

FACTORS AFFECTING SELF-EFFICACY IN CAREGIVERS OF LATINA  
BREAST CANCER SURVIVORS

by

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## ABSTRACT

**Introduction:** Informal caregivers provide the bulk of care to individuals with chronic diseases, including cancer. There were 2.8 million informal caregivers of cancer survivors in the United States in 2015. Informal caregivers are vulnerable to poor physical and emotional consequences related to their caregiving role. Caregivers of Latina breast cancer survivors have additional risks related to social determinants of health, which may be attenuated through increased caregiver self-efficacy. Therefore, the purpose of this study is to evaluate a moderating model of self-efficacy in caregivers of Latina breast cancer survivors between acculturation, spiritual well-being, and social support and global health and depression.

**Conceptual Model:** The theoretical framework for this project is grounded in Social Cognitive Theory (SCT) and is informed by Complex Adaptive Systems (CAS). Self-efficacy, from (SCT), is the belief in one's ability to achieve a desired outcome. It is the anchor of the proposed model for caregivers of Latina breast cancer survivors. CAS provides a framework for this model due to the complexity of caregiver contexts and relationships, particularly those from minority groups. CAS concepts such as interactions, self-organization, and emergence provide a backdrop for the relationships between caregiver factors and health outcomes through the influence of self-efficacy.

**Methods:** Secondary analysis was completed using data from a primary experimental study addressing a psychosocial intervention in Latina breast cancer survivors and their caregivers. Data were analyzed using SPSS for descriptive statistics and frequencies, correlational analysis, moderation analysis, and factor loading. Confirmatory factor analysis and path analysis were completed using AMOS.

Results: A total of 233 participants were included in the analysis. Caregivers were primarily women, of Mexican-American or Latino ethnicity, and low-income. There were significant relationships between caregiver Anglo-orientation, informational support, self-efficacy symptom management, self-efficacy cancer knowledge, and health outcomes. In moderation analysis, self-efficacy for symptom management significantly moderated the relationship between informational support and depression. This moderating effect was also noted in path analysis. Additionally, self-efficacy cancer knowledge had a significant moderating effect on the relationship between Anglo-orientation and depression in simple moderating analysis, while self-efficacy symptom management in path analysis had a trend towards a significant moderating effect on the relationship between Anglo-orientation and global health.

Conclusions and Implications: Caregivers of Latina breast cancer survivors are a unique caregiving population due to cultural norms that can serve as sources of strength and resilience along with social determinants of health that can contribute to poor health outcomes. Nurses and healthcare providers can support these caregivers more successfully by addressing cultural, spiritual, and informational needs. These factors, along with strategies to foster self-efficacy, may promote better health outcomes in caregivers of Latina breast cancer survivors.

## **CHAPTER 1: INTRODUCTION**

### **Caregivers of Latina Breast Cancer Survivors**

In 2015, there were 2.8 million individuals in the United States providing unpaid care to an adult with a primary diagnosis of cancer (National Alliance for Caregiving [NAC], 2016). Specifically, in the Latino population, one in five are unpaid family caregivers (NAC & American Association of Retired Persons [AARP] Public Policy Institute, 2015). Caregivers are the core of the health system in the United States (NAC, 2016; NAC, 2015; National Cancer Institute [NCI], 2017; Lovell & Wetherell, 2011). They also suffer significant physical and mental health consequences related to their caregiver roles, and these can be more acute in the Latino caregiver population due to cultural factors and social determinants of health (Pinquart & Sorenson, 2005; Vega et al. 2009). Therefore, the purpose of this study was to test a model of cancer caregiver self-efficacy in caregivers of Latina breast cancer survivors. The moderating relationship of self-efficacy between social support, acculturation, and spiritual well-being and global health and depression will be addressed.

### **Background**

Informal caregivers of cancer survivors navigate the paradox of being foundational to the healthcare system in the United States, while also being an unacknowledged and vulnerable partner of the healthcare team (NCI, 2017; Roche, 2009). Informal caregiving can be a mixed experience with caregivers experiencing both negative and positive consequences related to their role (NCI, 2017). Caregivers may experience significant negative consequences related to their caregiving role including: weight loss, sleep deprivation, depressive symptoms, anxiety, social isolation, and most troubling, increased risk of mortality (Perkins et al., 2013). Cancer caregiving

is more intense in time and caregiving activities than caregiving in other health conditions (NAC, 2016). Goren and colleagues reported (Goren et al., 2014) health impairments experienced by cancer caregivers including stress-related illnesses, work impairment, increased healthcare utilization, and poorer health-related quality of life. Increased risk of mortality has been noted in general for informal caregivers (Perkins et al., 2013; Schulz, & Beach, 1999) along with disruption of endocrine and immunologic function (Lovell & Wetherell, 2011). The positive consequences of caregiving include satisfaction and a sense of meaning in the caregiving experience (Schulz & Sherwood, 2008).

### **Financial Implications**

The time and financial contributions of informal caregivers, estimated at 37 billion hours of care and 470 billion dollars of unpaid contributions, are immense and irreplaceable (Reinhard, 2015). Chari (2015) estimated the annual cost of replacing the time and care provided by informal caregivers at 221 billion dollars in unskilled care and 642 billion dollars in skilled care (Chari, 2015). In Latino caregivers the financial burdens and contributions related to caregiving are more significant. For example, one in four Latino caregivers provide over 40 hours per week of care (NAC, 2015). Additionally, Latino family caregivers spend 44% of their annual income on out-of-pocket costs related to caregiving, compared to the average 20% spent by caregivers of other ethnicities (Rainville et al., 2016).

### **Barriers in Cancer Caregiving**

There are multiple stressors related to the caregiving role beyond the physical act of caregiving including: grief, informational needs, employment challenges, and lack of support from the health care system. Cancer caregivers may experience anticipatory and situational grief

as they watch their loved one suffer and anticipate death in end-stage cancer (Family Caregiver Alliance [FCA], 2013). They may be poorly prepared with the requisite knowledge for their caregiving role. Additionally, cancer caregivers may have difficulty finding financial, social, and informational support for their caregiving activities (FCA, 2006; NAC, 2015). Even more challenging for Latino caregivers is the need for and often lack of culturally sensitive support, including written and verbal information presented in Spanish (Evercare & NAC, 2008; Escarce, 2006; Gallagher-Thompson et al., 1997; Napoles, Chadiha, Eversley, & Moreno-John, 2010). Informal caregivers are usually uncompensated for their time, while being at risk for lost wages, job loss, and increased financial responsibilities for their loved ones with chronic illnesses (NCI, 2017; Rainville, 2016). Although caregivers play the primary role in care provision, caregivers are affected by their unacknowledged role and the lack of support they receive from the health care system emotionally, physically, financially, socially, and educationally (NCI, 2017; Roche, 2009; Silva, Teixeira, Teixeira, & Freitas, 2013; Tamayo, Broxson, Munsell, & Cohen, 2010).

### **Implications for Latino Cancer Caregivers**

In addition to the financial, physical, and emotional costs that are fundamental to the caregiver role, caregivers of Latina breast cancer survivors have the added weight of being an ethnic minority. For Latino family caregivers, caregiving situations are more intensive, informal caregiving is more common, and the adverse health consequences of caregiving are more pervasive (Committee on Family Caregiving for Adults [CFCA], 2016; Evercare & NAC, 2008; NAC, 2016; Pinquart & Sorenson, 2005). Latino or Hispanic are often used interchangeably to refer to someone of Hispanic origin (American Cancer Society [ACS], 2018). Hispanic is a socially and politically constructed federal designation in the United States that is separate from

race. Individuals of Hispanic origin may self-identify as any race, while Latino or Latina are self-designated terms of ethnicity (ACS, 2018). Latino and Latina are gendered terms used for male and female, respectively, although Latino is used as a collective term. There is movement towards the use of Latinx to avoid gendered terms, but uptake is not yet universal. For caregivers of Latina breast cancer survivors, caregiving is complicated by late stage of cancer diagnosis, more serious disease characteristics, later receipt of treatment, and higher risk of mortality (Miller et al., 2018; American Cancer Society [ACS], 2018).

Ethnic and racial minorities, such as Hispanics, in the United States are disproportionately affected by social determinants of health, along with cultural norms that may affect navigation of the healthcare system (Branin & Juarez, 2013; Grabovschi, 2013; NIH, 2010; Pinguart & Sorensen, 2005). The World Health Organization (WHO) describes social determinants of health as daily conditions such as access to health care, education, work conditions, leisure activities, homes, communities, and cities that rely on inequitable distribution of power, income, goods, and services on national and global levels (Commission on Social Determinants of Health [COSDH], 2008). This disparate distribution leads to poor health for individuals who are the most socially and economically vulnerable (COSDH, 2008). One example is the poorer health status and lack of healthcare coverage for immigrants in the United States (Kaiser Commission on Medicaid and the Uninsured, 2003, 2008). Hispanics are more likely to be uninsured than any other minority and the white majority (Cohen, 2018). Female minorities are also at greatest risk for health disparities (Sampsel, 2007). There are more female than male caregivers, overall, and the percentage of female caregivers is even higher in the Hispanic population (Badger et al., 2018b; Evercare & NAC, 2008; NAC, 2015). In addition,

minority females are more likely to engage in informal caregiving than their white counterparts (NAC, 2015). This intersection of risk creates an environment of greater vulnerability for caregivers of Latina breast cancer survivors (Sellman, 2005).

While ethnic minorities may have greater vulnerability due to social determinants of health (COSDH, 2008), patterns of self-efficacy in caregivers are not consistently reflective of this. In two studies, minority caregivers, including Hispanic caregivers, had greater self-efficacy and perceived control than white caregivers (Depp et al., 2005; Namkung, Greenberg, & Mailick, 2017). Despite having more demanding caregiving situations than the average family caregiver, Hispanic family caregivers report being fulfilled in their caregiving role. They also report their caregiving role as an expectation of their upbringing (Evercare & NAC, 2008). On the other hand, minority caregivers may experience unique challenges related to cancer caregiving such as lower education levels, socioeconomic status, and greater provision of care (Pinquart & Sorensen, 2005). Specific to Hispanic caregivers, insurance status, income level, level of income investment, time spent caregiving, and need for culturally-relevant information all lead to complex barriers to caregiving (Evercare & NAC, 2008; Cohen, 2018; Rainville, 2016; Tienda, 2006). This divergence in self-efficacy outcomes for ethnic minorities demonstrates the phenomenon found in complex adaptive systems where diverse outcomes may occur in the presence of the same stimulus (Notarnicola et al., 2017).

### **Cancer Caregivers in the Family System**

Cancer is a family experience affecting all members through changes in routine and family member roles (Wozniak & Izycki, 2014). Caregivers simultaneously influence the family system and are influenced by it through family roles, caregiving, and health behaviors (CFCA,

2016). Caregivers often prioritize the well-being of those they care for, so their self-care behaviors may be limited, leading to increased mental, emotional, and physical distress (CFCA, 2016; Bevans & Sternberg, 2012; Collins & Swartz, 2011; Perkins et al., 2013). Research has demonstrated the interdependent nature of caregiver and patient dyad characteristics, with health and emotional outcomes in one influencing health and emotional outcomes in the other. This has been specifically addressed in Latina breast cancer survivors and caregivers, with greater distress in one being associated with greater distress in the other (Ellis et al., 2017; Kershaw et al., 2015; Segrin & Badger, 2014; Segrin, Badger, Sikorskii, Crane, & Pace, 2018).

Self-efficacy has also been evaluated, with lower levels of self-efficacy and higher levels of distress in caregivers being associated with lower levels of self-efficacy and higher levels of distress in cancer survivors (Ellis et al., 2017). Self-efficacy contributes to health outcomes through both the stress response and behavior adoption, both of which are relevant to cancer caregivers (O'Leary, 1992). Therefore, understanding the holistic factors that contribute to caregiver self-efficacy has the potential to improve self-efficacy and well-being for both caregivers and cancer survivors.

### **Philosophical Approach**

Complex adaptive systems will provide the philosophical underpinnings for this study. Complex adaptive systems are viewed as systems with multiple components that may have many-to-one or many-to-many mapping of functions and interactions (Hong & Hain, 2016). In complex systems, the whole is viewed as greater than the sum of its parts. Complex systems are flexible with the ability to adapt or self-regulate if one component is affected negatively (Hong & Hain, 2016; Sturmberg, 2016). In addition, complex systems are open to the environment and

experience emergence, which results in the potential for resilience (Sturmberg, 2016). Finally, complex adaptive systems may be nested within each other and interact with one another. The health care system, the family system, the relationship between caregiver and cancer survivor, and caregivers alone are complex systems (Sturmberg, 2016).

### **Theoretical Framework**

System behavior is key to complex adaptive systems, and this study will use Bandura's Social Cognitive Theory and as the theoretical framework to understand caregiver behavior and outcomes. In Bandura's theory, reciprocal interactionism occurs among personal, environmental, and behavioral factors that affect behavioral change (Bandura, 1977). Fundamental to this theory is the concept of self-efficacy, which is both being a self-agent and believing in one's ability to achieve a desired outcome (Bandura, 1977; Bandura, 2001). Self-efficacy is influenced by factors such as vicarious experiences, performance accomplishments, verbal persuasion, and physiologic arousal (Bandura, 1977). Bandura posited the concept of collective self-efficacy where groups could have a unified belief in the group's ability to create change, or if described in complex adaptive system terms, experience emergence (Bandura, 2001; Hong & Hain, 2016).

Resilience, emergence, and self-efficacy are the intersections of complex adaptive systems and social cognitive theory. Fundamental to personal resilience is one's intrinsic beliefs in self and the ability to change and overcome challenges (Schwarzer & Warner, 2013). In this study, the proposed model of self-efficacy is focused on the caregiver alone and their perceived self-efficacy to navigate cancer care and manage their own symptoms. While this remains the primary focus of the present study, the ultimate goal is to build on the findings of this study for a broader systems view of caregiver self-efficacy, resilience, and health emergence, and address

this within the caregiver-survivor system, the family system, and the system of the health care team.

Researchers have addressed the interactions of self-efficacy with mental and emotional health (Duggleby, Doell, Cooper, Thomas, & Ghosh, 2014; Ellis et al., 2017; Kershaw et al., 2015), spirituality (Pearce, Singer, & Prigerson, 2006), educational interventions (Havyer, van Ryn, Wilson, & Griffin, 2017), and support interventions (Knoll, Scholz, Burkert, Roigas, & Gralla, 2009). Self-efficacy influences human behavior through perceptions, goals, and patterns of thinking. In cancer caregivers, self-efficacy has the potential to enhance caregiver's perceptions related to their ability to engage in self-care and address cancer survivor symptom management, medication administration, and health care system navigation (Bandura, 2006). In a study of mental health caregiving, researchers noted self-efficacy as a source of resilience for caregivers, by promoting positive physical and emotional outcomes in caregivers (Zauszniewski, Bekhet, & Suresky, 2010). In other studies, researchers have noted the relationship between cancer caregiver self-efficacy levels and factors such as caregiver burden, mental health, and hope (Duggleby et al., 2015; Kershaw et al., 2015; Yildiz, Karakas, Gungormus, & Cengiz, 2017).

It is evident that self-efficacy plays a role in holistic cancer caregiver outcomes, although no specific models of self-efficacy have been proposed for caregivers of Latina breast cancer survivors (Duggleby et al., 2015; Kershaw et al., 2015; Yildiz et al., 2017; Zauszniewski et al., 2010). Models in healthcare practice and research are mechanisms that guide practice or help explain phenomenon. They are not demonstrations of ultimate truth, although they do allow providers and researchers to frame health needs and phenomenon in an understandable way

(Pincus, 2010). Kershaw and colleagues (2008) included self-efficacy as a personal factor in a longitudinal model of quality of life with caregivers and cancer survivors. They noted that self-efficacy affected levels of uncertainty in both caregivers and cancer survivors, and patient self-efficacy had indirect effects on mental quality of life (Kershaw et al., 2008). These findings are valuable in their demonstration of self-efficacy and its effect on uncertainty and quality of life, but the purpose of the model was not to highlight self-efficacy. There is a need for a holistic caregiver self-efficacy model which addresses self-efficacy as a moderating variable. Self-efficacy may affect the strength of relationships between health outcomes and factors such as social support, acculturation, and spiritual well-being.

Caregivers of Latina breast cancer survivors are a unique population to consider in terms of self-efficacy and resilience. First, prior research has demonstrated higher levels of self-efficacy (Depp et al., 2005), although this population may be at greater risk due to health disparities (Escarce, 2006). There are also factors to consider in this population including *familism* as a potential source of social support (Brooks, Andrade, Middleton, & Wallen, 2014), the Hispanic paradox (Teruya & Bazargan-Hejazi, 2013), spirituality as a resilience mechanism (Koerner, Shirai, & Pedroza, 2013), acculturation (Escarce, 2006), and sociocultural barriers to interacting with the healthcare system (Escarce, 2006).

### **Study Aims**

The purpose of this study was to test a model of self-efficacy in caregivers of Latina breast cancer survivors (Figure 1). The specific study aims were:

1. To identify relationships between caregiver context, social support, and spiritual well-being as predictor variables and mental health and global health as outcome variables.

Research Questions:

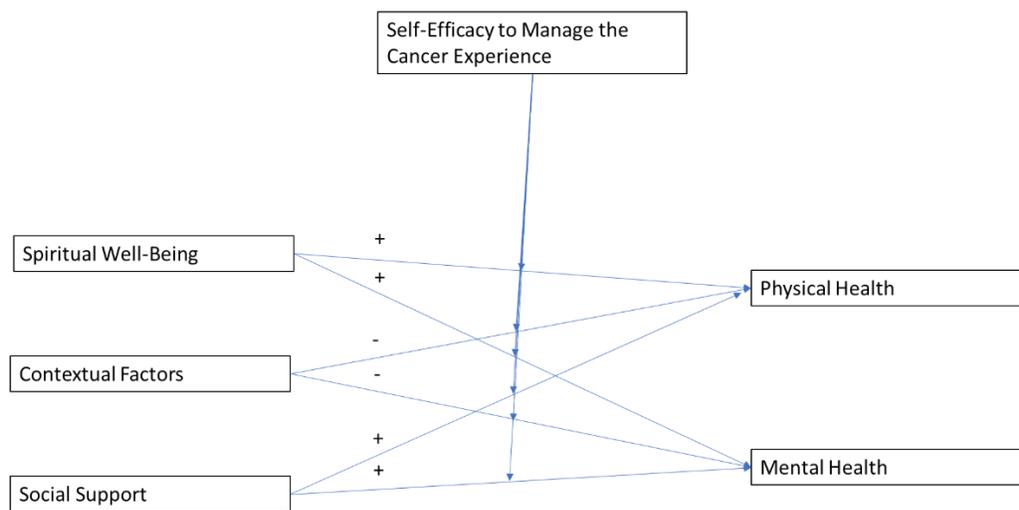
- a. Are variables of caregiver context (Anglo-orientation, gender, annual income, and education) negatively associated with emotional/mental health and global health?
  - b. Is social support positively associated with mental health and global health?
  - c. Is spiritual well-being positively associated with mental health and global health?
2. To identify relationships between self-efficacy and caregiver context, social support, spiritual well-being, mental health, and physical health.

Research Question:

- a. Is self-efficacy associated with caregiver context, social support, spiritual well-being, mental health, and global health?
3. To test the proposed cancer caregiver self-efficacy model through structural equation modeling (SEM) (Figure 1).

Research Questions:

- a. Does self-efficacy moderate the relationships between caregiver context and mental health and global health?
- b. Does self-efficacy moderate the relationships between social support and mental health and global health?
- c. Does self-efficacy moderate the relationships between spiritual well-being and mental health and global health?
- d. Does the model demonstrate pathways with interaction effects of self-efficacy on relationships between predictor variables (spiritual well-being, social support, and acculturation) and outcome variables (global health and mental health)?



*FIGURE 1.* Model of caregiver self-efficacy.

### Definitions of Terms

The following terms with associated definitions were used throughout this study with reference to measures, characteristics, or factors representing caregivers of Latina breast cancer survivors:

1. Cancer caregiver or caregiver of Latina breast cancer survivor: informal caregiver, primarily family members, although other personal relationships may be included (NAC, 2016).
  - a. Cancer caregivers of Latina breast cancer survivors were the population of interest in this study.
2. Cancer survivor: An individual from the time of cancer diagnosis to the end of life (NCI, n.d.).
  - a. Cancer survivors were not participants in this study, but they provided the background for the caregiving role for participants in this study.

3. Caregiver disease-related self-efficacy: This is a situation-specific definition of self-efficacy that covers cancer knowledge and decision-making, and management of personal symptoms (Bandura, 2006).
  - a. This was represented by two 1-item scales: self-efficacy to make treatment-related decisions and self-efficacy to manage personal symptoms
4. Health: The state of physical, mental, and social well-being rather than the absence of disease or infirmity (WHO, n.d.).
  - a. Global health: The experience of overall health, including physical and mental health. This was represented by a global health scale.
  - b. Mental health: The experience of mental or emotional distress as indicated by presence of anxiety or depressive symptoms. This was represented by distress scales addressing anxiety and depression.
5. Social support: The social structure and relationships in an individual's life including perceived and received support. Informational support is a type of functional support while emotional support addresses expression of caring and affection (Kent de Gray, Uchino, Trettervik, Cronan, & Hogan, 2018).
  - a. This will be represented by informational and emotional support scales.
6. Spiritual well-being: Spirituality is innate to humans, and it encompasses hope, a sense of connectedness, and a sense of meaning or purpose. This sense of connectedness and meaning may be expressed through behaviors such as religious activities and spiritual practices (Chirico, 2016; Ferrell, Dow, & Grant, 2012).

- a. This was represented by a spiritual well-being subscale addressing involvement in religious activities, such as church attendance, and spiritual practices, such as prayer.
7. Caregiver Context: Factors related to the context of caregivers and their experience of health. These are primarily social determinants of health such as socioeconomic status, education level, gender, and acculturation (COSDH, 2008).
    - a. This was represented by demographic data such as gender, education level, and annual income.
    - b. Acculturation was represented by an acculturation subscale addressing Anglo-orientation for Hispanics. Anglo-orientation, which addresses cultural orientation towards non-Hispanic white or Anglo culture, is one facet of acculturation (American Psychological Association [APA], 2019). It was the focus for this study.

### **Significance of the Study**

The potential contribution of this study was to enhance current understanding of self-efficacy in caregivers of Latina breast cancer survivors for multiple reasons. First, this model was developed and tested in a simultaneously vulnerable and resilient group, caregivers of Latina breast cancer survivors. In this sample, a majority of caregivers are of Latina or Hispanic origin (Badger, Segrin, Sikorski, Pasvogel, Weihs, Lopez, & Chalasani, 2018a). This caregiver group has vulnerabilities related to social determinants of health and gender of the caregiver (Badger, Sikorskii, & Segrin, 2018b; Escarce, 2006), and protective factors related to cultural norms such as *familism* and spiritual practices (Badger et al., 2018b; Brooks et al., 2014; Koerner et al.,

2013). Many models are tested primarily in White, non-Hispanic populations and then translated to ethnic and racial minorities. This study did the opposite through initial testing in the Latino population.

