additionally, a woman's lifetime risk of breast cancer is doubled to 20% if she has a first-degree family member with breast cancer and increases up to 80% if she has one of the breast cancer mutation genes (Siegel et al., 2015; Kuhl et al., 2005). As a result of these findings, there has been extensive research that has identified environmental and behavioral risk factors for breast cancer, as well as a variety of medical advances that identify genetic risk factors and improve early detection practices.

There is ample research that suggests the importance of living a healthy lifestyle, getting routine mammograms, and receiving genetic testing as variables that are important for early detection and prevention strategies (Cameron & Reeve, 2006; Cohen, 2006); however, research has been inconsistent regarding which variables influence whether women at risk for breast cancer will adhere to these recommendations. Researchers have utilized the HBM to identify factors that would increase adherence among women at risk for breast cancer. The premise of the HBM is that if an individual values health, accurately perceives his or her susceptibility, and believes he or she has

control over his or her behaviors, adherence should increase (Strecher & Rosenstock, 1997). Despite knowledge regarding increased susceptibility for breast cancer, there were no statistical difference in early detection practices, such as getting mammograms or performing breast self-examinations (Cohen, 2006). These results have serious implications, as it suggests that some women with a known lifetime prevalence of up to 80% for breast cancer are still not engaging in early detection practices and are engaging in health behaviors that may further increase their susceptibility. Furthermore, with low early detection practices and such a high susceptibility for breast cancer, it is likely that these women may not receive a breast cancer diagnosis until a late stage when the rate of mortality is much higher. These results indicate that valuing heath and being aware of susceptibility are not adequate in promoting adherence, and that other research must be done to identify variables that contribute to poor health behaviors. Therefore, this study aimed to identify other factors that may influence adherence among women at risk for breast cancer.

There is a dearth of research on cognitive distortions in relation to health adherence among women at risk for breast cancer; however, this study was inspired by research studies that suggest that cognitive distortions have been found to predict adherence behaviors in primary care settings for individuals with various other medical conditions. Research by Uhl (2007) examined the relationship between cognitive distortions and psychological and behavioral risk factors in a primary care setting. This study found that the more thinking becomes distorted, the more individuals were likely to suffer from various psychological and behavioral problems. Other research also found that irrational beliefs predicted health behaviors in both clinical and healthy populations

(Christensen et al., 1999), indicating that regardless of whether individuals suffer from chronic illnesses, cognitive distortions affect health behaviors. The study by Christensen, Moran, and Wiebe (1999) also found that irrational beliefs impacted psychological factors, such as negative affectivity, and predicted poorer health adherence for individuals with type I diabetes.

Results from populations with chronic illnesses exemplify the importance of using a biopsychosocial model when treating individuals in healthcare settings, as it demonstrates the undeniable relationship with between thinking, mental health, and physical health. Because breast cancer can be influenced strongly by both genetic and behavioral factors, understanding the relationship between distorted thinking and health behaviors is essential for women at risk. By identifying the relationship between distorted thinking and health behaviors, it is possible to implement psychological interventions that may increase adherence and, consequently, decrease mortality rates.

The purpose of this study was to determine whether cognitive distortions would predict adherence behaviors for women at risk for breast cancer. The primary aim was to contribute to the literature on adherence behaviors among women at risk for breast cancer with the hope that this information will help inform practice. Another aim was to identify factors that affect adherence, as a means of helping to improve prevention strategies and decrease mortality rates.

This study used the ICD—a questionnaire designed to identify the frequency and types of unhelpful thinking styles that are associated with individuals perceiving situations inaccurately—to predict scores on the HABIT——a measure designed to assess the degree to which individuals are adhering to physician recommended health

behaviors. Targeted questions regarding breast cancer screening procedures were also added to include specific breast cancer health behaviors, such as getting a mammogram and receiving genetic counseling.

The study yielded significant findings, indicating that as thinking becomes more distorted, adherence to health behaviors decreases. Results also identified specific cognitive distortions that predicted worse adherence, including minimization, the tendency to minimize the severity of problems, and fortune telling, the tendency to predict that outcomes will be negative.

This research has implications for future research to further explore potential interventions aimed at identifying maladaptive thought problems related to medical adherence, as a means of aiding women at risk for developing breast cancer. It is important that future research focus on targeting cognitive distortions among women at risk for breast cancer to potentially increase adherence behaviors and, therefore, increase early detection and decrease mortality rates. Research has demonstrated that cognitive behavioral interventions have been effective at improving adherence for individuals with HIV (Safren et al., 2009). Improvements in adherence were also maintained at both 6-month and 12-month follow-ups, demonstrating 10 to 12 sessions of cognitive behavioral treatment could lead to long-term improvements in health adherence.

Psychological interventions can be implemented in healthcare settings by administering questionnaires, such as the ICD, to identify women who are less likely to engage in health behaviors. The use of the ICD is of particular value because it was designed specifically to identify cognitive distortions based on A. T. Beck's cognitive theory. Because fortune telling and minimization have been shown to predict

nonadherence, it is also possible to administer items related to those specific subscales for screening purposes. For example, the subscale for fortune telling has specific items a person can endorse through statements such as "I feel like a fortuneteller, predicting bad things will happen to me" and "I act as if I have a crystal ball, forecasting negative events in my life," which indicate that the person feels as though he or she can predict the future. This can be problematic because when a person believes that he or she does not have control over what happens to him or her—in this case, that negative outcomes are inevitable, regardless of his or her behaviors—adherence behaviors are likely to decrease. With the identification of women at risk for nonadherence, it is possible that cognitive behavioral interventions provided by mental health professionals could be an essential component in improving early detection and prevention strategies.