Caregivers of Latina breast cancer survivors are a vulnerable group due to challenges related to caregiving as well as being underestimated and unacknowledged (Sampsel, 2007). Vulnerability has been described in terms of race, income level, sex, sexual orientation, age, religion, immigrant status, and physical health, but vulnerability occurs on a broader level as a lived experience and as an intersection of risk (Flaskerud et al., 2002; Grabovschi, 2013; Sellman, 2005). Broadly, caregivers of cancer survivors experience risk physically, mentally, emotionally, and financially due to their caregiving role (NCI, 2017). Specifically, minority caregivers experience additional risk related to social determinants of health such as education, healthcare access, socioeconomic status, ethnicity, and culture (Evans & Ume, 2012; Grabovschi, 2013; NIH, 2010). Latina caregivers have these additional risks along with having higher caregiving burden situations and higher financial investment with their caregiving roles (Evercare & NAC, 2008; Rainville, 2016).

Second, while studies have addressed self-efficacy in cancer caregivers in multiple ways, it remains poorly understood and conceptualized. In this study, a situation-specific model in caregivers of Latina breast cancer survivors was developed that may contribute to larger translation in the future. In complex adaptive systems, a key feature is openness to the environment and system vulnerability (Notarnicola et al., 2017). As described above, Latina cancer caregivers are potentially vulnerable systems. Another important aspect of complex adaptive systems is the ability to self-organize and adapt, which leads to resilience (Hong &

Hain, 2016). Bandura described self-efficacy as a factor in resilience (Bandura, 1990). A key feature of Bandura's model is the reciprocal interactions between behavior, environment, and personal factors (Bandura, 1977). This is reflective in complex systems, where there are nested systems that influence each other, the systems are open to the environment and reciprocally influencing the environment, and there are feedback loops among nodes or components (Sturmborg, 2016). In this study, self-efficacy was viewed as a resilience factor for caregivers of Latina breast cancer survivors through its interaction with predictor variables (Anglo-orientation, spiritual well-being, and social support) as they relate to health outcomes.

Finally, caregivers are an often forgotten and neglected group within the health care system, but they are vital to the care and well-being of individuals with chronic disease. Latino caregivers, specifically, are significant contributors to the care of their loved ones, while navigating the challenges of being an ethnic minority (Evercare & NAC, 2008). Caregivers in the Hispanic community are more often female and may be more prone to neglecting their own needs while taking care of others (Badger et al., 2018b; Evercare & NAC, 2008; NAC, 2015). Developing models to promote self-efficacy and resilience may contribute to Latina caregiver well-being.

### **Organization of the Dissertation**

The remainder of this dissertation is organized as follows: an overview of the extant literature related to self-efficacy in caregivers of cancer survivors; description of data collection, data management, and data analysis methods; results; discussion of findings and conclusion. Three manuscripts are included as appendices. Manuscript one focuses broadly on the state of the science of self-efficacy in caregivers of cancer survivors. The author conceptualized the

manuscript, conducted the literature search and review, and prepared the manuscript with support from additional authors. Manuscript two is a methods paper describing structural equation modeling in secondary data analysis. The author also conceptualized the manuscript topic, searched and evaluated the literature, and developed the manuscript with support from the other authors. Manuscript three is a research report of this analytical study, testing a model of self-efficacy in caregivers of Latina breast cancer survivors. The model was conceived by the author and applied to the proposed dataset with support from the author's advisor, Dr. Terry Badger. The data analysis was conducted by the author with statistical support from a statistician, and the manuscript was prepared by the author with feedback and contributions from the committee.

## **Conclusion**

Caregivers of cancer survivors are a vulnerable group, and family caregivers of Latina cancer survivors are especially vulnerable related to social determinants of health. The health and well-being of caregivers is at risk due to the demands of caregiving. Caregiver self-efficacy and distress influences survivor self-efficacy and distress. Through a better understanding of the interaction effects of self-efficacy between caregiver characteristics and health outcomes, which was the goal of this study, the health of caregivers of Latina breast cancer survivors may be better supported.

## **Health Outcomes, Contextual Factors and Self-Efficacy in Latina Cancer Caregivers**

The purpose of this section is to review the literature associated with the proposed constructs in this study including: self-efficacy, caregiver context, spiritual well-being, social support, mental and emotional health, and physical health. This will be approached in cancer caregiving overall and then applied specifically to caregivers of Latina breast cancer survivors.

### **Self-Efficacy and Cancer Caregivers**

Self-efficacy may be represented as a predictor, outcome, or moderating variable, depending on the study (Bachner & Carmel, 2009; Ellis et al., 2017; Kershaw et al., 2015; Michael, O'Callaghan, Baird, Hiscock, & Clayton, 2014; Mori et al., 2013; Northouse et al., 2014; Zhang, Edwards, Yates, Guo, & Li, 2013). Because of this, the role of self-efficacy in cancer caregivers is poorly understood. When approaching self-efficacy with a CAS perspective, it is reasonable to expect that self-efficacy would interact with other variables in multiple ways (Notarnicola et al., 2017). To date, there is not a clear understanding regarding what might help support greater self-efficacy and how self-efficacy might affect cancer caregiver outcomes. Theoretically, Bandura (1977) proposed four mechanisms for self-efficacy development including performance accomplishments, vicarious learning, physical and mental stimuli, and verbal persuasion. Self-efficacy itself is the personal belief that one can engage in behavior to achieve a desired outcome (Bandura, 1977).

The literature for caregivers of adult cancer survivors demonstrates a clear relationship between higher self-efficacy levels and improved emotional health outcomes, although the evidence for physical health outcomes is less defined (Hebdon, 2018; La & Yun, 2017; Lee et al., 2013; Mystakidou et al., 2013; Oh, 2017). There are studies that have addressed self-efficacy as an outcome variable with educational, psychosocial, or physical health-related interventions in cancer caregivers and/or survivors, with either increased self-efficacy following the intervention (Bevans et al., 2014; Dockham et al., 2016; Duggleby & Williams, 2010; Hendrix et al., 2016; Lee, Yiin, & Chao, 2016; Leow, Chan, & Chan, 2014; Li, Xu, Zhou, & Loke, 2015; Marshall et al., 2013; Mosher et al., 2016; Northouse et al., 2014; Northouse et al., 2013; Stacey, James,

Chapman, & Lubans, 2016; Stoutenberg, Sogor, Arheart, Cutrono, & Kornfeld, 2016; Titler et al., 2017) or no change in self-efficacy (Duggleby et al., 2017; Duggleby & Williams, 2010; Mosher et al., 2017; Sun et al., 2017). There is a large gap in the research regarding social determinants of health and self-efficacy levels in caregivers. Social determinants of health along with cultural factors are key contextual issues for caregivers of Latina breast cancer survivors. This reinforces the need for a holistic model of self-efficacy in this population that might serve as a framework for future research and practice interventions.

### **Caregiver Context and Self-Efficacy**

There is a significant gap in the literature regarding the relationship between caregiver contextual factors such as social determinants of health and self-efficacy. This relationship is vitally important to the experiences of Latina cancer caregivers due to the intersections of culture, social factors, and the caregiving experience (Badger et al., 2018b). Therefore, this portion of the discussion will focus on social determinants of health that could be influenced by self-efficacy in caregivers of Latina breast cancer survivors. Social determinants of health are physical, social, and environmental contexts that contribute to health disparities in vulnerable groups (COSDH, 2008). Contextual factors are the main source of risk for caregivers of Latina breast cancer survivors due to cultural, social, economic, and physical barriers to care (Escarce, 2006; Vega, Rodriguez, & Gruskin, 2009).

Socioeconomic challenges are relevant for cancer caregivers due to inadequate social policy and gender norms for caregiving. Caregivers suffer financially due to lost wages, unemployment, or early retirement, and caregivers are not adequately supported through current social policy in the United States (FCA, 2009; Eckenwiler, 2007; Reinhard, 2015). Caregivers

may have more financial barriers to seeking health care than non-caregivers (Castellanos & Nikpay, 2017). Women continue to be the largest proportion of caregivers in the United States. (FCA, 2009). In the Hispanic and Latino population, the proportion of female caregivers is even higher, the amount of care and financial contribution they provide is greater, and their baseline income is lower (NAC, 2015; Rainville, 2016). Ginossar (2014) reported lower health prevention seeking behaviors, specifically for cancer prevention, in minority cancer patients and caregivers with lower educational levels and household incomes. The risk increased for Spanish-speaking Hispanics (Ginossar, 2014).

Other contextual challenges are disparities that exist due to levels of acculturation, cultural norms, and language barriers. Acculturation is an important factor in Hispanic health, and is a primary emphasis in this study, with individuals who are more acculturated experiencing disease at higher rates, but also being more likely to access health care (Perez, 2015). Many researchers have noted the influence of acculturation on health outcomes, with situation-dependent relationships between degree of acculturation and better or worse health (Abraido-Lanza, Echeverria, & Florez, 2016; DeSanto-Madeya et al., 2009; Dominguez, 2015; Escarce, 2006; Teruya & Bazargan-Hejazi, 2013). Caregiver end-of-life decision-making are affected by acculturation with less acculturated individuals seeking less information and relying more on the community than the medical team for support (DeSanto-Madeya et al., 2009). Finally, cultural values including *familism*, spiritual practices, and community relationships may be different among more-or-less acculturated caregivers, resulting in variable experiences of social support (Abraido-Lanza et al., 2016).

The cultural norms of *familism* may be both protective as well as sources of vulnerability for Latina caregivers. Along with *familism* are the gendered concepts of *marianismo* and *machismo*. While the actual lived experience of Latina caregivers may vary, these cultural values can influence perceptions and role enactment. *Marianismo* is the prescribed role for women, emphasizing a virtuous life through exceptional caregiving and the subjugation of individual needs for the well-being of others (Badger et al., 2018b). Alternatively, *machismo* focuses on males as the source of strength, protection, and income for the family (Badger et al., 2018b). Again, how these roles play out in day-to-day life varies for individuals, but statistically there is evidence that the caregiving role more often falls on Latinas (Evercare & NAC, 2008). Additionally, caregiving is culturally embedded for Hispanics, so expectations about time, money, and caregiving investment may be higher for this population (Badger et al., 2018b; Evercare & NAC, 2008; Pharr, Terry, & Clark, 2014).

Researchers have discussed the challenge of providing culturally tailored care for caregivers and individuals with chronic illnesses, due to both the individualized and cultural needs of individuals who may also experience significant health disparities (Napoles et al., 2010; Pinquart & Sorensen, 2005). A major aspect of culturally-tailored care is information provision provided in an understandable format based on language and health literacy. Researchers have noted the relationship between lower health and lower functional health literacy in informal caregivers (Easton, Entwistle, & Williams, 2010). Hispanic caregivers report the desire and need for health information, especially information provided in Spanish (Evercare & NAC, 2008). Badger and colleagues (Badger et al., 2018a; Badger et al., 2013) conducted educational studies with cancer caregivers where disease-related information was tailored to preferred language and

appropriate health literacy levels. Caregivers reported benefit from the intervention and appreciation for materials provided in their preferred language (Badger et al., 2013).

The environment, including community characteristics, safety, neighborhood amenities, and access to care are key contextual factors related to health disparities. In a systematic review of literature reviews addressing psychosocial risk factors, Egan, Tannahill, Petticrew, and Thomas (2008) noted that better health outcomes were generally noted in more favorable psychosocial environments. They defined psychosocial environments by levels of community cohesion, social capital, neighborhood desirability, and the range of opportunities (Egan et al., 2008). Hispanics, while they may have community cohesion, generally live in lower income areas with higher-risk environments (Escarce, 2006). The physical environment, along with financial, language, cultural, and social barriers all contribute to health care access challenges for Hispanic caregivers (Escarce, 2006).

### **Spiritual Well-Being and Self-Efficacy**

The connection between self-efficacy and spiritual well-being is not fully understood. Spiritual well-being encompasses hope, a sense of connectedness, and a sense of meaning or purpose (Ferrell, 2012; Newberry et al., 2013). Spirituality may act as a buffer for adverse health outcomes in caregivers of cancer survivors (Newberry et al., 2013), which may be a connection point between self-efficacy and spiritual well-being. This discussion will address the relationship between spirituality and self-efficacy in informal caregivers broadly, along with Hispanic and Latino caregivers, specifically.

Overall, the relevance of spirituality in caregiving has been noted broadly. Evidence supports the relationship between higher self-efficacy and spirituality in caregivers through

factors such as greater hope, decreased hopelessness, collaborative spiritual coping (higher self-efficacy and higher spirituality) and lower distress, and greater spirituality and decreased depression (Duggleby et al., 2014; Juan Aníbal & Adam, 2018; Kershaw et al., 2008; Lopez, Romero-Moreno, Marquez-González, & Losada, 2012). The importance of hope and spirituality in the cancer caregiving experience was echoed in a qualitative study of Mexican-American cancer caregivers along with the importance of a belief in God (Cagle & Wolff, 2009). Additionally, supportive interventions in cancer caregivers and survivors may result in greater spiritual well-being (Badger et al., 2011).

Spirituality may be a protective factor in Latino and Hispanic caregivers. It is a Hispanic cultural norm that may affect the Hispanic paradox through the connection between spirituality and community (Badger et al., 2018b; Gallegos & Segrin, 2018). This idea was noted in a qualitative study, with caregivers describing the connection between their spiritual practice and family (Koerner et al., 2013). Spirituality has also been described as an anchor during the cancer caregiving experience for Latinos, and both internal and organizational spirituality may result in lower perceived caregiver burden (Delgado-Guay et al., 2017; Herrera, Lee, Nanyonjo, Laufman, & Torres-Vigil, 2009). Latina cancer caregivers may even be selected by survivors for their caregiving role due to their religious beliefs (Badger et al., 2017).

### **Social Support and Self-Efficacy**

Social support factors for caregivers include the amount of social support provided by the family system, community support from friends and religious affiliations, and support from team members in the healthcare system (CFCA, 2016). Social support is primarily divided into four areas including emotional support, informational support, tangible support (goods & resources),

and appraisal (information for self-evaluation) (Glanz, Riner, & Viswanath, 2008). Individuals may receive support in all of these domains from family, community, or healthcare team members. Researchers have addressed social support and self-efficacy through interventional and observational studies. Many interventional studies have focused on social support and self-efficacy as outcomes, with both factors increasing following the interventions (Leow, Chan, & Chan, 2013; Parker Oliver et al., 2017). In two studies of dementia caregivers, self-efficacy and social support were described as co-predictors of caregiver depression levels (Park, Tolea, Arcay, Lopes, & Galvin, 2018), and self-efficacy was a partial mediator between social support and depressive symptoms (Au et al., 2009). Additionally, organizational support was predictive of self-efficacy for pain management in family cancer caregivers (Kizza & Maritz, 2018). Interestingly, being the provider of social support to a patient was longitudinally correlated with higher self-efficacy levels in caregivers of prostatectomy patients (Knoll, Scholz, Burkert, Roigas, & Gralla, 2009).

Social support may be an important factor in the well-being of caregivers of Latina breast cancer survivors. Latina caregivers are providers of social support for cancer survivors, but they also benefit from receiving social support (Badger et al., 2017). *Familism* is a core cultural concept in Hispanic and Latino culture that may be more-or-less relevant, depending on individual characteristics such as family relationships, family proximity, and acculturation (Badger et al., 2018b; Tienda, 2006). Family support may affect physical and mental health in Latina caregivers, and there is evidence that mental health in Latina breast cancer survivors may be impacted by loneliness in their partners, who are often their caregivers (Mulvaney-Day et al., 2007; Segrin, Badger, & Pasvogel, 2015).

### **Physical Health and Self-Efficacy**

The relationship between health and self-efficacy has been addressed both through observational and interventional studies. In observational studies of cancer caregivers, higher self-efficacy levels were associated with higher physical health ratings (Kershaw et al., 2015) and lower levels of symptom distress (Ellis et al., 2017). Additionally, self-efficacy acted as a mediator between symptom distress and threat appraisals related to cancer situations (Ellis et al., 2017). Quality of life also encompasses physical and mental health, and both Ito and Tadaka (2017) and Duggleby et al. (2015) noted a relationship between greater quality of life and greater self-efficacy levels in caregivers of terminal cancer patients (Duggleby et al., 2015; Ito & Tadaka, 2017). Alternatively, Barber (2013) did not identify relationships between self-efficacy and physical health or social support, but noted that caregivers reported higher physical quality of life than cancer survivors (Barber, 2013). In two intervention studies, researchers noted the relationship between physical activity interventions and greater self-efficacy levels (Stacey et al., 2016; Stoutenberg et al., 2016).

Physical health and self-efficacy apply to the experience of caregivers of Latina breast cancer survivors due to the Hispanic paradox, the known health challenges in the Hispanic and Latino populations, and what caregivers report about their health. The Hispanic paradox is the phenomenon of better than expected health and mortality in immigrants, primarily from Mexico, who also experience low socioeconomic status (Teruya & Bazargan-Hejazi, 2013). This perspective has been questioned by researchers, due to differences among Hispanic and Latino groups and representativeness of data for undocumented, uninsured, underserved, and sick individuals (Teruya & Bazargan-Hejazi, 2013). Interestingly, the Centers for Disease Control

and Prevention (CDC) reported that Hispanics had lower death rates for most leading causes of death and lower prevalence of cancer, heart disease, and smoking (Dominguez, 2015). Death rates were higher for diabetes, liver disease, homicide, hypertension, and hypertensive renal disease along with higher prevalence of obesity and uncontrolled hypertension. Hispanics born in the United States had higher disease prevalence than their foreign-born counterparts. Decreased health care and preventive care service access were also noted, with 41.5% of Hispanics lacking health insurance (Dominguez, 2015). Specific to caregiving, Hispanic and Latino caregivers reported little to no caregiving strain in a national survey of informal caregivers (Evercare & NAC, 2015). And Pinguart and Sorenson (2005) reported more physical health issues in Hispanic and other minority caregivers than White caregivers. These findings are reflective of complexity in interactions among social determinants of health, acculturation, behavior, and disease in Latina caregivers (Badger et al., 2018b; Hong & Hain, 2016).

### **Mental Health and Self-Efficacy**

Many researchers have noted the relationship between self-efficacy and mental and emotional health outcomes including caregiver burden, appraisals of caregiving, anxiety and depressive symptoms, threat appraisals, and overall mental health symptoms in cancer caregivers. Yildiz et al. (2017) noted lower caregiver burden with higher levels of self-efficacy. In addition, self-efficacy may mediate the relationship between caregiver burden and quality of life (Wang, 2015). Appraisals of caregiving, including threats and overall appraisals of the experience are better with greater self-efficacy levels (Ellis et al., 2017; Kershaw et al., 2008). In multiple studies, anxiety and depression levels were lower in the presence of greater self-efficacy (Lee et al., 2013; Mystakidou et al., 2013; Perz, Ussher, Butow, & Wain, 2011; Ugalde,

Krishnasamy, & Schofield, 2014), and overall mental health was higher longitudinally with greater self-efficacy at baseline in another study (Kershaw et al., 2015).

There is a research gap related to the relationship between mental and emotional health and self-efficacy in Latina caregivers. Additionally, factors related to mental and emotional health in caregivers of Latina breast cancer survivors are similar to the complex manifestations of physical health described earlier. In a systematic review, Teruya and Bazargan-Hejazi (2013) reported lower mood, anxiety and substance use disorders in Mexican-American immigrants, although the stress of migration may increase the risk of depression and anxiety in first-generation immigrants. Additionally, mental health protection among Mexican-Americans does not extend to other Latino populations, such as Puerto Ricans or Cuban Americans (Teruya & Bazargan-Hejazi, 2013). Interestingly, Piquart and Sorenson (2005) reported that Hispanic caregivers had more depressive symptoms than their non-Hispanic white peers. Factors that may affect mental health include social support, acculturation, insurance status, and undocumented status (Badger et al., 2018b; Mulvaney-Day, Alegria, & Sribney, 2007; Teruya & Bazargan-Hejazi, 2013; Tienda, 2006).

### **Conclusion**

In cancer caregivers, self-efficacy has been investigated in relationship to mental and emotional health, physical health, and social support, although its role remains less well-understood in spiritual well-being and social determinants of health. Social determinants of health, spiritual well-being, and social support are culturally and socio-politically important to the health experiences of caregivers of Latina breast cancer survivors. More research is needed to

fully understand the role of self-efficacy and the relationships among these factors in this population.

## **CHAPTER 2: PRESENT STUDY**

### **Study Methods**

Secondary baseline data from an experimental study addressing a psychosocial intervention for Latina breast cancer survivors and their nominated caregiver was used for this research project. Only caregiver data were used in this analysis. The primary focus of statistical analysis was structural equation modeling to test the proposed model of self-efficacy in caregivers of Latina breast cancer survivors. The purpose of this chapter is to review the primary study and outline the methods that were used for sampling, measurement, data management, data analysis, and promotion of rigor.

### **Description of Primary Study**

The primary study was conducted by Dr. Terry Badger and her research team (T. A. Badger, 2012-2018). It was an experimental study testing two psychosocial interventions in Latina breast cancer survivors and their nominated caregivers in the Southwestern part of the United States. The data presented in this report were collected prior to the interventions and were based on self-report (Badger et al., 2019a).

Purposive sampling of cancer survivors occurred through direct contacts at a regional cancer center, community health clinics serving primarily Latina/o residents, survivorship conferences, breast cancer support groups, placement of brochures in oncology and women's health clinics, and referrals from health care personnel (Badger et al., 2019a). Caregivers were recruited following designation by the cancer survivor, and they completed informed consent procedures to participate in the study. Family caregivers were contacted independently of cancer survivors by a bilingual trained data collector for the baseline assessment. They could opt to

participate in either English or Spanish. After the baseline assessment was completed, the participants received a thank-you letter and a \$20 gift card to a retail merchant.

### **Sample**

The sample for the current study included approximately 233 nominated caregivers of Latina breast cancer survivors from a larger experimental trial focusing on a psychosocial intervention for survivors and caregivers. Inclusion criteria from the primary study for informal caregivers were: nominated by the cancer survivor, over 21 years of age, English or Spanish speaking, access to and ability to speak on the telephone, and not diagnosed with cancer themselves (Badger, 2019). Caregivers were included in this analysis if they were missing fewer than 10% of data. Some 24 participants were excluded because they were missing two or more items from the acculturation scale, and one participant was excluded due to missing almost half of the relevant variables for this analysis.

### **Protection of Human Subjects**

The primary study was approved by the University of Arizona Institutional Review Board (IRB) (Protocol 1100000136) (Badger et al., 2019a). In the primary study, participants consented to have their data used for research purposes. The secondary data analysis for the current study was approved as a non-human subjects' study (Appendix D). Only de-identified secondary data was used for the study, so the risks to participants were no more than would be encountered in daily life.

### **Data Collection Methods**

The data from the primary study were collected from both survivors and caregivers. Caregivers were contacted independently from cancer survivors through telephone calls. The

data were collected by trained data collectors who were bilingual in English and Spanish. Calls were audio-taped and data were entered into an encrypted database rather than collected with paper and pencil questionnaires. The data are stored within the College of Nursing in a secure database (A. Pasvogel, personal communication, February 15, 2019). Only caregiver data were requested for this analysis including all demographic, socio-economic, and socio-cultural data, clinical information about number of chronic diseases, acculturation, self-efficacy, emotional support, informational support, depression, anxiety, global physical health, and spiritual well-being.

## **Constructs and Measures**

### **Caregiver Contextual Factors**

Caregiver contextual factors were measured based on demographics and level of acculturation. *General demographics* were collected including age, gender, race, marital status, number of children, number of children living in the home, and relationship to survivor. Additional demographic information addressed social determinants of health such as education level, annual household income. Acculturation will be used to represent caregiver contextual factors for the moderation analyses.

*Anglo-orientation*, orientation towards Anglo culture and a dimension of acculturation, was measured using the Anglo-Oriented Scale (AOS) from the Acculturation Rating Scale for Mexican Americans II (ARSMA-II) (APA, 2019; Cuellar, Arnold, & Maldonado, 1995). This is a seven-item subscale that is scored by dividing the sum of items by 13 to obtain a mean score. The mean score was used in this current study. In the primary study, the scale had a Cronbach's alpha of .86 (Segrin et al., 2018). Jimenez et al. (2010) noted internal consistency of the AOS

with a Cronbach's alpha of .93. The full scale has demonstrated validity older adults and caregiver populations (Gallagher-Thompson et al., 1997; Haan et al., 2003; Jimenez, Gray, Cucciare, Kumbhani, & Gallagher-Thompson, 2010).

### **Disease Related Self-Efficacy**

Self-efficacy was represented by two one-item measures. The first measure was a one-item Likert scale question assessing an individual's level of confidence in their knowledge to make treatment-related decisions. Participants responded '1' (Not true about me) to '10' (True about me) to the phrase: "I am confident that my knowledge about breast cancer and its treatment is enough for me to be able to make necessary decisions regarding [survivor name] treatment." A lower score represents lower self-efficacy levels. This will be referred to as self-efficacy cancer knowledge (SECK). This measure was also developed by Dr. Badger and has been used in multiple studies over the past 20 years (Marshall et al., 2013; T. Badger, personal communication, February 2018). In Marshall et al. (2013), it correlated significantly with items from the Cancer Knowledge Questionnaire (CKO). This expected relationship is an example of construct validity.

The second one-item measure is a question from the General Symptom Distress Scale (GSDS), which was developed by Badger, Segrin, and Meek (2011). Participants responded to this question "How well are you able to manage your symptoms" on a scale of '1' (cannot manage at all) to '10' (can manage extremely well). A higher score indicates higher self-efficacy for managing symptoms. This will be referred to as self-efficacy symptom management (SESx). The overall scale had satisfactory test-retest reliability ( $r=.72$ ) and the item assessing symptom

management was correlated as expected with depression, positive affect, negative affect, and general health (Badger et al., 2011).

For this study, self-efficacy was initially tested as a composite measure, but the items did not load together during factor analysis, and Cronbach's alpha was low ( $\alpha=.17$ ). In addition, the items assess two different facets of caregiver self-efficacy (cancer knowledge and personal symptom management), so are representative of different self-efficacy constructs. Therefore, the self-efficacy items were used in the analysis as independent measures. This can be identified as a weakness in the study, although Petrescu (2013) notes positive aspects of single-item measures including concrete, unidimensional constructs and avoidance of common method bias.

### **Spiritual Well-Being**

In the original study, this was measured with a seven-item spiritual well-being subscale from the Quality of Life-Breast Cancer version questionnaire developed by Ferrell, Dow, and Grant (2012). This assesses the influence of breast cancer on spirituality. Responses range from '1' (not at all) to '10' (a great deal) (Ferrell, 2012). Badger et al. (2011) used this in a study of prostate cancer survivors and their partners. Cronbach's alpha was 0.78 for prostate cancer survivors and 0.74 for partners at baseline (Badger et al., 2011).

For this analysis, only the first two items were included due to poor factor loading for the full scale. These items address involvement in religious activities and spiritual practice. Factor loading for the spiritual well-being items one and two were .90 and .92, respectively, and remaining factor loadings for the five other items were below .6. Cronbach's alpha for the two-item scale was .87.

## Caregiver Health

This was measured using the PROMIS Global Health measure and a sum of caregiver chronic illnesses.

*Global health* was measured using the PROMIS Global Health scale, a four-item questionnaire. The total score of the items was added and converted to T-scores, with a high score indicating greater level of health (Patient Reported Outcomes Measurement Information System [PROMIS], 2017). PROMIS measures have been broadly studied and well-validated (PROMIS, 2013).

*Chronic illness* information was collected from participants including self-reported physical conditions, such as heart disease, diabetes, stroke, hypertension, arthritis, or respiratory illness. Each illness self-reported by a research participant was added for an overall sum score. The maximum score was '7' and the minimum was '0' for individuals with no self-reported chronic illnesses. This measurement of chronic illnesses was used in another analysis from the same data by the researcher and was correlated as expected with healthcare utilization (Hebdon, Segrin, Pasvogel, & Badger et al, 2019).

## Social Support

Social support was assessed using two questionnaires: PROMIS Emotional Support and PROMIS Informational Support.

*Emotional support* was assessed using the PROMIS Emotional Support short form scale. This is composed of eight-items assessing the frequency of emotional support with responses ranging from *never* '1' to *always* '5.' A raw score was tabulated from the total of the eight items,

then converted to a t-score. High scores indicate higher levels of emotional support (PROMIS, n.d.a).

*Informational support* was assessed using the six-item PROMIS Informational Support Short Form. Like the previous measure, this assesses the frequency of informational support with response ranges from *never* '1' to *always* '5,' with high scores indicating higher levels of informational support (PROMIS, n. d.b). PROMIS measures were developed using patient interviews and expert review panels. They have been widely studied and have demonstrated adequate psychometric properties (PROMIS, 2013).

### **Mental Health**

This was measured using PROMIS Emotional Distress-Depression and PROMIS Emotional Distress-Anxiety.

*Depressive symptoms* were measured with the PROMIS Emotional Distress-Depression Short Form, an eight-item form assessing frequency of symptoms of depression from *never* '1' to *always* '5.' The total from the items is tabulated and then converted to a standardized t-score. High score reflects more frequent occurrence of depressive symptoms (PROMIS, 2018b). The depression and anxiety forms were tested in a cervical cancer population by Wilford et al. (2018) and internal consistency was greater than 0.95 for both measures. The depression measure also demonstrated sensitivity to change with improvement following a counseling intervention (Wilford et al., 2018).

*Anxiety symptoms* were measured with the PROMIS Emotional Distress-Anxiety Short Form. It is a seven-item form assessing frequency of anxiety symptoms from *never* '1' to *always*

‘5.’ The total score is summed from the seven items and then converted to a t-score. High score reflects higher frequency of anxiety symptoms (PROMIS, 2018a).

### **Data Management**

The data used for this analysis were de-identified and stored in a password-protected computer in SPSS data files. Data were submitted through survey software and compiled by Dr. Alice Pasvogel within the College of Nursing secure server (A. Pasvogel, personal communication, February 15, 2019). Once data were requested and received, the researcher and statistician reviewed the data for patterns of ‘missingness.’ Prior to excluding participants due to missing acculturation data or large amounts of missing data, the data was examined for missingness patterns. No clear patterns were noted. Once those participants were excluded, the remaining participants and data demonstrated a missing completely at random pattern with a nonsignificant Little’s MCAR test ( $p=.097$ ). Due to this pattern, mean imputation was used for all data analysis.

### **Data Analysis**

Data were analyzed using SPSS for frequencies, descriptive statistics, and significance testing, PROCESS within SPSS for moderation testing, and AMOS for structural equation modeling to address the primary study aims with accompanying research questions:

The specific study aims were:

1. To identify relationships between caregiver context, social support, and spiritual well-being as predictor variables and mental health and global health as outcome variables.

Research Questions:

- a. Are variables of caregiver context (acculturation, gender, annual income, and education) negatively associated with emotional/mental health and global health?
  - b. Is social support positively associated with mental health and global health?
  - c. Is spiritual well-being positively associated with mental health and global health?
2. To identify relationships between self-efficacy and caregiver context, social support, spiritual well-being, mental health, and global health.

Research Question:

- a. Is self-efficacy associated with caregiver context, social support, spiritual well-being, mental health, and global health?
3. To test the proposed cancer caregiver self-efficacy model through structural equation modeling (SEM) (Figure 1 & 2).

Research Questions:

- a. Does self-efficacy moderate the relationships between caregiver context (gender, income, education, and Anglo-orientation) and mental health and global health?
- b. Does self-efficacy moderate the relationships between social support and mental health and global health?
- c. Does self-efficacy moderate the relationships between spiritual well-being and mental health and global health?
- d. Does the model demonstrate pathways with interaction effects of self-efficacy on relationships between predictor variables (spiritual well-being, social support, and Anglo-orientation) and outcome variables (global health and mental health)?

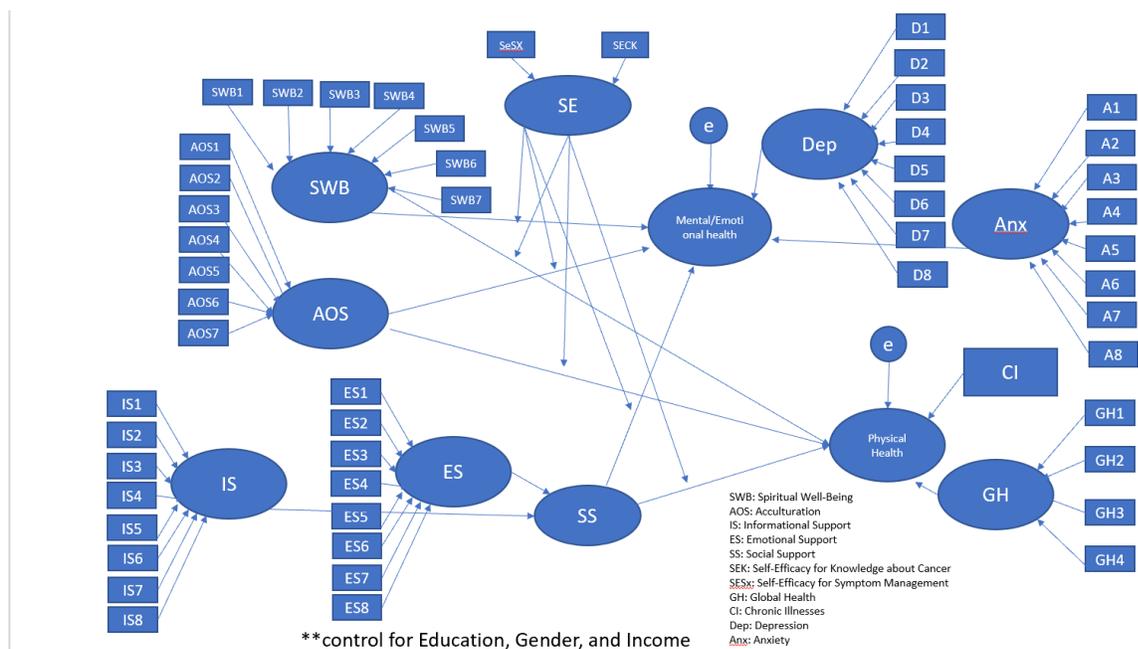


FIGURE 2. Proposed structural model of self-efficacy.

Data were initially analyzed for descriptive statistics, frequencies, and significance testing (independent samples t-test, Pearson's  $r$ , chi-square, & Spearman's rho) using SPSS. Moderation analysis was completed using the PROCESS add-on software. Each independent and control variable (spiritual well-being, informational support, emotional support, acculturation, gender, income, & education) was analyzed for the interaction effects of self-efficacy (symptom management & cancer knowledge) with the outcome variables (global health, anxiety, & depression).

Finally, structural equation modeling was conducted using AMOS and R. The primary researcher conducted the SEM with AMOS, while concurrent modeling was conducted by a statistician using R. The analysis plan followed recommendations by Newman, Vance, and Moneyham (2009): measurement model, full causal model with path analysis, and then model trimming.

For the first step in structural equation modeling, a factor analysis was completed for all proposed independent and dependent variables. Findings during this step suggested that number of chronic illnesses did not load well with the other variables. The main issue with the number of chronic illnesses was the level of variability ('0' to '5'), with most participants having a score of one or two. The researcher and statistician opted to exclude this from the model. Additionally, this phase demonstrated poor loading of self-efficacy symptom management (SESx) and self-efficacy cancer knowledge (SECK) together, but the research and statistician agreed to proceed with both items for the confirmatory factor analysis (CFA). A CFA was attempted with all variables in AMOS, excluding number of chronic illnesses, and the model fit was very poor. Iteratively, and with reference to the initial model, the researcher and statistician made the decision to scale back the model and examine four different models: global health with SECK, global health with SESx, depression with SECK, and depression with SESx (Figure 3 & 4).

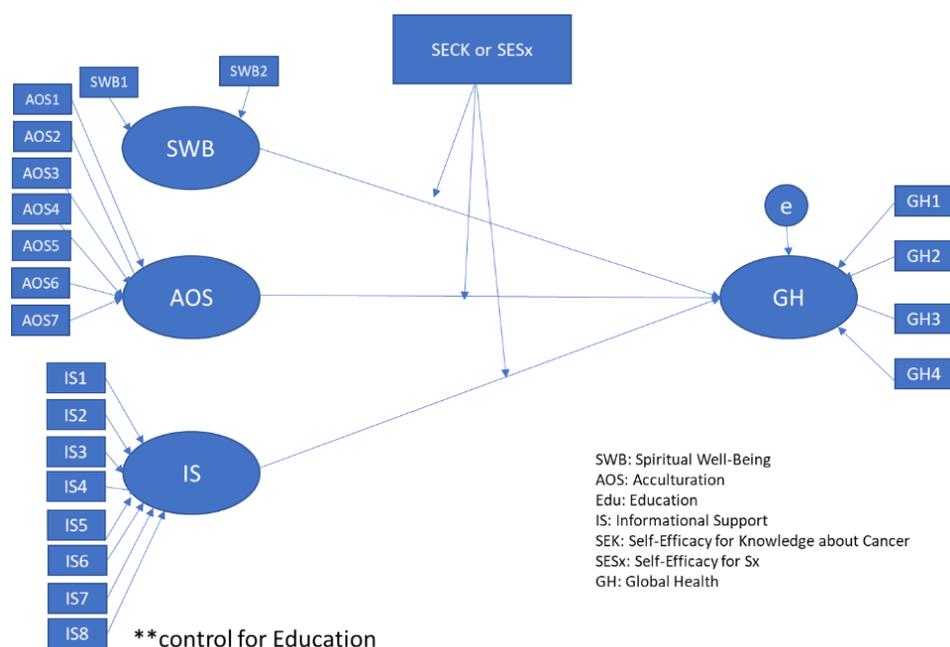


FIGURE 3. SEM of self-efficacy and global health.

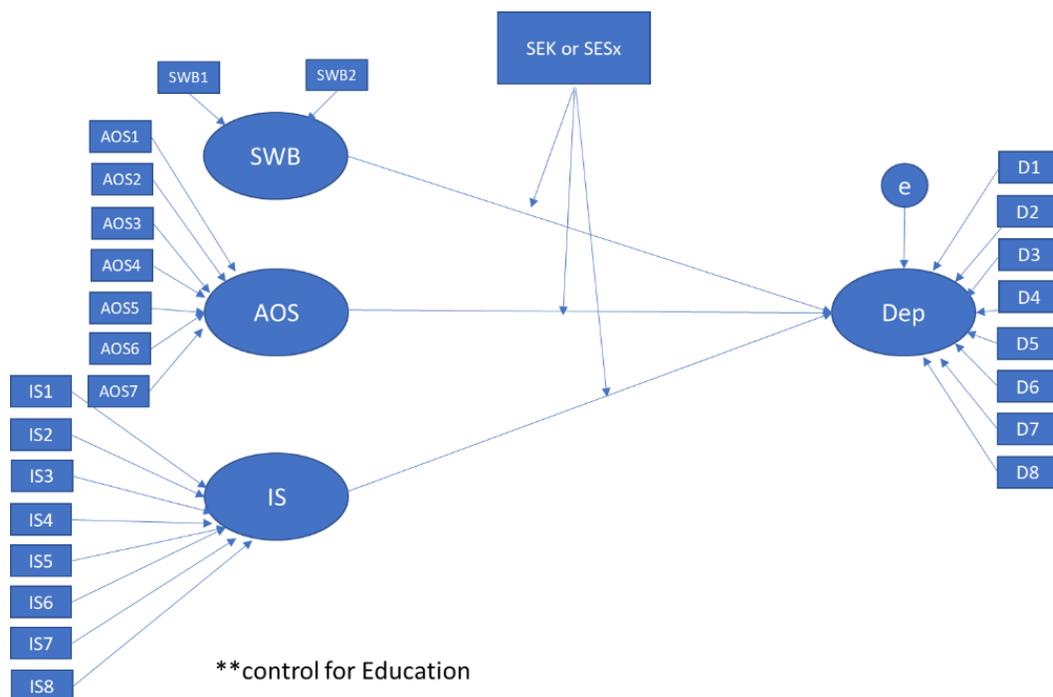


FIGURE 4. SEM of self-efficacy and depression.

Then, two factor analyses were completed to address the factors for global health and depression in SPSS to identify factor loading scores for the following measures: spiritual well-being, Anglo-orientation, informational support, global health, depressive symptoms, self-efficacy cancer knowledge (SECK), and self-efficacy symptom management (SESx). Both emotional support and anxiety were excluded, because depression and informational support were stronger statistically and theoretically. Additionally, gender and income were excluded as control variables due to lack of meaningful relationships with the predictor and outcome variables.

Items from each measure loaded together with loadings of .6 or higher, except the self-efficacy measures which had item loadings of less than .20. Through consultation, both the primary researcher and statistician determined that conducting analysis with each self-efficacy

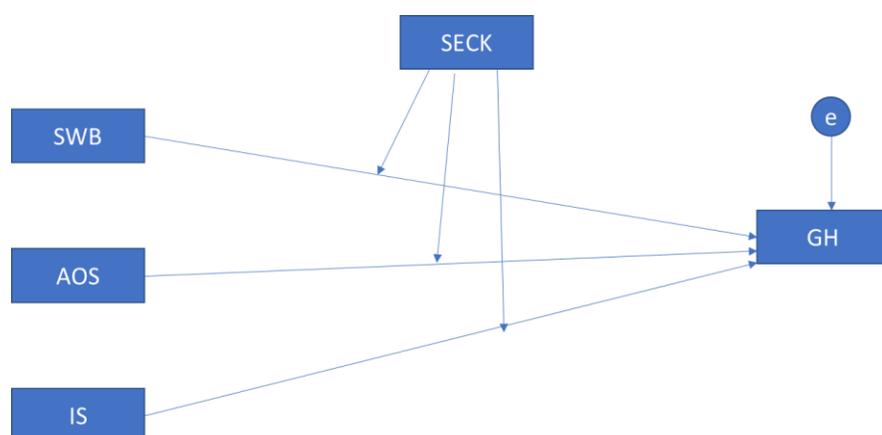
measure alone had the potential for stronger models. Theoretically and statistically, this approach held up due to the different aspects of self-efficacy being measured by these items and poor Cronbach's alpha for the two items.

The measurement models were tested in AMOS for both global health and depression with the items with observed and latent variables (global health, depression, spiritual well-being, Anglo-orientation, & informational support). The self-efficacy items were not included in the measurement models, because they did not load on one latent variable, but would serve as an observed variable in the structural models. Two models were tested using CFA, one for global health and one for depression. The authors set model fit parameters at: chi-square  $>.05$ ; RMSEA with less than 0.01, 0.05, and 0.08 as indicators of excellent, good, and poor fit (MacCallum, Browne, & Sugawara, 1996); and  $GFI \geq .95$ ,  $AGFI \geq .90$ , Tucker Lewis Index  $\geq .95$ ,  $CFI \geq .90$  (Cornell University, n.d.).

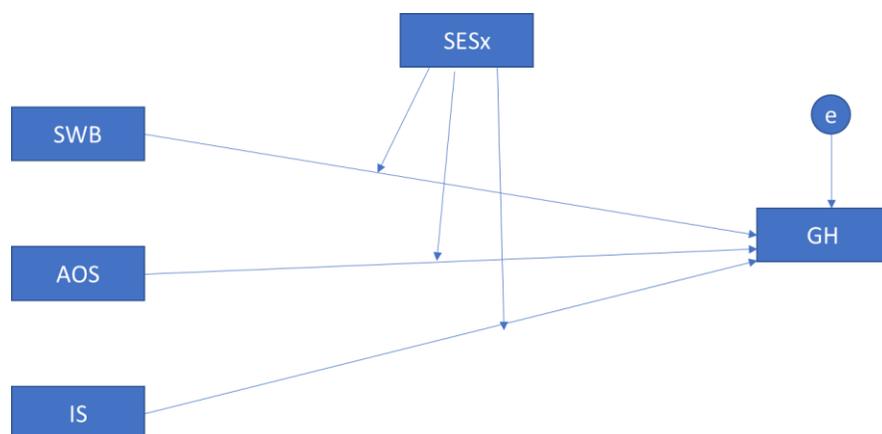
For both models tested with CFA, the chi-square was significant, the RMSEA was  $<.05$ , the GFI and AGFI were below .95 and .90, respectively, TLI was  $\geq .95$ , and CFI was  $>.90$ . So, the model fit indexes were mixed. There were additional issues with Heywood cases, where the standardized loadings were greater than one. Attempts to address model fit and Heywood cases, such as adding a third item for the spiritual well-being scale, moving path constraints to different items, or moving the constraint to the latent variable and making path constraints equal did not fully address the issues (Gaskin, 2018; Kenny, 2011). Therefore, overall model specification using CFA was not achieved. The researcher believes this was likely due to two key issues including sample size (parameters exceeded 10 per parameter) (Hox, 1998). Also, the number of observed variables per latent variable was either too large or small for most variables, ranging

from ‘8’ to ‘2,’ when the recommendation is ‘4’ (Gaskin, 2018; Hair et al., 2010). Due to these issues, the researcher did not pursue further analysis of a full structural model.

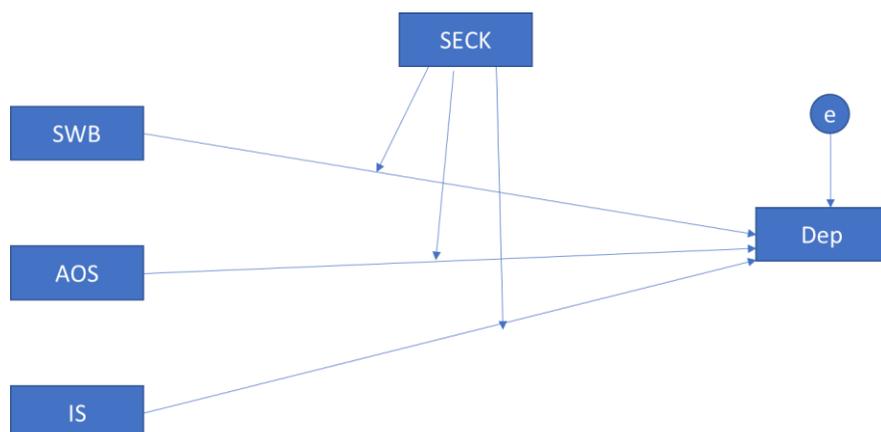
While less statistically powerful than a full structural model, a path analysis can provide understanding of the relationships among variables in a model (Gaskin, 2018). Path analysis was completed using AMOS for four different models: self-efficacy symptom management for global health and depressive symptoms; and self-efficacy cancer knowledge for global health and depressive symptoms. Education was included as a control variable due to its significant relationships with outcome variables. Please see the models below (Figure 5, 6, 7, & 8):



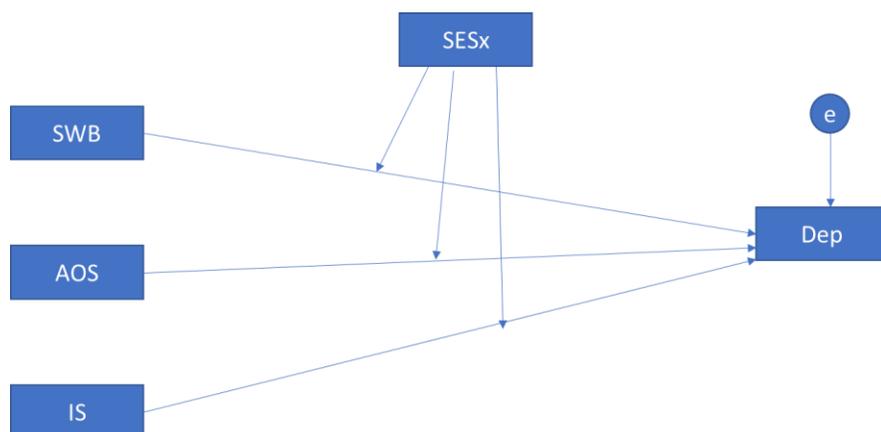
*FIGURE 5.* Self-efficacy cancer knowledge and global health.