Similarly, the identification of the cognitive distortion of minimization may be helpful to include in a screening for all women with a higher risk of breast cancer. Minimization refers to the tendency to grossly distort to the magnitude or significance of an event (J.S. Beck, 2011). There are two items on the ICD that make up the subscale of minimization, including "I underestimate the seriousness of situations" and "I find I have a tendency to minimize the consequences of my actions, especially if they result in negative outcomes." With this information, it can be easy to see that although a person has a 20% lifetime risk of breast cancer, he or she may minimize this risk by thinking there is an 80% chance he or she will not develop cancer. This may lead to nonadherence in regard to attending screenings, and could potentially also discount the possible effects of other health behaviors such as smoking or obesity, which have been found to increase the risk for breast cancer (McTiernan, 2003).

The literature suggests that integrated care and using a multidisciplinary approach to treat patients in primary care settings has yielded many benefits and improvements in patient care and health outcomes (DiTomasso, Golden, & Morris, 2009). The finding that cognitive distortions can predict health behaviors provides insight into why the movement towards integrated care in behavioral health settings may be helpful. It also suggests that there is likely a fundamental role for clinical psychologists in these settings. For example, it may be beneficial to screen for the severity of cognitive distortions as part of genetic counseling or primary health care visits in order to target individuals that may distort the results and, therefore, be less likely to follow up with regular breast cancer screenings. Targeting these women and explaining the potential advantages of brief psychological counseling may be instrumental in improving health adherence, given that cognitive behavioral interventions have been shown to increase adherence behaviors for individuals with chronic illnesses in a variety of other behavioral health settings (Sperry, 2009).

This research also has identified several specific cognitive distortions, including minimization, magnification, and fortune telling, which suggests that these cognitive distortions may be important to target when providing psychological interventions to patients in order to increase health behaviors and improve adherence to physician recommended health behaviors. It was predicted initially that the more individuals magnify their problems, the more they would engage in health behaviors. The findings indicated that magnification actually predicted worse health behaviors, which is consistent with the literature on avoidance. It is suggested that either too much or too little anxiety can be predictors of avoidance of getting screenings (Schwartz, Taylor, &

Willard, 2003). It is possible that as individuals intensify their problems, they become overly anxious about negative consequences and, consequently, do not engage in health behaviors in order to avoid having to cope with potential adverse results. It is also possible that as individuals magnify their situations, they may develop a sense of hopelessness or inability to control the outcomes, causing them to give up on potential health behaviors that may prevent cancer or increase the probability of early detection and treatment outcome. Additional research on cognitive distortions and avoidance can increase understanding of why some individuals are adherent or nonadherent to health behaviors, and can be used to generate ways to improve prevention strategies through methods such as psychoeducation and community outreach.

Limitations

There are several limitations to this study. First, the HABIT consists of true/false questions about health behaviors, which prevents the researchers from being able to adequately determine the degree to which individuals engage in health behaviors. Despite this limitation, this measure was used due to the lack of other adherence measures at this time. In addition, the data are based solely on self-report, which is not always the most accurate measure of behavior. Another limitation is that participants were self-selected, which may skew the results to indicate a greater level of medical adherence, as individuals who are more interested in breast cancer research and prevention may be more likely to participate in research. Additionally, subjects were recruited primarily from the Philadelphia area, which makes the results difficult to generalize to the entire breast cancer population because the city may not be representative of the United States population. Furthermore, 86.8% of participants in this

study are Caucasian; therefore, it is difficult to determine whether the results generalize to other ethnicities.

Another limitation is that the analyses intended to determine whether age is correlated with health behaviors were not able to be completed. This information may have important implications because if age is correlated with health behaviors, it could provide insight into which age group may be considered a more vulnerable population to be targeted for prevention and early intervention in behavioral health settings. This study also does not account for differences in cognitive distortions and health behaviors between SES, ethnicity, and other cultural variables, which may confound the results of the study because these variables have been implicated in adherence and cognitions in previous research, although the findings have been variable.

Future Directions

The findings of this study suggest that cognitive distortions impact health behaviors significantly. Due to an insufficient number of women who tested positively for the BRCA1 or BRCA2 mutation genes, statistics on adherence behaviors and cognitive distortions between individuals with a family history of breast cancer and individuals who tested positively for a breast cancer mutation gene could not be run. Therefore, future research examining differences in cognitive distortions and health adherence behaviors between these groups could have important implications in further understanding which individuals are more at risk and may need specific interventions that can lead to early detection and prevention strategies.

Males were excluded from the study due to a lower prevalence of breast cancer; however, it would be interesting to determine whether the results of this study generalize

to males with a family history of breast cancer. Future research could also conduct statistical analyses on all of the cognitive distortions on the ICD to determine whether there are additional cognitive distortions that predict adherence behaviors.

Finally, based on the findings of this study, it would also be important to conduct a longitudinal study to determine whether cognitive behavioral interventions increase health behaviors for women at risk for breast cancer over a longer period of time.

Summary and Conclusions

This study examined the relationship between cognitive distortions and health behaviors among women at risk for breast cancer. The findings of this study indicate that as the frequency of cognitive distortions increases, health behaviors decrease. More specifically, this study determined that minimization, magnification, and fortune telling predicted worse health behaviors. There was no correlation between the cognitive distortion of emotional reasoning and health behaviors. The results of this study have implications for the use of cognitive behavioral interventions in health care settings as a means of breast cancer prevention and early detection strategies to reduce breast cancer mortality rates.

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