*FIGURE 6.* Self-efficacy symptom management and global health.



*FIGURE 7.* Self-efficacy cancer knowledge and depression.



*FIGURE 8.* Self-efficacy symptom management and depression.

Model fit parameter pre-specifications were not changed for these models. These models were built using z-scores for each variable to standardize variables, and an interaction term was created for each exogenous variable and the self-efficacy variable (Gaskin, 2018). These were correlated with the endogenous variable and covaried with the other exogenous variables. Beta scores were evaluated and the pathways with lowest significance were trimmed.

## **Methods to Promote Rigor in Secondary Data Analysis and Structural Equation Modeling**

There are primary concerns with rigor in secondary data analysis including alignment of the original study purpose and data with the current study purpose and having a theoretically grounded research question, so a fishing expedition is not conducted. Threats to validity can also be addressed by having access to primary study procedures, attending to sampling issues such as weighting, and noting patterns of missingness during data analysis and interpretation. Methods to promote rigor in these areas will be outlined below. Just as there are methodological concerns with secondary data analysis, there are key factors with structural equation modeling to reduce bias including: a theoretically driven model, adequate sample size, measures that adequately represent latent variables, patterns of missingness, and *a priori* model fit parameters.

### **Alignment of Primary and Secondary Studies**

The primary study for this analysis was focused on a psychosocial intervention in Latina breast cancer survivors and their nominated caregivers (Segrin et al., 2018). The analysis for the current study used baseline data from caregivers that is well matched with proposed constructs in the present study. There is also a match between the psychosocial emphasis of the first study and the focus on self-efficacy and holistic health outcomes in the proposed study (Bandura, 1977; Boslaugh, 2012). In addition, the population of interest in this study adds dimension to testing the model of self-efficacy. As a primarily minority population, there are potential social determinants of health related to education, discrimination, health care access, and socioeconomic status that could affect self-efficacy (Pinquart & Sorensen, 2005).

### **Avoiding a Fishing Expedition**

To avoid a fishing expedition in the current study, the researcher developed the proposed model of self-efficacy based on current research, personal experiences, and clinical experiences. The constructs were defined, and measures were selected based on their alignment with the proposed constructs. *A priori* hypotheses about the nature of relationships among predictor, outcome, and moderator variables were defined.

### **Access to Primary Study Information**

In the present analysis, the researcher worked with the data for a prior analysis and had direct access to the primary investigators from the first study. Also, the researcher included the following strategies: using the analytic plan outlined above, understanding and reporting on the strengths and limitations of the dataset including measurement methods, using the definitions of variables that were outlined in chapter 1, and identifying patterns of missingness in the data (Boo & Froelicher, 2013; Cheng & Phillips, 2014; Cooke & Iwashyna, 2013).

### **Attention to Sampling**

Some primary studies use stratified and weighted sampling schemes to represent the population of interest. In the primary study that was used for this analysis, no weighting procedures were used and a discrete target population, caregivers of Latina breast cancer survivors, were recruited along with Latina breast cancer survivors. A sampling model or proximal similarity model were not considered because of the focused nature of the target population (Trochim, 2006). The sample size of caregivers from the primary study was not adequate to fully investigate the proposed model, although path analysis was addressed (n=233).

### **Patterns of Missingness**

Data were initially examined for patterns of missingness. Participants were excluded if they were missing more than two items from acculturation or were missing a high percentage of overall data. One participant was excluded due to missing close to half of target data and 24 participants were excluded due to missing acculturation data. Following exclusion of these participants, patterns of missingness were evaluated, and less than 10% of data were missing with the missingness pattern being completely at random. Therefore, researchers proceeded with mean imputation for missing data prior to data analysis.

### **Theoretically Driven Model**

The proposed study used the self-efficacy model identified in Chapter 1, which is both theoretically and research driven (Bowen, 2012; Hox, 1998). The indicator variables were specified to represent the latent variables. Relationships among latent variables were indicated in the model. Analysis for the full structural model was not further pursued due to issues with data and measurement, but path analysis was completed using the proposed model.

### **Adequate Sample Size**

In the proposed study, there were 233 caregivers after missingness was addressed, which proved to be one of the variables preventing analysis of the full structural model due to a higher ratio of indicator variables.

### **Measures Representative of Latent Variables**

It is generally preferable to have multiple indicator variables to represent latent variables, but it is also key to have the indicator variables be an adequate representation of the construct of the latent variable (Li, 2013; Newman et al., 2009). In the present study, this is one of the major

issues. The researcher selected indicator variables, measures from the primary analysis, that are best aligned with the constructs that have been defined. Some constructs had only one or two indicator variables, including self-efficacy (one item for each type of self-efficacy) and spiritual well-being (two items). This proved to be a limiting factor for proceeding with the full structural model.

### **Model Fit Parameters**

In the proposed study, the model-fit parameters were pre-specified and the root mean square error of approximation (RMSEA) was used with less than 0.01, 0.05, and 0.08 as indicators of excellent, good, and poor fit, respectively (MacCallum, Browne, & Sugawara, 1996). Other indicators of model fit included:  $GFI \geq .95$ ,  $AGFI \geq .90$ , Tucker Lewis Index  $\geq .95$ ,  $CFI \geq .90$  (Cornell University, n.d.). These were used to evaluate model fit of the CFA, with RMSEA, CFI, and TLI being adequate. Yet, the model specifications had limitations that have already been described.

### **Conclusion**

Ultimately, path analysis versus full structural equation modeling was completed to test the proposed model of Latina cancer caregiver self-efficacy to address the third aim of the study. Methodological issues such as sample size, number of observed variables per latent variable, and factor loading affected further pursuit of structural equation modeling. Issues such as theory-driven data collection and analysis and missingness were addressed to promote study rigor.

## Study Results

This section will focus on study findings starting with a description of study participants.

Then, the results will be presented in order of the following study aims with research questions:

The specific study aims were:

1. To identify relationships between caregiver context, social support, and spiritual well-being as predictor variables and mental health and global health as outcome variables.

Research Questions:

- a. Are variables of caregiver context (Anglo-orientation, gender, annual income, and education) negatively associated with mental health and global health?
  - b. Is social support positively associated with mental health and global health?
  - c. Is spiritual well-being positively associated with mental health and global health?
2. To identify relationships between self-efficacy symptom management and self-efficacy cancer knowledge and caregiver context, social support, spiritual well-being, mental health, and global health.

Research Question:

- a. Is self-efficacy associated with caregiver context, social support, spiritual well-being, mental health, and global health?
3. To test the proposed cancer caregiver self-efficacy symptom management and self-efficacy cancer knowledge models through structural equation modeling (SEM). This aim was modified due to the model fit issues with the measurement model. Path analysis was conducted to address this aim. (Figure 1).

Research Questions:

- a. Does self-efficacy moderate the relationships between Anglo-orientation and mental health and global health?
- b. Does self-efficacy moderate the relationships between social support and mental health and global health?
- c. Does self-efficacy moderate the relationships between spiritual well-being and mental health and global health?
- d. Does the proposed moderation model of cancer caregiver self-efficacy represent the relationships between spiritual well-being, social support, and Anglo-orientation and mental and global health?

**Participant Characteristics**

As mentioned previously, data from 233 participants were utilized for data analysis. Of the participants included in the analysis, the mean age was 43 (SD=13) and the majority were women (70%) and of Hispanic or Mexican American descent (94%). Approximately one-quarter (25.8%) were a spouse or significant other to the survivor participating in the study, and 68% were married. Most participants had an income of 50,000 dollars per year or lower (92.3%), over half had high school or some college (54%), and just under half were employed full time (43.8%) (Table 1). In addition, approximately 50% of participants reported having two to three children living in the home.

TABLE 1. *Participant characteristics.*

<b>N=233</b>	<b>N (%)</b>
Sex	Male 69 (29.6) Female 164 (70.4)
Ethnicity	Hispanic/Latina 90(38.6) Mexican/MA 129(55.4) South American 9(3.9) Central American 5(2.1)
Marital Status	Married 157(68) Unmarried 74(32)
Number of Children	None 32(13.7%) One 27(11.6%) Two 59(25.3%) Three 58(24.9%) Four 32(13.7%) Five 17(7.3%) >Five 8(3.4%)
Number of Children Living in the Home (N=201)	None 32(13.7%) One 27(11.6%) Two 59(25.3%) Three 58(24.9%) Four 32(13.7%) Five 17(7.3%) Ten 1(.5%)
Relationship to Survivor	Spouse/SO 60(25.8) Sibling 37(15.9) Daughter/Son 48(20.6) Friend 25 (10.7) Mother 47(20.2) Other 16(6.9)
Annual Household Income	Over 100,000 8(3.4) 50,000-99,999 33(14.2) 10,000-49,999 137(58.8) Under 10,000 45(19.3) No Answer 10(4.3)
Highest Level of Education	Elementary 24 (10.3) Middle School 47(20.2) High School 65(27.9) Voc/Tech/Some Coll 61(26.2) College 31(13.3) Post Grad/Prof 3(1.3) Other 2(.9)

TABLE 1 – *Continued*

<b>N=233</b>	<b>N (%)</b>
Employment Status	Unemployed, but seeking 37(15.9) Part Time 29(12.4) Full Time 102 (43.8) Retired 17(7.3) Disabled 11(4.7) Other 37(15.9)
<b>N=233</b>	<b>Mean (SD)</b>
Age	43(13)
Number of Children	3.5(1.7)
Number of Children Living in the Home	2.9(1.4)
Spiritual Well-Being (SWB)	16.8(4.4)
Anglo-Orientation Scale (AOS)	2.9(1.2)
Distress-Anxiety (Anx)	50(10)
Distress-Depression (Dep)	50(10)
Global Health (GH)	50(10)
Chronic Illnesses (CI)	.68(.91)
Informational Support (IS)	50(10)
Emotional Support (ES)	50(10)
Self-Efficacy Symptom Management (SESx)	7.7(2.5)
Self-Efficacy Cancer Knowledge (SECK)	5.9(2.9)

### Relationships Between Independent and Dependent Variables

Differences between male and female gender and the following study variables were examined using an independent samples t-test: global health, anxiety, depression, emotional support, informational support, spiritual well-being, and Anglo-orientation. Significant differences were found for spiritual well-being, with women having higher mean spiritual well-being levels than men  $t(109)=-2.54$  ( $p<.05$ ) (Table 2 & 3).

TABLE 2. *Associations based on gender.*

<b>N=233</b>	<b>Sex</b>
Income	8.06
Education	20.06*

\*significant at  $<.05$

TABLE 3. *Differences in means based on gender.*

N=233	Sex
AOS	-1.14
SWB	-2.54*
IS	-1.04
ES	.25
SECK	.21
SESx	.98
CI	1.14
GH	-.15
Dep	-.78
Anx	-.36

\*significant at  $<.05$ ; AOS: Anglo-Orientation Scale, SWB: Spiritual Well-Being, IS: Informational Support, ES: Emotional Support, SECK: Self-Efficacy Cancer Knowledge, SESx: Self-Efficacy Symptom Management, CI: Chronic Illnesses, GH: Global Health, Dep: Depression, Anx: Anxiety

TABLE 4. *Correlation matrix.*

N=233	Inc	Educ	AOS	SWB	IS	ES	SECK	SESx	CI	GH	Dep	Anx
Inc	1											
Educ	<b>.97.9*</b>	1										
AOS	.37*	.53*	1									
SWB	.02	-.13*	-.18*	1								
IS	.23	.22*	.23*	.11	1							
ES	.06	.14*	.11	.11	.81*	1						
SECK	.09	.12*	.10	.15*	.18*	.18*	1					
SESx	.1	.12	.21*	-.003	.21*	.22*	.09	1				
CI	.04	-.03	.03	.02	-.10	-.04	-.05	-.12*	1			
GH	.18*	.30*	.27*	.08	.39*	.38*	.14*	.27*	-.20*	1		
Dep	-.06	-.16*	-.13*	-.07	-.43*	-.43	-.10	-.33*	.13*	-.48*	1	
Anx	-.01	-.06	-.02	-.08	-.30*	-.32*	-.03	-.26*	.09	-.40*	.74*	1

Pearson's  $r$ , Spearman's  $\rho$ , **chi-square**, \*significant at  $<.05$ ; AOS: Anglo-Orientation Scale, SWB: Spiritual Well-Being, IS: Informational Support, ES: Emotional Support, SECK: Self-Efficacy Cancer Knowledge, SESx: Self-Efficacy Symptom Management, CI: Chronic Illnesses, GH: Global Health, Dep: Depression, Anx: Anxiety

Chi-square analysis for significant relationships between gender and both education and income level was conducted. There was a significant relationship for education levels, with females having higher education levels than males  $X^2(2, N=233) = 20.06, p < .005$  (Table 3). The relationship between income and education levels was also examined using chi-square analysis,

and there was also a significant relationship between these two variables,  $X^2(2, N=233) = 97.91$ ,  $p < .05$ , with lower education levels being associated lower income.

Spearman's rho was used to analyze the relationships among both education level and income and the following continuous variables: global health, anxiety, depression, emotional support, informational support, spiritual well-being, and acculturation. Income was positively associated with global health ( $r(233) = .18$ ,  $p < .05$ ) and Anglo-orientation levels ( $r(233) = .37$ ,  $p < .001$ ). As global health and Anglo-orientation levels increased, income levels increased. Therefore, higher income levels were associated with higher global health and Anglo-orientation levels. Education levels were significantly positively associated with Anglo-orientation ( $r(233) = .53$ ,  $p < .001$ ), informational support ( $r(233) = .22$ ,  $p = .001$ ), emotional support ( $r(233) = .14$ ,  $p < .05$ ), and global health ( $r(233) = .31$ ,  $p < .001$ ). As educational levels increased, levels of informational support, emotional support, and global health increased. Therefore, higher education levels were associated with higher levels in those domains. Education was inversely correlated with depression ( $r(233) = -.16$ ,  $p < .05$ ), so as education increased depression levels decreased. Higher education levels were associated with lower depression levels. Interestingly, there was a trend towards significance for an inverse relationship between education levels and spiritual well-being ( $r(233) = -.13$ ,  $p = .06$ ). As education levels increased, spiritual well-being levels decreased. In summary, higher education levels were associated with lower spiritual well-being levels.

To answer the first aim of the study, global health, as one of the outcome variables had significant relationships with Anglo-orientation ( $r(233) = .27$ ,  $p < .001$ ), informational support ( $r(233) = .39$ ,  $p < .001$ ), and emotional support ( $r(233) = .38$ ,  $p < .001$ ). With increased levels of

Anglo-orientation, informational support, and emotional support, there were corresponding increased levels of global health. Depression levels were significantly inversely correlated with Anglo-orientation ( $r(233)=-.13$ ,  $p=.05$ ), informational support ( $r(233)=-.43$ ,  $p<.001$ ), and emotional support ( $r(233)=-.43$ ,  $p<.001$ ). As Anglo-orientation, and informational support levels increased, depression levels decreased. Therefore, there were lower depression levels in the presence of informational support and Anglo-orientation. Anxiety levels were significantly inversely associated with informational support ( $r(233)=-.30$ ,  $p<.001$ ) and emotional support ( $r(233)=-.32$ ,  $p<.001$ ) (Table 4). As informational and emotional support levels increased, anxiety levels decreased. Finally, outcome variables had associations with each other. Global health was significantly negatively correlated with number of chronic illnesses ( $r(233)=-.20$ ,  $p<.005$ ) and anxiety ( $r(233)=-.40$ ,  $p<.001$ ) and depression levels ( $r(233)=-.48$ ,  $p<.001$ ). Higher global health levels corresponded to lower number of chronic illnesses and anxiety and depression levels. Depression was positively associated with both number of chronic illnesses ( $r(233)=.13$ ,  $p=.05$ ) and anxiety ( $r(233)=.74$ ,  $p<.001$ ), with a highly significant relationship to anxiety. As depression levels increased, the number of chronic illnesses and anxiety levels increased.

Other relationships of note included the significant negative relationship between spiritual well-being and Anglo-orientation ( $r(233)=-.18$ ,  $p=.005$ ) and positive relationship between Anglo-orientation and informational support ( $r(233)=.23$ ,  $p=.001$ ). As Anglo-orientation increased, spiritual well-being decreased. Therefore, higher levels of Anglo-orientation and education were associated with lower spiritual well-being levels. Increased Anglo-orientation levels were associated with higher informational support levels.

### **Relationships Between Self-Efficacy and Independent and Dependent Variables**

Two types of self-efficacy were measured in this study, self-efficacy cancer knowledge and self-efficacy symptom management. Of note, the self-efficacy items were not correlated with each other. The second aim of this study was to evaluate the relationships between self-efficacy and predictor and outcome variables. Self-efficacy cancer knowledge had near significant or significant relationships with education level ( $r(233)=.12$ ,  $p=.06$ ), spiritual well-being ( $r(233)=.15$ ,  $p<.05$ ), informational support ( $r(233)=.18$ ,  $p<.05$ ), emotional support ( $r(233)=.18$ ,  $p<.05$ ), and global health ( $r(233)=.14$ ,  $p<.05$ ). These were all positive relationships, where higher self-efficacy cancer knowledge levels were associated with higher education, spiritual well-being, informational support, emotional support, and global health levels.

Self-efficacy symptom management had significant relationships with Anglo-orientation ( $r(233)=.21$ ,  $p=.001$ ), informational support ( $r(233)=.21$ ,  $p=.001$ ), emotional support ( $r(233)=.22$ ,  $p=.001$ ), global health ( $r(233)=.27$ ,  $p<.001$ ), chronic illnesses ( $r(233)=-.13$ ,  $p=.05$ ), depression ( $r(233)=-.33$ ,  $p<.001$ ) and anxiety ( $r(233)=-.26$ ,  $p<.001$ ). As self-efficacy symptom management levels increased, there were corresponding increases in Anglo-orientation, informational support, emotional support, and global health. Self-efficacy symptom management was inversely associated with chronic illnesses, depression, and anxiety, where increased self-efficacy symptom management levels were associated with lower number of chronic illnesses, and depression and anxiety levels.

### **Moderating Effects of Self-Efficacy on Relationships Between Variables**

As part of the third aim of the study, the interaction effects of the two dimensions of self-efficacy on the relationships between predictor variables (gender, income, education,

acculturation, spiritual well-being, informational support, & social support) and outcome variables (global health, number of chronic illnesses, depressive symptoms, and anxiety symptoms) were analyzed. Table 5 provides an overview of the significant interaction effects of self-efficacy cancer knowledge and Table 6 provides an overview of the significant interaction effects of self-efficacy symptom management. Figures provide a graphical representation of two-way interactions, with high levels of the moderating variables reflecting one standard-deviation above the mean, medium levels reflecting mean levels, and low levels reflecting one standard-deviation below the mean.

TABLE 5. Significant interaction effects of self-efficacy cancer knowledge

Self-Efficacy Cancer Knowledge (SECK)	R2-change	F	DF1	DF2	p
Anglo-orientation+SECK→Depression	.02	4.05	1	229	.05
Anglo-orientation+SECK→Chronic Illnesses	.03	6.35	1	229	<.05
Education+SECK→Depression	.02	4.84	1	229	<.05
Education+SECK→Anxiety	.02	4.05	1	229	.05

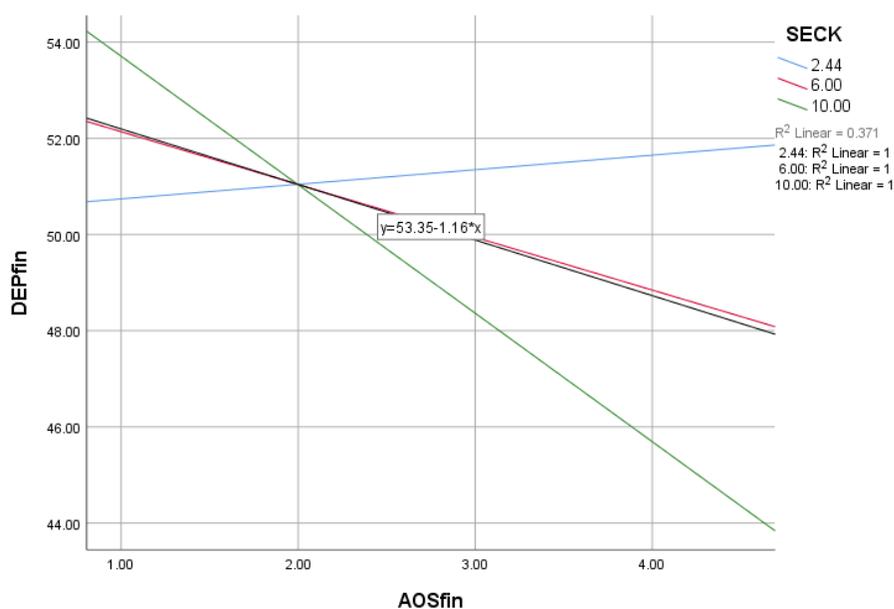
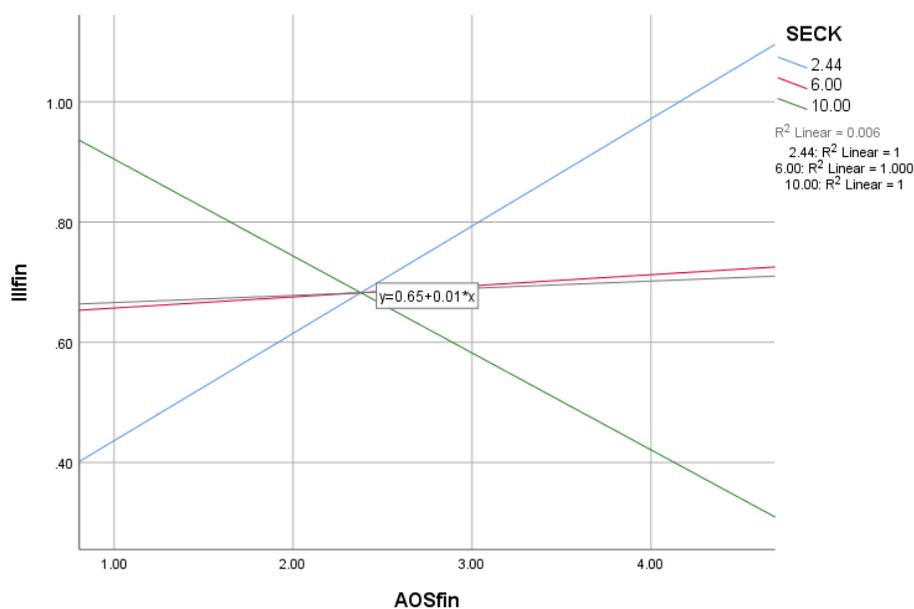


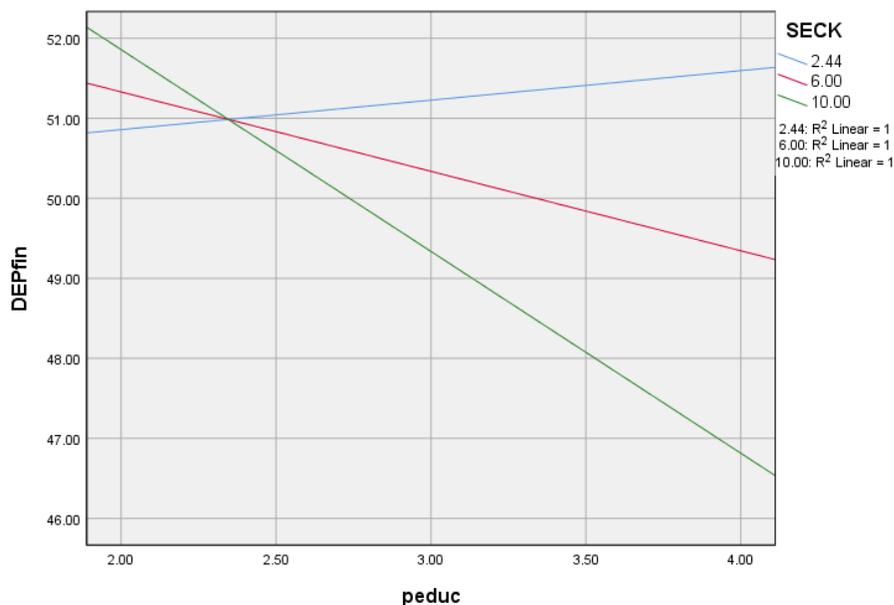
FIGURE 9. Interaction effects of self-efficacy cancer knowledge on Anglo-orientation and depression.

There was a significant moderating effect of self-efficacy cancer knowledge on the relationship between Anglo-orientation and depressive symptoms. At low levels of self-efficacy there was a positive association between depression and Anglo-orientation levels. At the medium and high levels of self-efficacy, there was a negative relationship between depression levels and Anglo-orientation. So, medium to high levels of self-efficacy cancer knowledge strengthened the negative relationship between depression levels and Anglo-orientation levels.



**FIGURE 10.** Interaction effects of self-efficacy cancer knowledge on Anglo-orientation and chronic illnesses.

There was a significant interaction effect of self-efficacy cancer knowledge on the relationship between Anglo-orientation and chronic illnesses. At low levels of self-efficacy there was a positive association between number of chronic illnesses and Anglo-orientation levels. At high levels of self-efficacy, there was a negative relationship between number of chronic illnesses and Anglo-orientation. Therefore, high self-efficacy levels strengthened the negative relationship between Anglo-orientation levels and number of chronic illnesses.



*FIGURE 11.* Interaction effects of self-efficacy cancer knowledge on education and depression.

There was a significant interaction effect of self-efficacy cancer knowledge on the relationship between education and depression levels. At low levels of self-efficacy there was a positive relationship between depression and education levels. At medium to high levels of self-efficacy the negative relationship between education levels and depression levels was strengthened.

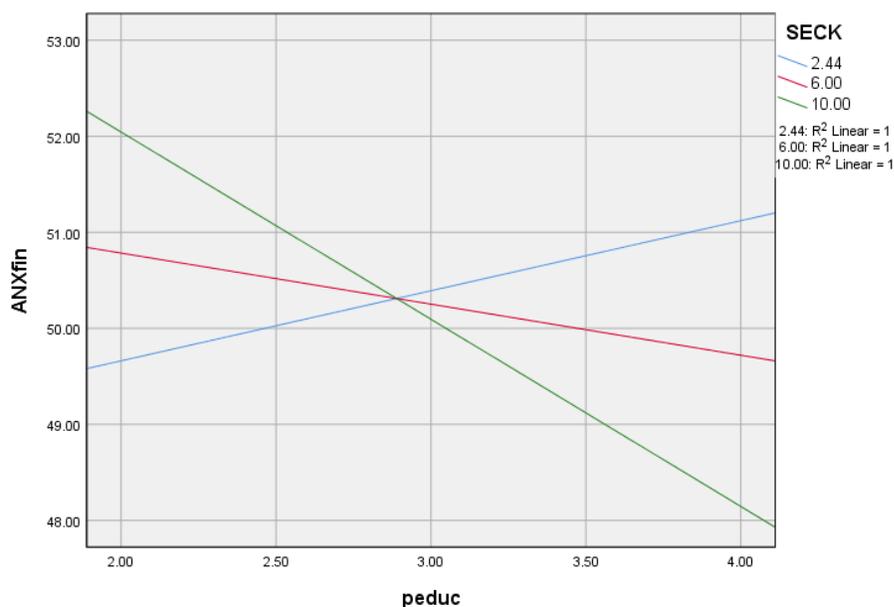
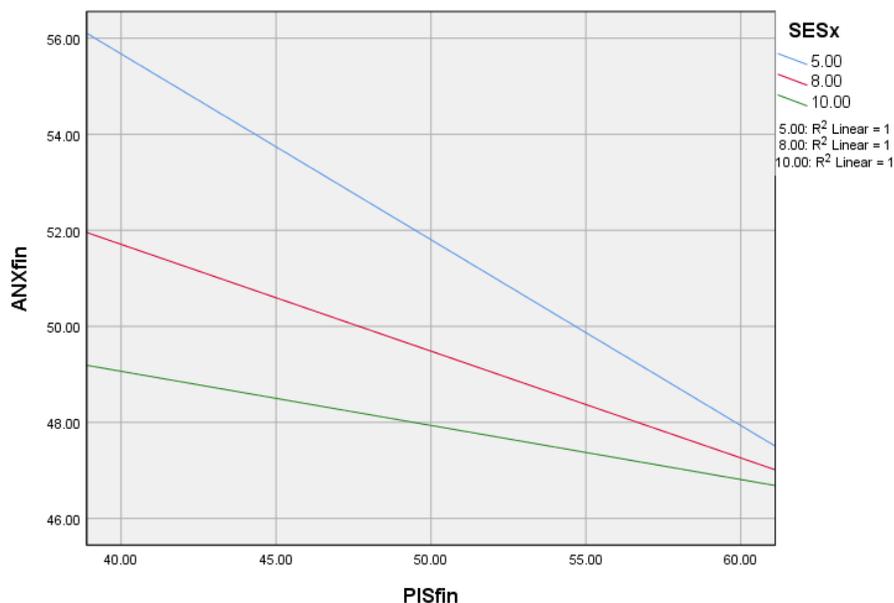


FIGURE 12. Interaction effects of self-efficacy cancer knowledge on education and anxiety.

There was a significant interaction effect of self-efficacy cancer knowledge on the relationship between education and anxiety levels. At low self-efficacy cancer knowledge levels there was a positive relationship between education and anxiety levels. Medium to high levels of self-efficacy cancer knowledge strengthened the negative relationship between education levels and levels of anxiety.

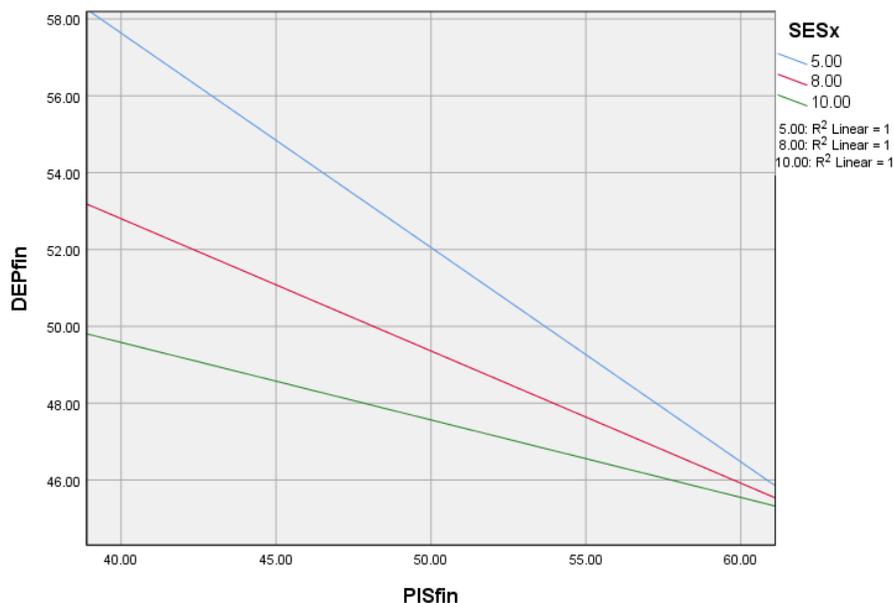
TABLE 6. Significant interaction effects of self-efficacy symptom management

Self-Efficacy Symptom Management (SES <sub>x</sub> )	R <sup>2</sup> -change	F	DF1	DF2	p
Informational Support+SES <sub>x</sub> →Anxiety	.02	5.5	1	229	<.05
Informational Support+SES <sub>x</sub> →Dep	.03	11.00	1	229	<.05



**FIGURE 13.** Interaction effects of self-efficacy symptom management on informational support and anxiety.

There was a significant interaction effect of self-efficacy symptom management on the relationship between informational support and anxiety levels. At low levels of self-efficacy symptom management, the negative relationship between informational support and anxiety levels was stronger, while at higher levels of self-efficacy symptom management the relationship between informational support and anxiety levels was less dramatic. So, individuals with high informational support and high self-efficacy had the lowest anxiety levels. Individuals with low informational support and low self-efficacy had the highest anxiety levels, although individuals with low informational support and high self-efficacy had lower depression levels than their low informational support, low self-efficacy counterparts.



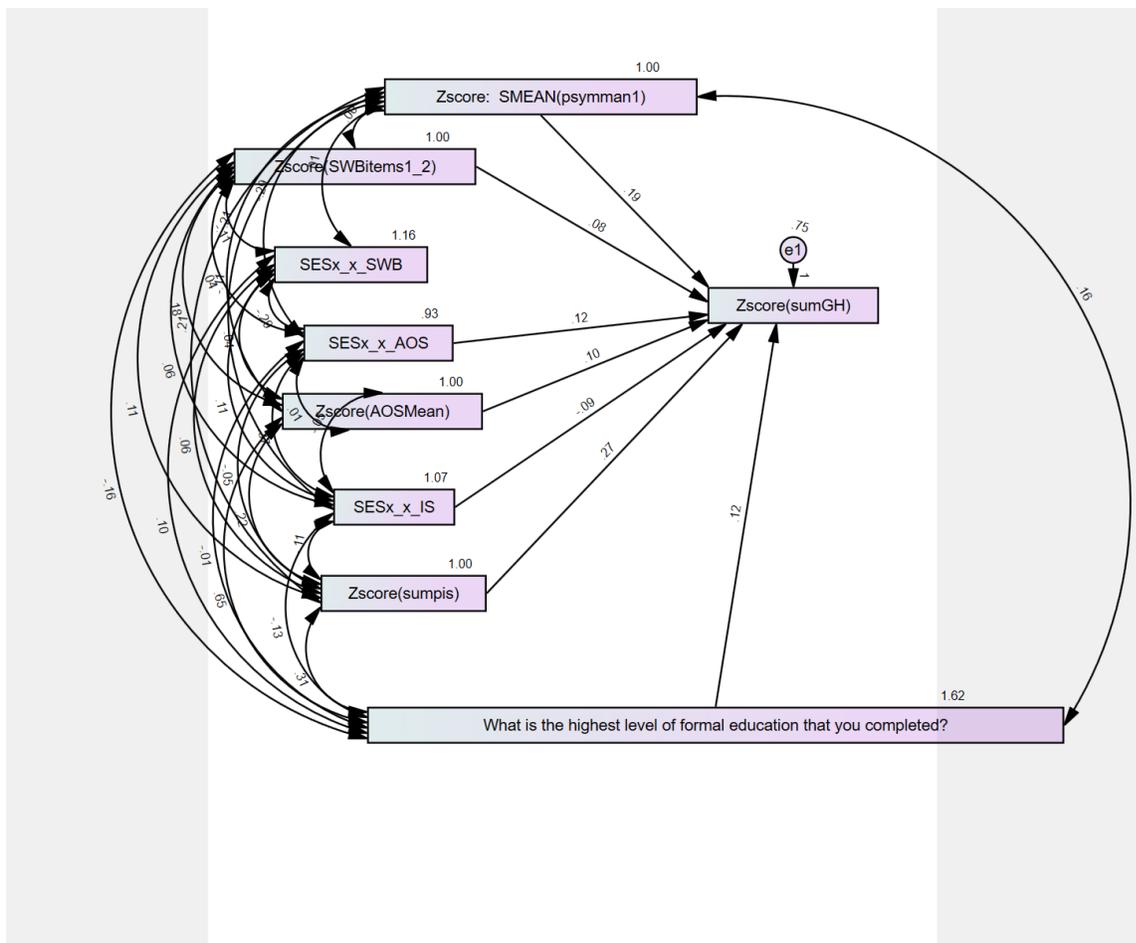
**FIGURE 14.** Interaction effects of self-efficacy symptom management on informational support and depression.

There was a significant interaction effect of self-efficacy symptom management on the relationship between informational support and depression. Individuals with low self-efficacy symptom management and low informational support had the highest depression levels. Those with high self-efficacy symptom management and low informational support had lower levels than the low self-efficacy group. Finally, individuals with high self-efficacy symptom management and high informational support had the lowest depression levels.

### **Moderation Model of Self-Efficacy in Caregivers of Latina Breast Cancer Survivors**

As previously described, full structural equation modeling was not achieved due to model specification issues. Aim three was partially addressed through the simple moderation analysis described above. In addition, path analysis was completed to examine the interaction effects of self-efficacy symptom management and self-efficacy cancer knowledge with the two outcome variables, depression and global health. This resulted in four models. Figures 15, 17, 18, and 20

are the final models after data trimming. Figures 16, 19, and 21 represent two-way interactions with high levels of the moderating variable reflecting one standard-deviation above the mean and low levels of the moderating variable reflecting one standard-deviation below the mean.

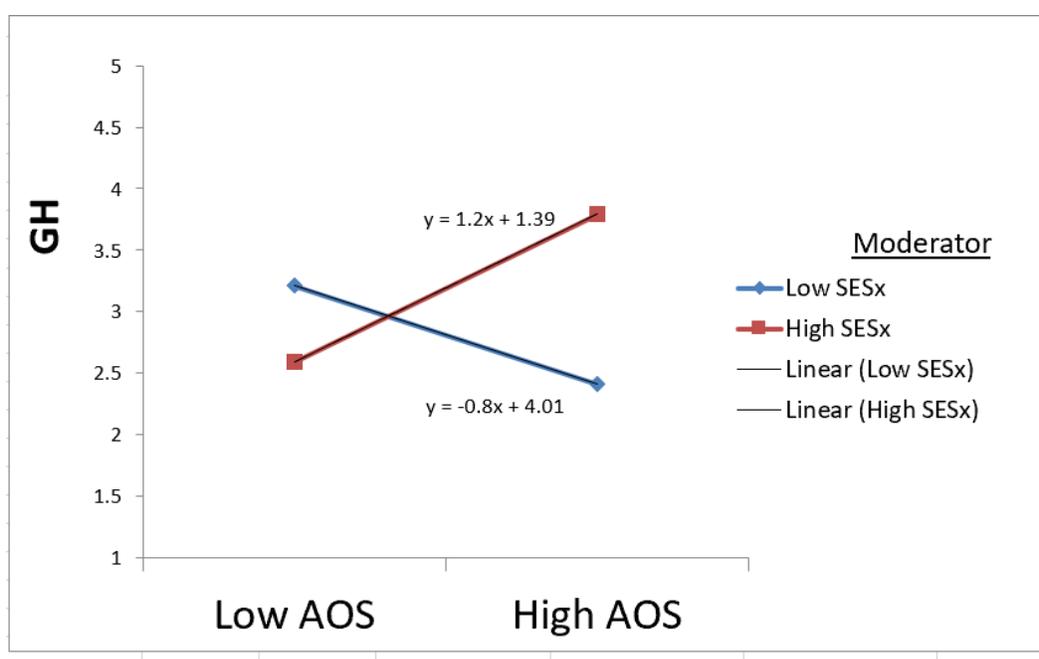


(Model Fit: chi-square=.85, p=.36; GFI=1.00; AGFI=.96; NFI=1.00; TLI=1.02; CFI=1.00; RMSEA=.00)

FIGURE 15. Path model for self-efficacy symptom management and global health.

TABLE 7. Pathways in path model self-efficacy symptom management and global health.

Path	Estimate	SE	CR	p
Global Health←Self-Efficacy Symptom Management (SESx)	.19	.06	3.08	<.05
Global Health←Spiritual Well-Being (SWB)	.08	.06	1.43	.15
GH←SESx x AOS (interaction term)	.12	.07	1.78	.08
Global Health←Anglo-Orientation Scale	.10	.07	1.43	.15
Global Health←SESx x IS (interaction term)	-.09	.06	-1.57	.12
Global Health←Informational Support	.27	.06	4.45	<.05
Global Health←Education	.12	.05	2.27	.02

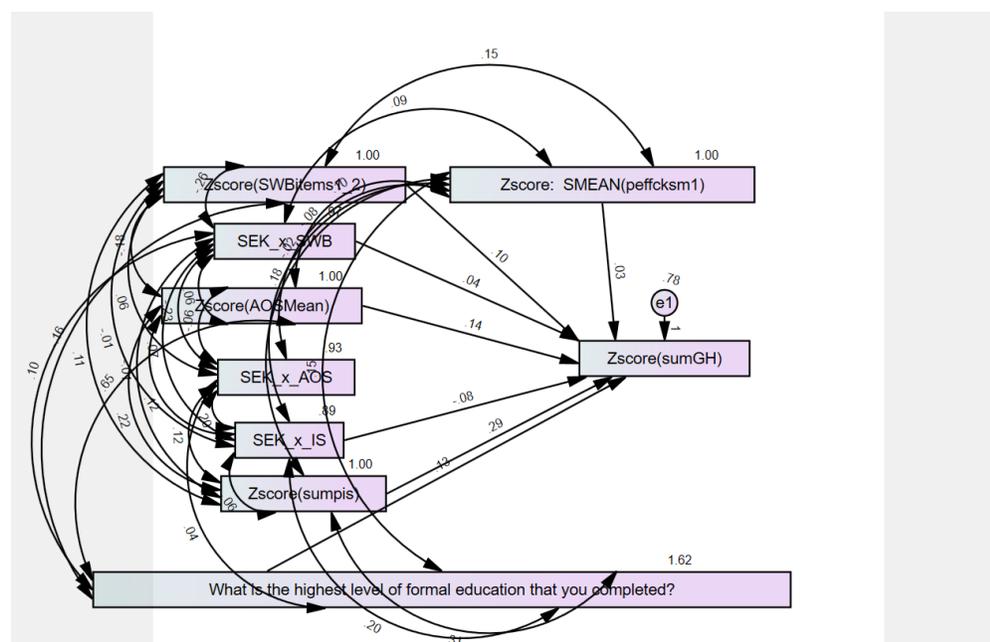


(Interaction effect was not significant at  $p=.08$ .)

FIGURE 16. Interaction effect of self-efficacy symptom management on the relationship between Anglo-orientation and global health.

Self-efficacy symptom management had a trend toward a significant interaction effect on the relationship between Anglo-orientation and global health. High levels of self-efficacy and Anglo-orientation were associated with the highest levels of global health. High levels of self-efficacy and low acculturation levels were associated with higher global health levels than low self-efficacy levels and high acculturation levels.

There were also significant positive pathways between self-efficacy symptom management and global health and informational support and global health, where increased levels of self-efficacy symptom management and informational support were associated with corresponding increases in global health.



Model Fit: Chi-square=.28,  $p=.60$ ; GFI=1; AGFI=.99; NFI=1; TLI=1.12; CFI=1; RMSEA=.00

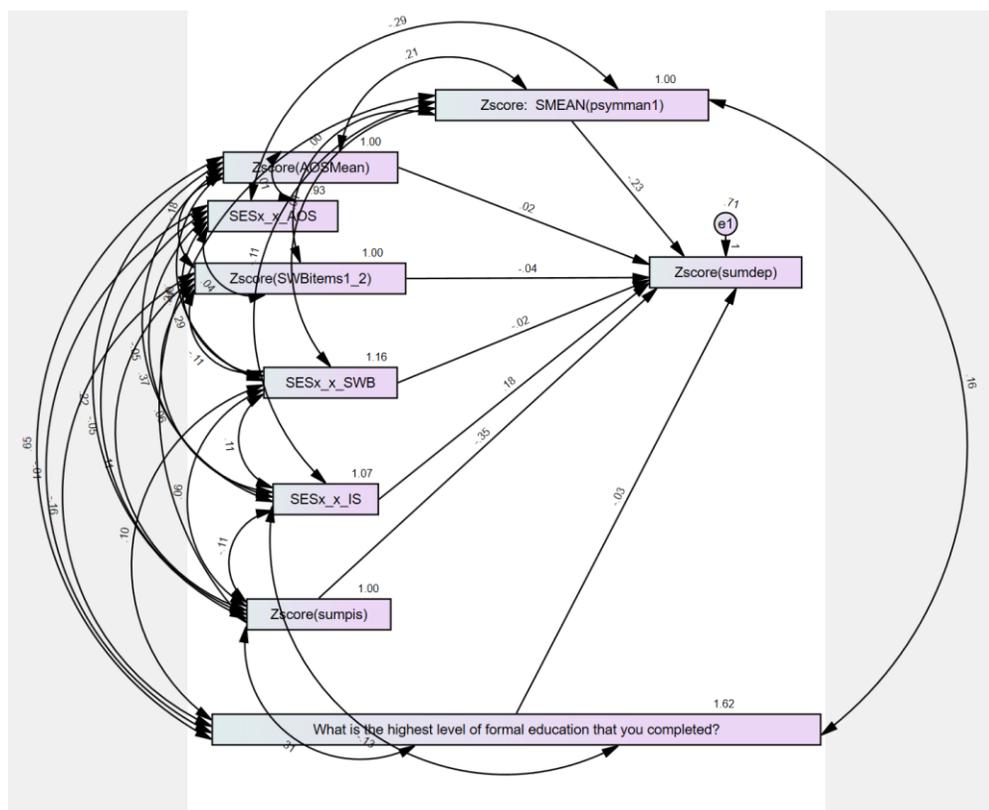
FIGURE 17. Path model for self-efficacy cancer knowledge and global health.

TABLE 8. Pathways in path model self-efficacy cancer knowledge and global health.

Path	Estimate	SE	CR	p
Global Health←Self-Efficacy Cancer Knowledge (SECK)	.03	.06	.53	.60
Global Health←Spiritual Well-Being (SWB)	.10	.06	1.53	.13
GH←SECK x SWB (interaction term)	.05	.06	.73	.47
Global Health←Anglo-Orientation Scale	.14	.07	2.02	<.05
Global Health←SECK x IS (interaction term)	-.08	.06	-1.23	.22
Global Health←Informational Support	.29	.06	4.73	<.05
Global Health←Education	.13	.05	2.39	.02

There were no significant interaction pathways for self-efficacy cancer knowledge and global health. There were significant positive pathways between informational support and

Anglo-orientation and global health. As Anglo-orientation levels and informational support levels increase, global health levels increase.

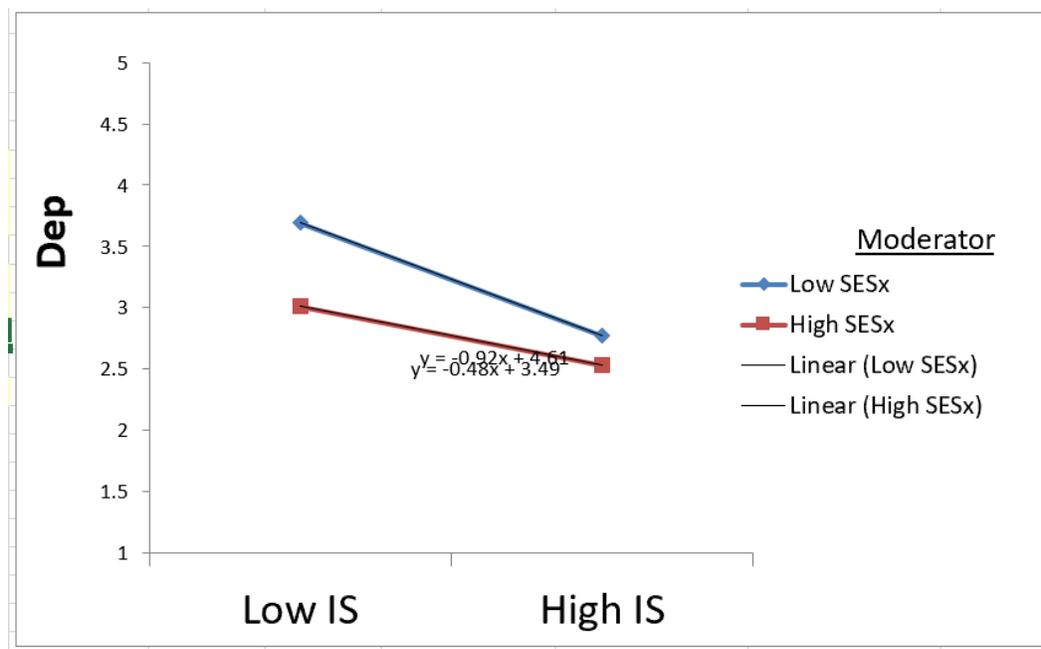


(Model Fit: Chi-square=.00, p=.99; GFI=1.00; AGFI=1.00; NFI=1.00; TLI=1.17; CFI=1.00; RMSEA=.00)

FIGURE 18. Path model for self-efficacy symptom management and depression.

TABLE 9. Pathways in path model self-efficacy symptom management and depression.

Path	Estimate	SE	CR	p
Depression←Anglo-Orientation Scale (AOS)	.02	.07	.30	.77
Depression←Spiritual Well-Being (SWB)	-.04	.06	-.74	.46
Depression←Informational Support (IS)	-.35	.06	-5.92	<.05
Depression←Self-Efficacy for Symptom Management (SESx)	-.23	.06	-3.97	<.05
Depression←SESx x SWB (interaction term)	-.02	.05	-.33	.74
Depression←SESx x IS (interaction term)	.18	.06	-3.36	<.05
Depression←Education	-.03	.05	-.50	.62

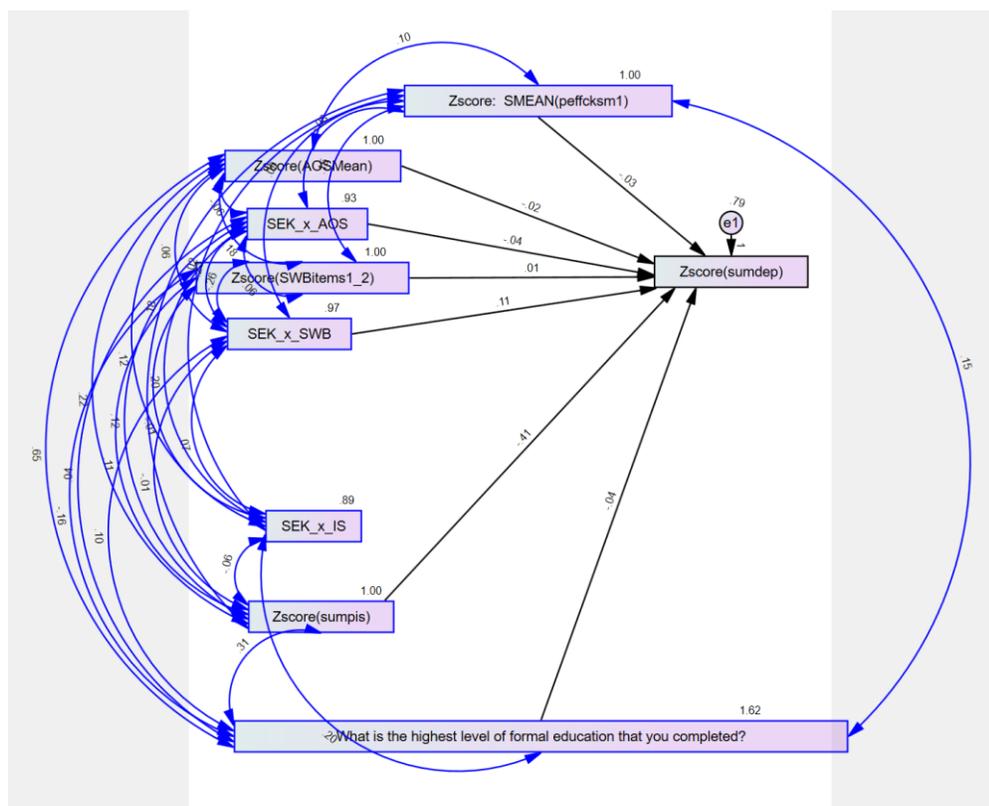


(Self-efficacy for symptom management weakens the negative relationship between depression and informational support. This was significant at  $p < .05$ .)

**FIGURE 19.** Interaction effect of self-efficacy symptom management on informational support and depression.

There was a significant interaction effect of self-efficacy symptom management on the relationship between informational support and depression ( $p < .05$ ). Participants with high self-efficacy symptom management and high informational support had lower depression levels, and individuals with low informational support, but high self-efficacy symptom management had lower depression levels than those with low self-efficacy symptom management and low informational support.

The pathways from informational support and self-efficacy symptom management alone to depression were also significant. These were negative relationships where high self-efficacy symptom management and high informational support levels were associated with lower depression levels.

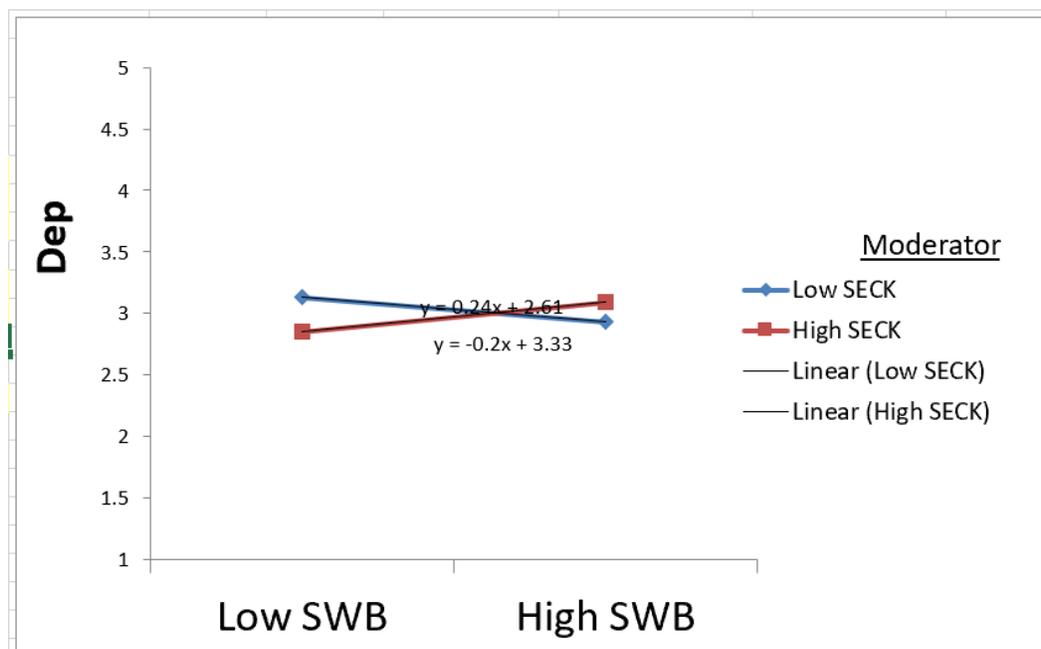


(Model Fit: Chi-square=.015, p=.90; GFI=1.00; AGFI=1.00; NFI=1.00; TLI=1.13; CFI=1.00; RMSEA=.00)

FIGURE 20. Path model for self-efficacy cancer knowledge and depression.

TABLE 10. Pathways in path model self-efficacy cancer knowledge and depression.

Path	Estimate	SE	CR	p
Depression←Self-Efficacy Cancer Knowledge (SECK)	-.03	.06	-.54	.60
Depression←Anlgo-Orientation Scale (AOS)	-.02	.07	-.25	.80
Depression←SECKxAOS (interaction term)	-.04	.06	-.63	.53
Depression←Spiritual Well-Being (SWB)	.01	.06	.08	.93
Depression←SECKxSWB (interaction term)	.12	.06	1.8	.07
Depression←Education	-.04	.05	-.70	.50
Depression←Informational Support	-.41	.06	-6.49	<.05



(Self-efficacy for cancer knowledge strengthens the relationship between spiritual well-being and depression, although this relationship was not significant at  $p=.05$ .)

**FIGURE 21.** Interaction effect for self-efficacy cancer knowledge on spiritual well-being and depression.

The trend toward a significant interaction effect of self-efficacy cancer knowledge on the relationship between spiritual well-being and depression. Participants with high self-efficacy cancer knowledge and low spiritual well-being levels had the lowest depression levels. While individuals with high self-efficacy and high spiritual well-being were modestly lower than those with low self-efficacy and low spiritual well-being.

All four path models had excellent model fit indexes. There was only one significant interaction effect in all four models, which was the interaction effect of self-efficacy symptom management on informational support and depression.

## **Conclusion**

Both Aim 1 and Aim 2 were accomplished with data analysis, and Aim 3 was partially addressed through moderation of two self-efficacy items on the relationships between proposed dependent and independent variables. In addition, path analysis of the models identified one significant moderating path for self-efficacy for symptom management on informational support and depression. Significant moderating relationships were identified with simple moderation analysis as well.

## **Discussion**

The current study sought to test a moderating model of self-efficacy on caregiver characteristics and health outcomes in caregivers of Latina breast cancer survivors. While the full structural equation model was not successfully completed, some important correlational and moderation relationships were elucidated. Caregiver factors such as Anglo-orientation and perceived social support were related to physical and mental health outcomes. Both types of self-efficacy were significantly related to some, but not all, predictor and outcome variables. Patterns varied based on the type of self-efficacy, and these patterns bear further discussion due to the specific types of self-efficacy that were measured in this study, self-efficacy cancer knowledge and self-efficacy symptom management. These findings are also significant due to the focused population in this study, caregivers of Latina breast cancer survivors with their specific challenges related to social determinants of health. Finally, each type of self-efficacy had distinctively significant interaction effects on relationships between dependent variables and outcome variables that will be further discussed.

### **Relationships Among Cancer Caregiver Characteristics and Health Outcomes**

Significant relationships were noted among caregiver factors and mental and emotional health outcomes in caregivers of Latina breast cancer survivors. Relationships of note included education and global health and depression; Anglo-orientation and global health and depression; and informational support and global health, depression, and anxiety. Additionally, both emotional and informational support and depression and anxiety had highly significant positive relationships. This finding is consistent with literature on the co-morbidity of anxiety and depression (Huppert, 2008). The social support findings are interesting and bear further investigation in the Latino population regarding the sources of emotional and informational support—family, healthcare providers, church organizations, friends, and community (National Hispanic Counsel on Aging [NHCOA], 2017). Informational support may be a way to circumvent barriers caregivers experience due to education and income (Aranda & Cordero, 2017) and this also had a significant relationship with health outcomes such as global health, depression, and anxiety. This is clinically relevant, because this is an important area where nurses and healthcare providers can intervene. This is also clear in the literature, with Latino caregivers expressing the desire for information regarding caregiving. In addition, Latino caregivers primarily rely on health care professionals for disease-related information, and want information provided in Spanish (NAC, 2008).

In the present sample, a high proportion of caregivers did not have a technical or college degree. Often, education corresponds with socioeconomic status, which was true for this sample of Latino cancer caregivers who were primarily low income (Amenta, 2016). While income only had a significant relationship with education and global health in this study, financial status is

still an important issue to consider in the Latino population due to health care access through transportation, appointments, medications, and additional services, such as respite care (NHCOA, 2017). Financial distress is a significant issue in Latino caregivers due to the high financial contributions to caregiving in the Latino population and the lower median household incomes of Hispanics when compared to white counterparts (NHCOA, 2017; Peter G. Peterson Foundation, 2018; Rainville et al., 2016). Additionally, there were approximately three children living in the home ( $M=2.9$ ,  $SD=1.4$ ), which is consistent with statistics demonstrating that a higher number of Hispanic households have five or more individuals than white non-Hispanic households (Pew Research Center, 2015). In addition to having lower incomes than white counterparts, contributing significant time and financial resources, and having high burden caregiving situations, these Latino caregivers are sharing their income with more people than their white counterparts.

### **Relationships Among Cancer Caregiver Self-Efficacy, Characteristics and Health**

In caregivers of Latina breast cancer survivors, self-efficacy cancer knowledge and self-efficacy symptom management were not related to each other. This is significant, because it is reflective of situation-specific self-efficacy posited by Bandura (2006). Caregivers who have high self-efficacy regarding their cancer knowledge may not be able to translate this high self-efficacy to managing their own symptoms of distress. Healthcare providers need to be aware of this issue and promote caregiver self-efficacy for both care of the cancer survivor and care of self.

Both self-efficacy measures had significant positive relationships with informational and emotional support, along with varied relationships with spiritual well-being, Anglo-orientation,

chronic illnesses, global health, depression, and anxiety. Social support is an important facet of Latino culture with *familism*, loyalty to and care of family (Badger et al., 2018b) and the reliance on healthcare providers for health information (Aranda & Cordero, 2017; NAC, 2008).

Individual experiences with *familism* as a cultural norm may be varied based on caregiver age and acculturation (Flores et al., 2009; Toro et al., 2018). It is important for health care providers to recognize that *familism* can be a source of strength and resilience for Latino caregivers, while also being a constraining force in caregiving (Flores et al., 2009; Toro et al., 2018). For example, women with the cultural norm of *marianismo* may feel greater responsibility to be caregivers, and men, with *machismo*, may not be culturally supported in taking on caregiving roles (Badger et al., 2018b; Flores et al., 2009). One way to address the nuances of family and support for Latino caregivers is completing an assessment of both the meaning of caregiving and the sources of support for caregiving that Latino caregivers are experiencing.

Provision of social support may be one of the areas where interventions can have the greatest impact in caregivers of Latina breast cancer survivors. As noted in a Latino caregiver needs assessment by the AARP, social support programming should focus on delivery at multiple levels—healthcare care system, community-based organizations, faith-based programs, and family support (Aranda & Cordero, 2017). The CARE Act is an example of legislation that may support programming at the healthcare and community level (Caceres & Perez, 2018).

Finally, the differing relationships with self-efficacy cancer knowledge and self-efficacy symptom management and spiritual well-being, Anglo-orientation, and health outcomes is important to note theoretically and clinically. Self-efficacy cancer knowledge had significant relationships with education, spiritual well-being, and global health. The positive relationship

between self-efficacy cancer knowledge and education is an important factor to consider clinically. Latino cancer caregivers with higher baseline education may respond more positively to educational interventions, so nurses and other healthcare providers should tailor education based on education level and have realistic expectations regarding caregiver response to these interventions (Hendrix, 2011). The relationship between self-efficacy cancer knowledge and spiritual well-being is interesting due to the negative relationship between spiritual well-being and education. Further research is needed for caregivers of Latina breast cancer survivors to examine the relationships between self-efficacy cancer knowledge, spiritual well-being, and education.

Finally, self-efficacy cancer knowledge was related to global health, but not to mental health outcomes such as anxiety or depression, while self-efficacy symptom management was related to all study health outcomes. Although research has demonstrated that greater self-efficacy to manage the impact of illnesses and general self-efficacy is related to lower symptom distress and depression, respectively (Ellis et al., 2017; Mystakidou et al., 2013), healthcare providers need to understand that self-efficacy is situation specific. Interventions to promote health in these caregivers should focus on self-efficacy for personal symptom management rather than simply focusing on caregiver self-efficacy for caring for the survivor. Cancer caregivers are at risk for poor health outcomes (Goren et al., 2014), and this risk is even greater for caregivers of Latina breast cancer survivors due to social determinants of health (NHCOA, 2017). Identifying factors, such as greater social support, that may contribute to higher self-efficacy levels for managing the care of self and care of the survivor is compelling both theoretically and clinically. Bandura described the role of performance accomplishments and verbal persuasion as

factors promoting self-efficacy (Bandura, 1977). If caregivers are provided with support to succeed in self-care and caregiving behaviors and given positive verbal feedback, this may reinforce greater self-efficacy levels. An additional consideration is the level of Anglo-orientation for caregivers of Latina breast cancer survivors. In this study, Anglo-orientation was positively correlated to self-efficacy symptom management. Further research is needed to examine how Anglo-orientation affects healthcare access, provider bias, and Latino cancer caregiver self-care (Blair et al., 2013; Lopez, Gonzalez-Barrera, & Krogstad, 2018).

### **Moderating Effects of Caregiver Self-Efficacy on Health Outcomes**

Self-efficacy symptom management and self-efficacy cancer knowledge had different interaction effects on the relationships between predictor and outcome variables. Interestingly, during simple moderation, self-efficacy cancer knowledge had significant moderating effects on the relationships between Anglo-orientation and depression and chronic illnesses. In both scenarios, high self-efficacy cancer knowledge and high Anglo-orientation were associated with lower levels of depression and lower number of chronic illnesses. Conversely, the highest depression levels and number of chronic illnesses were in participants with low Anglo-orientation and high self-efficacy cancer knowledge. This same pattern was noted during path analysis for self-efficacy symptom management on the relationship between Anglo-orientation and global health. Individuals with high self-efficacy symptom management, but low Anglo-orientation had the lowest global health levels. When considering the clinical implications of these findings, healthcare providers should consider screening caregivers of Latina breast cancer survivors regarding Anglo-orientation levels before proceeding with interventions to promote self-efficacy cancer knowledge, because health outcomes may not improve. This is an important

finding due to the premise of the Hispanic paradox, where new immigrants are sometimes found to have better health outcomes than American-born Latinos (Teruya et al., 2013). While correlational analysis did not support the Hispanic paradox, the moderation results lend some complexity to these relationships and how self-efficacy cancer knowledge interacts with the relationship between Anglo-orientation and health outcomes.

While interesting theoretically, the clinical implications of acculturation and health are also significant. Timing and content of interventions in caregivers of Latina breast cancer survivors is of utmost importance when considering Anglo-orientation (Aranda & Cordero, 2017). It is important for nurses and other healthcare providers to assess for informational, support, and health needs of cancer caregivers regardless of ethnicity or acculturation levels. Yet, there are significant barriers to accessing information and support for individuals who are ethnic and racial minorities and who have language barriers. Unfortunately, racial bias continues to persist, both explicit and implicit, towards Latinos in both public and health care settings in the United States (Blair et al., 2013; Lopez, Gonzalez-Barrera, & Krogstad, 2018). In addition to navigating barriers to care related to racial prejudice, there are other substantial cultural issues with health care access such as understanding the mechanics and the culture of the health care system in a new country (Straiton & Myhre, 2017). Expectations such as follow-up, the use of third-party payment structures, emphasis on Western medical practice versus complementary and alternative approaches to care, and primary, secondary, and tertiary settings for care are often taken for granted by healthcare professionals. This is an area where there needs to be greater intersection of research, practice, and health care policy.

Another interesting interaction pattern was the moderating effect of self-efficacy symptom management on informational support and depression and anxiety, which was also supported in path analysis for informational support and depression. High self-efficacy symptom management and high informational support were associated with the lowest depression and anxiety levels, although high self-efficacy symptom management was protective for participants with low informational support. Their depression levels were lower than individuals with low self-efficacy symptom management and low informational support. This is a key clinical finding for caregivers of Latina breast cancer survivors, because provision of care that promotes self-efficacy to manage their own symptoms may be protective at all levels of informational support. Prior research has noted improved self-efficacy with educational interventions focused on care of the survivor in cancer caregivers, but no corresponding improvement in mental health (Hendrix et al., 2011). In addition, several studies have focused on informational needs and interventions for cancer caregivers, but only a few have addressed holistic needs of cancer caregivers (Shin, Kang, Noll, & Choi, 2018). This is a research gap that requires further attention. Cancer caregivers need interventions to help them support cancer survivors, but also to support their own health. A vital aspect of providing this support is how it is delivered. In one survey of Latino caregivers, healthcare providers were the primary source of healthcare information, and technology-based information sources such as texts, emails, and app-based information were not highly utilized (Aranda & Cordero, 2017).

In the current healthcare system with burgeoning technology, it is important for researchers to understand information usage, with respect to both barriers and facilitators of technology delivery. In the Latino population, both a telephone intervention and promotor-

delivered interventions in Latino survivors and caregivers demonstrated promising results for survivor and caregiver outcomes (Badger et al., 2019; Marshall et al., 2013). Future research should include greater application of technology in a usable and accessible format for Latino caregivers. Options could include patient portals, text messaging, social media, and wearable devices. When applying complex adaptive systems to this area of research, there may be multiple modes of communication that are required to provide adequate informational support to Latino cancer caregivers.

### **Spiritual Well-Being**

Spiritual well-being was included in the model for this study due to the importance of spirituality in the Latino culture (Badger et al., 2018b). In the present sample, it was related to self-efficacy cancer knowledge, informational support, and acculturation. Interestingly, there was an inverse relationship between Anglo-orientation and spiritual well-being, with higher spiritual well-being with lower Anglo-orientation levels. This is consistent with the literature that describes the importance of spirituality in the Latino population (Badger et al., 2019b). This relationship deserves more investigation in the wider Latino caregiving population living in the United States, especially with measures that are reflective of hope and purpose rather than religious and spiritual activities. Additionally, the trend toward a significant moderating effect of self-efficacy cancer knowledge on the relationship between spiritual well-being and depression was noted. High self-efficacy cancer knowledge and high spiritual well-being were associated with the highest depression levels. The reasons for this relationship are unclear, but explanations include the possibility that self-efficacy *cancer knowledge* is not necessarily a positive influence on depression, and that measures of spiritual hope, meaning, and connectedness other than

*participation in activities* may better represent spirituality in Latinas. In addition, spiritual well-being and education levels were inversely correlated – consistent with previous findings on this relationship. Overall, then, the relationships among spiritual well-being, education, self-efficacy cancer knowledge, and depression could be further addressed.

Although the findings with spiritual well-being were mixed in this study, spirituality is still a potential source of strength and a motivator for caregiving in caregivers of Latina breast cancer survivors (Aranda & Cordero, 2017; Campesino & Schwartz, 2006). Health care providers need to be more intentional in addressing spiritual well-being, to prevent distress and to emphasize sources of strength for Latino caregivers. Spiritual well-being is a key aspect of palliative care provision for patients, and it should be extended to caregivers and families more consistently (National Consensus Project [NCP], 2013). Assessing for spiritual distress and provision of information about chaplain services, support groups, and spiritual practices should be included in caregiver interactions. These approaches may create greater space to share spiritual beliefs and needs in caregivers of Latina breast cancer survivors.

### **Limitations**

Many of the study limitations have been addressed in the methods, with the primary limitation being related to the measurement of the model and the sample size. Alterations and simplification of the model were completed iteratively, with an emphasis on consistency with the initial proposed model. Path analyses are not as robust as full structural equation modeling, but the analyses in this study have provided a starting point for ongoing research to refine the model. Additionally, the population in this study is focused, so generalization of findings should not be made to the broader cancer caregiver population.

## **Conclusion**

This study provides additional support for situation-specific self-efficacy in caregivers of Latina breast cancer survivors. Self-efficacy cancer knowledge and self-efficacy symptom management had varied relationships among predictor and outcome variables. In addition, the interaction effects of these two types of self-efficacy were different. Self-efficacy remains an important factor to consider in supporting caregivers of Latina breast cancer survivors. These caregivers are a unique example of caregiving, due to higher caregiving rates, higher investment of time and money, and greater positive appraisals of caregiving. They are also at risk due to social determinants of health. Strategies to promote greater self-efficacy to care for the survivor and to provide self-care should be balanced with factors such as Anglo-orientation levels, spiritual well-being, education, and informational support. Providers can better support caregivers of Latina breast cancer survivors by performing individualized assessments to understand how interventions to promote self-efficacy for care of the survivor and care of self will affect health outcomes.

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APPENDIX A: THEORY MANUSCRIPT –  
SELF-EFFICACY IN CANCER CAREGIVERS OF ADULT CANCER SURVIVORS: STATE  
OF THE SCIENCE

### Abstract

**Purpose:** The purpose of this paper is to present an integrative review of the state of the science of cancer caregiver self-efficacy in cancer caregivers of adult cancer survivors.

**Background:** Cancer caregivers experience multiple challenges related to their caregiving role.

Self-efficacy, through influences on both the stress response and behavior, is a construct that has proven relevant in cancer caregiver literature.

**Methods:** For this integrative review, a systematic search of PubMed, CINAHL, and PsychInfo yielded 507 articles addressing cancer caregivers and self-efficacy. Articles were selected based on inclusion and exclusion criteria for a total of 41 articles. These articles were reviewed for the representation of self-efficacy, characteristics of cancer caregivers, study characteristics, and study outcomes related to self-efficacy.

**Results:** Self-efficacy has been widely studied in cancer caregivers as both a predictor and outcome variable with significant relationships to quality of life, hope, and anxiety, among other factors. The majority of caregivers in the studies were women and Caucasian. None of the studies addressed psychosocial factors as predictor variables that contribute to self-efficacy as an outcome variable in cancer caregivers, and none of the studies used a qualitative design.

**Discussion:** Future research should include qualitative studies addressing self-efficacy in cancer caregivers and include diverse populations. There is a need for a model of cancer caregiver self-efficacy that could act as a guide for tailored interventions to support both self-efficacy and outcomes influenced by self-efficacy in cancer caregivers.

*Keywords:* cancer caregiver, self-efficacy, state of the science, integrative review

### Self-Efficacy in Cancer Caregivers of Adult Cancer Survivors: State of the Science

In 2015, there were 2.8 million informal caregivers providing care to adults with a primary diagnosis of cancer (National Alliance for Caregiving, 2016). Informal caregivers are foundational to the delivery of health care in the United States (National Cancer Institute, 2017), yet caregivers have been described as the hidden patient (Roche, 2009). Informal cancer caregivers may provide physical, mental, emotional, spiritual, and financial support for their loved one with cancer, and they may be asked to provide care for which they feel unprepared to deliver (National Cancer Institute, 2017). Caregivers may also suffer consequences from their caregiving role including weight changes sleep deprivation, depressive symptoms, anxiety, social isolation, and an increased risk of mortality (Adelman, Tmanova, Delgado, Dion, & Lachs, 2014; Perkins et al., 2013).

While informal caregiving in general can exact a toll cancer caregiving has unique challenges related to the disease course and patient supportive needs. Cancer caregivers are often tasked with managing complicated medication regimens, assessing for signs of cancer recurrence or medication toxicity, addressing symptoms related to cancer and its treatment, and navigating complex and costly testing and treatments, all while still caring for themselves and maintaining their responsibilities. Cancer caregivers are generally women and most often family members (NAC, 2016). The tenets of palliative care emphasize the fundamental role of family caregivers (National Consensus Project, 2013), yet cancer caregivers may not receive the support they need for the care of their loved ones in addition to their own needs (Dębska, Pasek, & Wojtyna, 2017). Self-efficacy has been described in health care research as a factor contributing to health outcomes. This occurs through both the stress response and behavior change, both of which are

relevant to cancer caregivers (O'Leary, 1992). Therefore, the purpose of this paper is to present the state of the science on the concept of self-efficacy in cancer caregivers of adult cancer survivors by addressing its relationship to well-being.

### **Background**

Cancer caregiving requires a greater intensity of work and time than other informal caregiving (National Alliance for Caregiving, 2016). Goren and colleagues reported (2014) health impairments experienced by cancer caregivers including stress-related illnesses, work impairment, increased healthcare utilization, and poorer health-related quality of life. Researchers have described interdependence of cancer survivors and their caregivers, with partner effects related to psychological and physical distress in one individual affecting the distress and quality of life in the other (Segrin & Badger, 2014; Segrin, Badger, Sikorskii, Crane, & Pace, 2018). Interventions that provide support for the informal cancer caregiver may indirectly promote the well-being of the cancer survivor. For this reason, self-efficacy is an important factor to address in cancer caregivers due to its relationship with the stress responses and caregiver behavior (O'Leary, 1992).

### **Conceptual Framework: Self-Efficacy**

Self-efficacy, described by Albert Bandura in his Social Cognitive Theory, is viewed as a fundamental factor in behavior and behavioral change (Bandura, 1977). Self-efficacy is the belief in one's ability to achieve a desired outcome through behavior, and it is influenced by the principle of individuals as self-agents (Bandura, 2001). Bandura (2006) described the importance of measuring self-efficacy with specificity to the domain of concern, because individuals can vary in their self-efficacy based on circumstance and experience. He addressed the need to

distinguish self-efficacy from other constructs including self-esteem, locus of control, and outcome expectancies, because of the distinct difference and influences guiding those other principles (Bandura, 2006). Self-efficacy affects human behavior, because of its influence on perceptions, goals, and patterns of thinking. In cancer caregivers, self-efficacy has the potential to influence caregivers' perceptions related to themselves as well as the individuals they care for in areas such as self-care, symptom management, medication administration, and navigation of the health care system (Bandura, 2006).

### **Methods**

For this integrative review, a systematic approach was used to search and identify articles relevant to self-efficacy in cancer caregivers.

#### **Search Strategy**

On June 8, 2019, a literature search was conducted through PubMed, CINAHL, and PsychInfo using the following combinations of search terms: cancer caregiver and self-efficacy and well-being; cancer caregiver and self-efficacy. The search yielded a total of 507 articles.

#### **Article Selection**

Article titles, abstracts, and full-texts were reviewed for relevance to this review. The inclusion and exclusion criteria included: cancer caregivers of adult cancer survivors as primary participants, assessment of self-efficacy, presence of results, written in English, readily accessible, and published from January 1, 2009 to June 8, 2019. Opinion pieces, non-systematic literature reviews, and research protocols were not included, although systematic literature reviews, metasyntheses, and meta-analyses were included. Forty-one articles remained after

completion of the screening process. See Figure 1 for a detailed outline of the article selection process.

### **Article Review**

Articles were reviewed with a focus on the following factors: study type, methodological strengths and weaknesses, representation of the self-efficacy construct through measures or themes, and outcomes related to caregiver self-efficacy. There were some studies that included both cancer survivors and cancer caregivers, but only the cancer caregiver-related outcomes were addressed for this review (see Table 1 for detailed study information).

### **Results**

The results of the literature review will be described according to study characteristics, self-efficacy as a predictor variable, self-efficacy as an outcome variable, and measures used to represent self-efficacy.

### **Study Characteristics**

The majority of studies were quantitative, and there were no exclusively qualitative studies. Four studies used a mixed methods design (Barber, 2013; Duggleby, Ghosh, et al., 2017; Duggleby et al., 2015; Duggleby et al., 2013). None of the mixed methods studies addressed self-efficacy specifically in the qualitative data. Sixteen of the studies were cross-sectional quantitative descriptive designs (Bachner, Yosef-Sela, & Carmel, 2014; Dionne-Odom et al., 2017; Duggleby, Doell, Cooper, Thomas, & Ghosh, 2014;. Duggleby et al., 2014;. Havyer, van Ryn, Wilson, & Griffin, 2017; Ito & Tadaka, 2017; Johansen, Cvancarova, & Ruland, 2018; La & Yun, 2017; Lee et al., 2013; Mori et al., 2013; Mystakidou et al., 2013a; Oh, 2017; Ugalde, Krishnasamy, & Schofield, 2013; Ugalde, Krishnasamy, & Schofield, 2014; Yildiz, Karakas,

Gungormus, & Cengiz, 2017), with one being a secondary analysis of existing data (Ellis et al., 2017). Quasi-experimental (Bevans et al., 2014; Dockham et al., 2016; Lee, Yiin, & Chao, 2016; Li, Xu, Zhou, & Loke, 2015; Marshall et al., 2013; L. Northouse et al., 2014; Stoutenberg, Sogor, Arheart, Cutrono, & Kornfeld, 2016; Titler et al., 2017) and experimental (Hendrix et al., 2016; Leow, Chan, & Chan, 2015; Mosher et al., 2017; Mosher et al., 2016; Northouse et al., 2013; Stacey, James, Chapman, & Lubans, 2016) studies constituted just over one-third of the studies reviewed, which is interesting due to the absence of qualitative studies and a slightly higher number of descriptive studies. This may be an indicator of where the state of the literature is for cancer caregiver self-efficacy with groundwork laid prior to 2013—the cutoff point for this review.

Longitudinal analyses (Hyde et al., 2018; Kershaw et al., 2015; Lee et al., 2018) were also included in this review, one of which also included cancer survivors as participants. Three literature reviews (Duggleby, Tycholiz, et al., 2017; Latter et al., 2016; Li & Loke, 2014) were also included, none of which primarily focused on self-efficacy as an outcome or predictor. Thirteen of the forty-one studies included both caregivers and cancer survivors as participants, which is a pattern frequently seen in the literature with caregiver and cancer survivor dyads (Barber, 2013; Dockham et al., 2016; Duggleby et al., 2014; Ellis et al., 2017; Johansen et al., 2018; Kershaw et al., 2015; La & Yun, 2017; Li et al., 2015; Mosher et al., 2017; Mosher et al., 2016; Northouse et al., 2014; Northouse et al., 2013; Stacey et al., 2016; Stoutenberg et al., 2016; Sun et al., 2017).

### **Caregiver Characteristics**

A consistent demographic finding among studies was the larger population of female caregivers (Bevans et al., 2014; La & Yun, 2017; Lee et al., 2018; Leow et al., 2015; Marshall et al., 2013; Oh, 2017; Sun et al., 2017; Ugalde et al., 2014; Yildiz et al., 2017). This could either serve as a limitation to the studies or as a representation of the wider cancer caregiver population, which does tend to have more females (National Alliance for Caregiving, 2016). Both male and female cancer caregivers should be represented, so all perspectives and experiences are addressed. The participant populations in the study tended to be homogeneous according to race, primarily white non-Hispanic caregivers (Bevans et al., 2014; Duggleby et al., 2014; Duggleby, Tycholiz, et al., 2017; Duggleby et al., 2014; Ellis et al., 2017; Havyer et al., 2017; Hendrix et al., 2016; Hyde et al., 2018; Oh, 2017; Sun et al., 2017; Titler et al., 2017), which is a major limitation to consider with both the generalizability of findings and future research.

### **Self-Efficacy as Predictor Variable**

Self-efficacy served as a predictor variable in a fifteen studies that addressed various outcomes: communication (Bachner et al., 2014), self-efficacy as a predictor for subsequent self-efficacy following problem-solving education (Bevans et al., 2014), quality of life (Duggleby et al., 2017; Duggleby et al., 2015; Ito & Tadaka, 2017), hope (Duggleby et al., 2014), threat appraisals (Ellis et al., 2017), caregiver burden and strain (Kershaw et al., 2015; Lee et al., 2018; Li & Loke, 2013), physical health (La & Yun, 2017), anxiety, depression, and mood (Lee et al., 2013; Li & Loke, 2013; Mystakidou et al., 2013a; Oh, 2017). The effect of self-efficacy was mixed, with researchers describing self-efficacy as a significant predictor of cancer caregiver outcomes or characteristics such as open communication (Bachner et al., 2014) or hope

(Duggleby et al., 2014), while other studies found no significant relationship between self-efficacy and caregiver outcomes such as quality of life (Duggleby, Ghosh, et al., 2017). In the current literature, it is unclear whether self-efficacy serves as an antecedent to better caregiver outcomes such as physical health, or whether better baseline caregiver characteristics such as physical health are predictive of higher caregiver self-efficacy.

### **Self-Efficacy as Outcome Variable**

Self-efficacy was also used as an outcome variable in 21 studies, especially interventional studies (Bevans et al., 2014; Dockham et al., 2016; Duggleby et al., 2017; Duggleby et al., 2013; Ellis et al., 2017; Havyer et al., 2017; Hendrix et al., 2016; Latter et al., 2016; Lee et al., 2016; Leow et al., 2015; Li et al., 2015; Marshall et al., 2013; Mori et al., 2013; Mosher et al., 2017; Mosher et al., 2016; Northouse et al., 2014; Northouse et al., 2013; Stacey et al., 2016; Stoutenberg et al., 2016; Sun et al., 2017; Titler et al., 2017). The types of interventions ranged in content and focus from an emphasis on cancer knowledge, peer helping, psychoeducational, couple-based, physical activity, symptom management, and end-of-life burdens. For eighteen studies, self-efficacy levels did increase following the intervention, although there were three where self-efficacy levels were unaffected by the interventions (Duggleby et al., 2013; Mosher et al., 2017; Sun et al., 2017).

### **Caregiver and Survivor Self-Efficacy**

Six studies included both the survivor and caregiver as participants, and some of these addressed dyadic outcomes related to self-efficacy. Both Dockham et al. (2016) and Li et al. (2015) noted improvement in dyad self-efficacy levels following interventions to support survivors and caregivers. Northouse et al. (2014) reported greater improvement in caregiver self-

efficacy in their feasibility study for survivors and caregivers. Ellis et al. (2017) described a direct association between lower levels of self-efficacy for both caregivers and survivors and higher levels of distress. In addition, partner effects were noted including a relationship between higher levels of patient distress and lower caregiver self-efficacy levels (Ellis et al., 2017). Kershaw and colleagues (2015) identified partner effects between patient self-efficacy and caregiver physical health over time. Conversely, La & Yun (2017) found no relationship between survivor self-efficacy and caregiver physical health scores. These mixed results suggest that the relationship between caregiver and survivor self-efficacy and dyadic outcomes such as physical health or distress is unclear. Another important finding is that none of the studies addressed social determinants of health such as education, socioeconomic status, and health care access as predictors of self-efficacy.

### **Self-Efficacy Measures**

The self-efficacy measures utilized among the studies varied. Some measures were well aligned with the focus of the study, like the Self-Efficacy and Exercise Habits Survey in Stoutenberg et al. (2016). The General Self-Efficacy Scale was used in seven studies (Bachner et al., 2014; Duggleby et al., 2014; Duggleby et al., 2017; Duggleby et al., 2015; Duggleby et al., 2013; Duggleby et al., 2014; Johansen et al., 2018), which does not align with Bandura's (Bandura, 2006) recommendation to use self-efficacy scales that are situation specific. There were several cancer specific scales utilized in studies including the Lewis Cancer Self-Efficacy Scale (Dockham et al., 2016), the Family Caregiving Self-Efficacy Scale in Terminal Cancer Patients at Home (Ito & Tadaka, 2017), and the Caregiver Self-Efficacy Scale (Ugalde et al., 2013), with the Lewis Cancer Self-Efficacy Scale being most frequently used.

## Discussion

In this state of the science paper on self-efficacy in cancer caregivers, several themes were identified including the diversity in the types studies addressing the construct of self-efficacy, cancer caregiver characteristics in the self-efficacy literature, self-efficacy as either a predictor or outcome variable, and the measures used to represent self-efficacy which can guide future cancer caregiver self-efficacy research. First, there is a gap in the recent literature of qualitative work on cancer caregiver self-efficacy. Even the mixed-methods studies in this review did not highlight issues related to self-efficacy within the qualitative thematic analyses. Qualitative research brings value by highlighting the stories and experiences of cancer caregivers. Second, many studies in this review were interventional in nature, which is an important step in the research process, but may be premature if self-efficacy in cancer caregiving is not fully understood. A model of self-efficacy that defines antecedents and outcomes related to self-efficacy might provide a guide for future intervention work with cancer caregivers.

The demographic characteristics of cancer caregivers in the studies included in this review were fairly homogeneous. There was only one study that highlighted an ethnic minority in the United States (Marshall et al., 2013), and a few studies that specifically addressed male cancer caregivers (Duggleby et al., 2014; Duggleby et al., 2017; Duggleby et al., 2015). Minority caregivers may experience unique challenges related to cancer caregiving such as lower education levels, socioeconomic status, and greater provision of care (Pinquart & Sorensen, 2005), so it is important that a diverse pool of cancer caregivers are represented in the literature. Future research should also address the potentially different needs and experiences of female versus male cancer caregivers, so interventions can be appropriately tailored.

Self-efficacy in cancer caregivers is somewhat nebulous, because there is not a clear understanding regarding what might help support greater self-efficacy and how self-efficacy may impact cancer caregiver outcomes. The findings from the studies in this review were mixed regarding self-efficacy outcomes and predictive relationships. To the best of our knowledge, to date there has not been a review of the literature focused on cancer caregiver self-efficacy. This reinforces the need for a model of self-efficacy in cancer caregivers that could serve as a framework for future research and practice interventions.

The relationship between cancer caregiver self-efficacy outcomes and cancer survivor outcomes was addressed by several researchers. It is important to address the caregiver and survivor as a family unit (National Consensus Project, 2013), because caregivers and survivors affect each other through the family system. Yet, there is also a need to consider the cancer caregiver independent from the survivor, so they do not continue to be the forgotten patient (Roche, 2009). Researchers should balance the need to understand cancer caregivers as individuals, while acknowledging the interdependence among members of the family system. A number of instruments were used to measure self-efficacy with some researchers aligning with Bandura's (2006) recommendation for situation specific self-efficacy measures and other researchers utilizing general self-efficacy measures. Future research on cancer caregiver self-efficacy should be conducted with attention to Bandura's (2006) recommendation.

### **Limitations**

This review has several limitations that should be considered before applying recommendations broadly to cancer caregiver self-efficacy research. First, the review was conducted by one researcher, so the objectivity of findings is affected by one person's

perspective. Second, the review was limited to research over the past five years and did not include any dissertation work. This may limit the strength of findings. Third, the representation of the state of the science in this review was thematic in nature, so the conclusions should be interpreted in that light.

### **Conclusion**

Cancer caregivers are a vital team member in the care of cancer survivors, and they are vulnerable to adverse outcomes related to their caregiving responsibilities. It is imperative that researchers and health care professionals acknowledge the importance of their role and supportive care needs during the cancer experience. Self-efficacy is a construct that readily applies to cancer caregivers due to the stress reactions of caregiving and the behaviors that affect both caregiver and survivor outcomes. Through an understanding of the current state of research related to cancer caregiver self-efficacy, future research can intentionally target areas of need such as qualitative studies and the development of a self-efficacy model for cancer caregivers. By identifying the factors that might improve self-efficacy and the role of self-efficacy in cancer caregiver outcomes, interventions can be tailored more appropriately to maximize positive cancer caregiver outcomes.

Figure 1: Article Selection Process

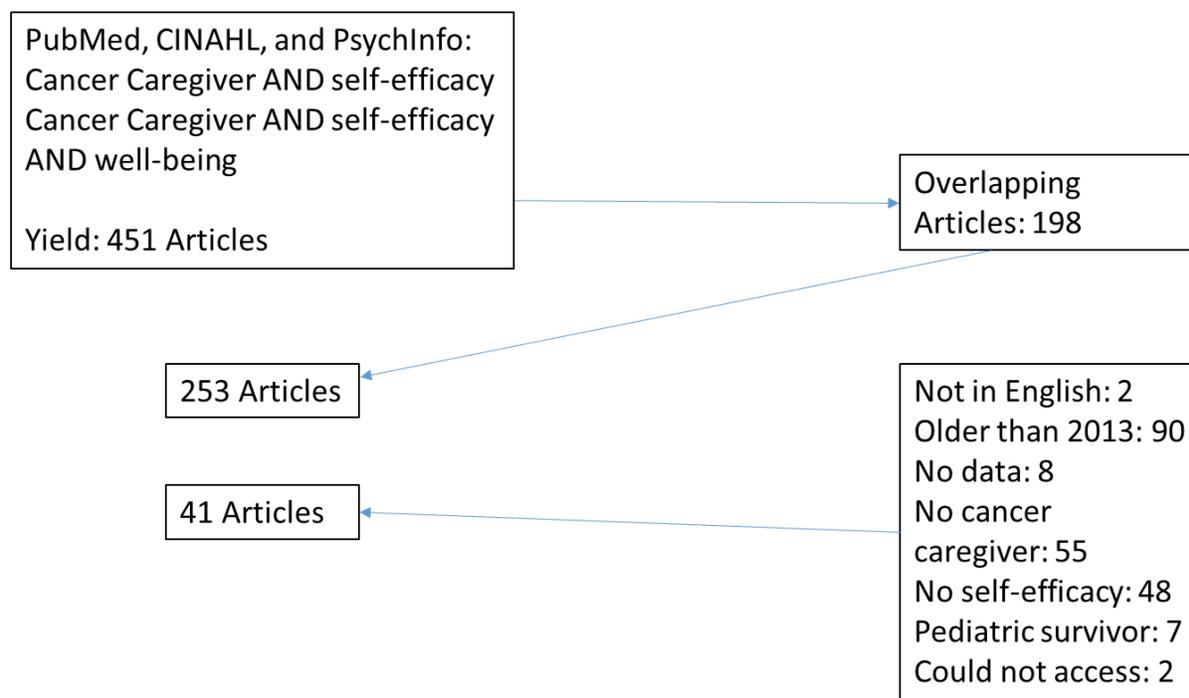


Table 1  
Overview of Research Articles

Authors	Study Type/ Purpose	Caregiver Characteristics/Self -Efficacy Representation	Findings	Strengths/ Limitations
(Bachner et al., 2014)	Cross-sectional descriptive; to compare the level of open communication between caregivers from 2 ethnic groups and examine the contribution of different caregiver characteristics and situational variables to open communication.	General Self-Efficacy Scale	Self-efficacy was associated with open communication ; self-efficacy was a significant predictor of open communication in regression analysis	No differences between respondent and non-respondents; self-efficacy was only variable closely related to another on the correlation matrix (depression); use of general scale versus specific to cancer caregivers
(Barber, 2013)	Cross-sectional mixed methods; To explore the relationships between adult cancer survivor and caregiver social support, self-efficacy for physical activity, physical activity behavior, and quality of life and to understand cancer survivors' and their caregivers' perceptions of social support in physical activity participation.	Exercise Confidence Survey	Self-efficacy making time and self-efficacy relapse were positively correlated	Convenience sampling; Self-efficacy scale specific to exercise rather than caregivers; mixed sample of both survivors and caregivers— incomplete dyads; small sample of caregivers (39); qualitative analysis did not separate survivors and caregivers; authors identified as quasi-experimental, but no evidence to support this

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Bevans et al., 2014)	Quasi-experimental; to determine the effect of an individualized problem-solving education (PSE) intervention on self-efficacy and distress in caregivers of patients receiving an allogeneic-hematopoietic stem cell transplantation	Cancer Self-Efficacy Scale--transplant	Caregivers reported improved self-efficacy scores following the intervention; baseline self-efficacy was the strongest predictor of greater self-efficacy post-intervention; intervention responders had lower scores pre-intervention than non-responders	Specific scale with good psychometric properties; power testing for sample size; female and white sample
DeSanto-Medaya et al. (2009)	Baseline data from prospective study; to examine how end-of-life treatment factors and psychosocial factors vary based on level of acculturation of caregivers of patients with advanced cancer	74% were female, 79% were married, mean age was 49, and mean years of education were 12, 47% were White and 43% were Hispanic; General Self-Efficacy Scale	Caregivers with lower acculturation levels were more likely to prefer patients have a feeding tube at the end of life, although most caregivers would not choose a treatment focused on extending life if it meant more pain and discomfort for the patient. Patients with	Sample came from several different sites, and black and Hispanic caregivers were recruited from 2 sites in Texas. Sample size limits conclusions

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Dionne- Odom et al., 2017)	Cross-sectional descriptive; to explore differences in caregivers' self-care practices associated with varying levels of caregiver well- being, preparedness, and decision making self-efficacy.	Family Decision- Making Self- Efficacy Scale	lower acculturation levels reported higher levels of self-efficacy, felt more spiritually supported by their religious community and the medical system, and had stronger family relationships Lower health responsibility, spiritual growth, interpersonal relation, and stress management scores were associated with lower decision- making self- efficacy.	Response rate of 42.3% and there were differences in race and marital status for those who did or did not complete the survey; correlational analysis only
(Dockham et al., 2016)	Quasi- experimental; to test effects of a psychoeducationa l program (FOCUS) on survivor and caregiver outcomes as a unit and determine program feasibility	Lewis Cancer Self- Efficacy Scale	Dyads had significant improvement in self-efficacy following FOCUS intervention using small group format	60% recruitment, but high retention rates; small sample size due to pilot study; dyad assessed as a unit

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Duggleby et al., 2013)	in terms of enrollment, retention, intervention fidelity, and satisfaction Quasi-experimental, mixed methods; to examine the effects of the Living with Hope Program on self-efficacy, loss and grief, hope and quality of life in rural women caring for persons with advanced cancer.	General Self-Efficacy Scale	Participants did not have changes in self-efficacy over time with the Living with Hope program. Self-efficacy was significantly related to hope	General scale; use of power analysis, although sample did not meet this criteria
(Duggleby et al., 2017)	RCT, mixed methods; to evaluate the feasibility of a web-based psychosocial supportive intervention entitled Male Transition Toolkit (MaTT).	General Self-Efficacy Scale	Self-efficacy was not a significant predictor of quality of life over time for either group	General scale; small samples in each group; higher attrition in usual care group than intervention group
(Duggleby et al., 2014)	Cross-sectional descriptive quantitative; to determine the relationship of hope with self-efficacy, guilt, and caregiver physical and	General Self-Efficacy Scale	There was a positive relationship between hope and self-efficacy in univariate analysis; in the regression	General scale; low response rate; homogeneous population

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Duggleby et al., 2017)	<p>mental health in rural women caring for persons with advanced cancer.</p> <p>Metasynthesis; To explore the transition experience of family caregivers caring for persons with advanced cancer living in the community, to describe potential triggers for transitions, to identify what influences this experience, and to develop a conceptual framework of their transition experience.</p>	Was not defined specifically	<p>model, self-efficacy was a predictor of hope</p> <p>Self-efficacy, along with sense of personhood, hope, finding meaning, and preparing for death, described as an outcome of redefining normal that is affected by crucial events, disruptions, outcomes, coming to terms, connecting, and influencing factors</p>	Focused on end-of-life care, lower quality studies, homogeneous study populations
(Duggleby, Doell, Cooper, Thomas, & Ghosh, 2014)	<p>Cross-sectional descriptive; to examine the relationship of the quality of life of male spouses of partners with breast cancer with demographic variables of male spouses and their partners, levels of hope of male spouses and their</p>	General Self-Efficacy Scale	<p>Relationship between quality of life and self-efficacy in male partners of individuals with breast cancer</p>	Low response rate, homogeneous according to ethnicity

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Duggleby et al., 2015)	<p>partners, self-efficacy and loss and grief of male spouses, and quality of life of partners with breast cancer.</p> <p>Cross-sectional, mixed-methods; to describe the types of transitions experienced by male spousal caregivers of women with breast cancer, strategies to deal with the transitions, and factors related to quality of life such as demographics, self-efficacy, guilt, hope, quality of life of their partner, and transitions.</p>	General Self-Efficacy Scale	Self-efficacy and hope had a significant positive relationship in univariate analyses, self-efficacy was a not a predictor of quality of life in multivariate analysis.	General scale, low response rate, no table representing univariate analysis.
(Ellis et al., 2017)	<p>Secondary analysis of existing baseline data from a RCT; to examine the influence of patient and caregiver symptom distress on their threat</p>	Two subscales from CASE scale: individual self-efficacy and family-related self-efficacy	Patients and caregivers with higher levels of distress had lower levels of individual and family-related self-efficacy; partner effects where higher	Homogeneous participant population

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Havyer, van Ryn, Wilson, & Griffin, 2017)	Cross-sectional descriptive; to examine the relationship between training during routine clinical cancer care and self-efficacy among caregivers of colorectal cancer patients.	Self-efficacy scale specific to study	levels of patient distress was significantly related to lower levels of caregiver efficacy; patients and caregivers with higher individual self-efficacy had lower threat appraisals; both patients and caregivers with higher symptom distress had higher threat appraisals indirectly through individual self-efficacy	Self-efficacy scale specific to study—had good internal validity; homogeneous sample
(Hendrix et al., 2016)	Two-armed RCT; to examine the effects of an	Self-Efficacy Scale for Cancer Caregivers	Caregivers randomized to the enhanced	Self-efficacy scale modified for study, no psychometrics

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
	enhanced informal caregiver training (Enhanced-CT) protocol in cancer symptom and caregiver stress management to caregivers of hospitalized cancer patients.		caregiver training had higher levels of self-efficacy for managing cancer survivor symptoms and their own stress	reported; power analysis completed; significant differences between caregivers who completed the study and caregivers who did not; homogeneous sample Small sample size
Hendrix et al. (2009)	Pilot quasi-experimental study; to investigate if an individualized and experiential can promote family caregiver's self-efficacy in home care and symptom management	Caregiver mean age of 62, most were White, female, spouses of cancer patients, about half had an Associate's degree, and majority unemployed; Cancer Caregiver Self-Efficacy Questionnaire in Symptom Management	Caregiver scores were significantly higher post-training and 1 week after hospital discharge	
Hu et al. 2018	Cross-sectional; to investigate the status of caregiver burden and identify factors related to caregiver burden among Chinese family caregivers of patients with lung cancer	Almost 60% female, Chinese, 35% college educated, 78% married, 66% employed; General Self-Efficacy Scale	Caregiver burden was inversely associated with self-efficacy; self-efficacy was not a significant predictor of caregiver burden in the regression model	Cross-sectional design; homogeneous sample

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Hyde et al., 2018)	Longitudinal study; to examine partner's psychological and cancer-specific distress over 2 years and predictors of change	Partner version of Self-Efficacy for Symptom Control Inventory	Higher caregiver self- efficacy for managing prostate cancer related symptoms was associated with lower baseline distress, but this pattern did not persist over time; Self- efficacy was not associated with anxiety levels; increased self- efficacy was associated with lower depression levels only at baseline	Homogeneous sample; 63% response rate
(Ito & Tadaka, 2017)	Cross-sectional descriptive; to identify the associated factors of quality of life among the family caregivers of patients with terminal cancer at home	The Family Caregiving Self- Efficacy Scale in Terminal Cancer Patients at Home	Self-efficacy was significantly related to family caregivers quality of life in univariate analysis; in the regression model, self- efficacy was a significant predictor of quality of life	Low response rate

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Johansen et al., 2018)	Cross-sectional analysis from larger interventional study; to examine the effect of cancer patients' and FCs' symptoms and demographic characteristics on caregiver burden at initiation of the patients' radiation treatment	General Self-Efficacy Scale	Self-efficacy scores were similar between caregivers and survivors; slightly higher in male survivors and slightly higher in female caregivers; self-efficacy was not a statistically significant predictor of caregiver burden	General scale rather than caregiver specific; both survivors and caregivers as participants; no comparison of partner effects
(Kershaw et al., 2015)	Longitudinal analysis; to investigate individual and interpersonal influences on patients' and their family caregivers' mental health, physical health, and self-efficacy to manage the challenges of advanced cancer over time	Lewis Cancer Self-Efficacy Scale	Patient and caregiver self-efficacy was not correlated at T1; strong actor effects over time, although caregivers had a stronger association from T1 to T2 than patients, no partner effects of self-efficacy; Caregivers with higher self-efficacy at T1 had higher mental health at T2—same for	High attrition rate; high SES of participants

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
Kizza & Maritz, 2018	Cross-sectional survey; to assess family caregivers' knowledge and self-efficacy levels for pain management in advanced cancer patients while at home in a resource-limited setting	Mean age 36 years old, 73% female, 60% partnered, 57% employed; Chronic Pain Self-Efficacy Scale	T2 to T3. Higher caregiver self-efficacy at T1 was associated with higher physical health at T2; Higher patient self-efficacy at T2 was related to higher caregiver physical health at T3 48% perceived low self-efficacy for pain management, although the mean score indicated moderate self-efficacy for pain management, self-efficacy for pain management was significantly related to physical well-being, weekly hours of caregiving, having a chronic illness, and receiving	Cross-sectional study; sampling was not random

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
Knoll et al. (2009)	Longitudinal Study; to explore prior and concurrent patient-reported received and mobilized spousal support on their own and partners' self-efficacy beliefs at 1 year post-surgery	Mean age 58 years, most were married, and the majority had between 9 to 13 years of schooling; General Self-Efficacy Scale	organizational support. The perceived impact of the caregiving role on health, caregiving hours per week, and receiving organizational support were significant predictors of self-efficacy.  Patient and caregiver self-efficacy beliefs were not correlated positive relationship between patient self-efficacy and patient received spousal support, patient reported mobilization of support was associated with spouse self-efficacy beliefs over time; patient reported relationship quality was associated with caregiver self-	Description of caregivers was limited for race/ethnicity and gender

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Latter et al., 2016)	Systematic review; to identify and review studies of interventions to help carers manage medicines for pain in advanced cancer.	Not indicated	efficacy after 1 year In an RCT, Keefe et al. noted higher self-efficacy scores following a tailored, intense intervention; Vallerand et al. noted no change in perceived control over pain in the patient-carer intervention, although a change was noted for carers whose nurse had received an intervention	One study directly addressing self-efficacy, one study indirectly addressing self-efficacy through perceived control
(La & Yun, 2017)	Cross-sectional descriptive; to identify dyadic associations between stress appraisal and the quality of life of patients with multiple myeloma and their caregivers in Korea	Modified scale of caregiver self-efficacy from Lorig et al.	Patient's self-efficacy did not affect caregiver physical health scores; lower levels of caregiver self-efficacy was associated with higher levels of caregiver burden; Caregiver self-efficacy and quality of life were mediated	Mixed survivor and caregiver population; Caregivers primarily female

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Lee et al., 2013)	Cross-sectional descriptive; to explore the prevalence and levels of anxiety and depression in family caregivers of patients newly diagnosed with advanced lung cancer before first treatment and identify the factors related to family caregivers' anxiety and depression.	Self-Efficacy in Symptom Management Scale	by caregiver burden; caregiver self-efficacy and patient mental health was mediated by caregiver burden Caregiver self-efficacy was negatively correlated with anxiety and depression levels; Self-efficacy was a predictor of family caregiver anxiety and depression	Self-efficacy scale modified from a scale focused on arthritis—reliability was 0.92
(Lee et al., 2016)	Two-group longitudinal repeated measures design; to test the ability of an integrative intervention program for caregivers of advanced cancer patients to lower caregiving burden	Modified Caregiver Self-Efficacy Scale	Self-efficacy scores increased significantly in the intervention group. There was improvement in the control group, but not significant	No differences noted between individuals who are lost to follow-up and those who completed the study

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Lee et al., 2018)	as death approaches Longitudinal design; to identify the changes of 5 domains of family caregiver burden and its sub-trajectories when caring for newly diagnosed advanced lung cancer patients during the first 6 months following cancer diagnosis and identify the family caregiver related and patient-related factors most associated with the overall family caregiver burden and each of its sub-trajectories.	Cancer Behavior Inventory—Brief, modified for study	Changes in family caregiver burden were significantly related to self-efficacy; for lower caregiver burden group, burden levels were significantly related to only self-efficacy	Self-efficacy scale not specific assessing self-efficacy; mostly female
(Leow et al., 2015)	Pilot RCT; to evaluate the effectiveness of a psychoeducational intervention (Caring for the Caregiver Program)	Self-Efficacy in Self-Care Scale	Participants in intervention group showed significantly greater improvements in self-efficacy scores	No significant differences between groups; majority of caregivers were female
Lewis	Randomized clinical trial; To test the short-term efficacy of a brief, fully manualized marital	Primarily Caucasian, mean age 55, college educated, working full or part-time, either gender	Spouse in experimental group had improvements in self-efficacy at 3 months	Unclear reporting of caregiver gender (all male); sample was not representative of diversity

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Li et al., 2015)	Quasi- experimental study; to examine the feasibility, acceptability, and preliminary effect of an intervention to support couples coping with cancer	None described	(wife focused and self-care focused). Self- care focused efficacy was sustained at 6 and 9 months. Wife-focused efficacy was not sustained at 6 months, but was significantly improved at 9 months from baseline. Couples experienced significant improvements in overall self- efficacy following the intervention; Caregivers had significantly higher levels of self-efficacy than patients	High attrition rates
(Li & Loke, 2013)	Literature review; to summarize and appraise the positive aspects of spousal caregiving and to identify directions for future research	None described	In one study, Keefe et al. reported a negative association between self- efficacy and caregiver strain and a positive association between self-	Review of quantitative and qualitative studies; only one study addressing self- efficacy

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Marshall et al., 2013)	Quasi-experimental study; to explore the effectiveness of the intervention in increasing cancer knowledge and self-efficacy among co-survivors	One question addressing self-efficacy of cancer knowledge	efficacy and caregiver positive mood Self-efficacy significantly increased from pre- to post-intervention	Most participants were women
(Mori et al., 2013)	Cross-sectional descriptive; to determine if there were end-of-life discussions, whether early establishment of DNR was associated with better care ratings, and to determine if end-of-life discussions and early DNR status were associated with outcomes such as self-efficacy	Self-efficacy question using the TIME tool	Greater self-efficacy levels were noted in caregivers who had end-of-life discussions	Less than 50% response rate
(Mosher et al., 2017)	RCT; to examine whether adding a peer helping component to a coping skills intervention leads to improved meaning in life	Measure of Current Coping Status	No main effects of study group or time by group effects on self-efficacy	Self-efficacy measure focused on coping

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Mosher et al., 2016)	and peace for advanced gastrointestinal cancer patients and their caregivers Randomized pilot trial; to examine the preliminary efficacy of telephone-based symptom management for symptomatic lung cancer patients and their family caregivers	16 item self-efficacy modified from arthritis literature focused on symptoms	There was a significant time by group effect for self-efficacy of managing emotions in caregivers—small increase in self-efficacy for intervention group and decline for control group	Homogeneous sample according to gender and education; both survivors and caregivers
Mosher et al. (2012)	Longitudinal; to examine support service use and interest in support services among distressed family caregivers of patients recently entering comprehensive cancer care facilities	Caregivers were Caucasian, median age of 55, married, female, well-educated, median income 50,000, and over half employed full- or part-time; Coping Self-Efficacy Scale	Interest in help with practical needs was correlated with caring for 2 or more family members, grater difficulty traveling to appointments, lower coping self-efficacy and shorter time since diagnosis. Lower coping self-efficacy, greater difficulty traveling to appointments	Caregivers recruited from 2 different facilities; small sample size, and homogeneous sample; only support service use was assessed longitudinally, while self-efficacy was assessed at only one time point

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Mystakidou et al., 2013b)	Cross-sectional descriptive; to examine the relationship between caregivers’ anxiety supporting a patient with advanced cancer and self-efficacy and their socio- demographic characteristics.	General Perceived Self-Efficacy Scale	and shorter time since diagnosis were predictive of interest in professional health with practical needs. Self-efficacy was not associated with mental health service use and CAM use. Caregiver state and trait anxiety scores were significantly negatively related to self- efficacy. In the regression model, self- efficacy was a significant predictor of state anxiety and self- efficacy was the only predictor of trait anxiety	No description of response rate
(Northouse et al., 2013)	RCT—three arm; to examine whether patient– caregiver dyads randomly assigned to a brief or extensive	Lewis Cancer Self- Efficacy Scale	Significant time by group effect for self- efficacy— extensive intervention group had a	Both survivor and caregiver participants; 62% retention rates at time 3; No significant demographic

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
	dyadic intervention (the FOCUS Program) had better outcomes than dyads randomly assigned to usual care and whether patients' risk for distress and other factors moderated the effect of the brief or extensive program on outcomes.		significant increase at 3 months, but this was not sustained at 6 months	differences among the three groups at baseline
(Northouse et al., 2014)	Quasi-experimental feasibility study; to examine the feasibility of translating a nurse-delivered program (FOCUS Program) for patients and their caregivers to a tailored, dyadic Web-based format.	Lewis Cancer Self-Efficacy Scale	Caregivers reported lower self-efficacy than patients; caregivers had greater improvement in self-efficacy scores than patients over time; medium effect sizes for self-efficacy with intervention	Low response rates, but high retention rates; both cancer survivor and caregiver participants
(Oh, 2017)	Cross-sectional descriptive; to investigate the relationship between communication with health professionals	1-item question addressing confidence in getting advice or information about health	Poor communication with healthcare professionals was associated with lower levels of self-efficacy; higher	Secondary analysis of existing data; homogeneous—female and Caucasian

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Stacey et al., 2016)	RCT; to test whether the Social Cognitive Theory constructs operationalized in the ENRICH	Name of scale not given, but focused on self-efficacy of initiating physical activity	trust in healthcare professionals was related to higher levels of self-efficacy; higher levels of self-efficacy were related to lower levels of psychological distress; mediating effect between communication with health professionals to self-efficacy through trust in health professionals; path from communication to psychological distress was mediated by self-efficacy; trust in health professionals to psychological distress was mediated by self-efficacy At 20 weeks there were significant intervention effects for self-efficacy	Self-efficacy scale with high Cronbach's $\alpha$ ; Did not describe extent of missing data; mixed participants

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
	intervention were mediators of physical activity behavior change.			(survivor and caregiver) with no delineation of role for data collection/analysis ; few caregivers; differences between those who completed the intervention and those who did not
(Stoutenberg et al., 2016)	Quasi-experimental; to assess the impact of the IWP on the overall wellness of the individuals participating in the program	Self-Efficacy and Exercise Habits Survey and Self-Efficacy and Eating Habits Survey	Statistically significant change in sticking to it subscale of Self-Efficacy and Eating Habits and trend for improvement in Reducing Fat subscale	No control group, very small homogeneous sample; mixed sample of survivors and caregivers with no delineation with data collection or analysis
(Sun et al., 2017)	Quasi-experimental, two group; To evaluate the feasibility and acceptability of a multimedia self-management (MSM) intervention to prepare patients and family caregivers for lung surgery	Lorig et al. Self-efficacy scale modified for this study	No change in self-efficacy pre- and post-intervention	Small sample size for caregiver and survivor groups; caregivers were primarily female
(Titler et al., 2017)	Quasi-experimental pre-test post-test	Lewis Cancer Self-Efficacy Scale	Significant positive effects on self-efficacy	Homogeneous sample

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
(Ugalde et al., 2013)	design; to examine effectiveness, feasibility, satisfaction and cost with implementation of the FOCUS program in two US Cancer Support Community affiliates in Ohio and California. Cross-sectional, measure design; to develop a new measure to assess self-efficacy in caregivers of people with advanced cancer	Caregiver Self-Efficacy Scale developed and tested with four factors: Resilience, Self-Maintenance, Emotional connectivity, and Instrumental caregiver	post-intervention  Five out of six convergent and divergent hypotheses were supported, planning subscale on Brief Cope was not supported	Focused on cancer caregivers; test-retest reliability and internal consistency were good
(Ugalde, Krishnasamy, & Schofield, 2014)	Cross-sectional descriptive; to describe the prevalence of anxiety and distress in a sample of caregivers of people with advanced cancer and explore the relationship with self-efficacy	Caregiver Self-Efficacy Scale	Participants state and trait anxiety scores were negative correlated with self-efficacy; self-efficacy subscale was negatively correlated with distress levels	Newly developed self-efficacy measure; caregivers mostly women
(Yildiz, Karakaş, Güngörmüş,	Cross-sectional descriptive; to determine the	Self-Efficacy Scale developed by Sherer et al.	Caregivers 18-23 years old had higher	No data on response rates;

Authors	Study Type/ Purpose	Caregiver Characteristics/Self- Efficacy Representation	Findings	Strengths/ Limitations
& Cengiz, 2017)	levels of self- efficacy and caregiver burden experienced by caregivers for patients with cancer		mean self- efficacy scores; caregivers without children had higher mean self-efficacy scores; Caregivers caring for spouses had lower self- efficacy scores; negative relationship between caregiver burden and self-efficacy scores	primarily female caregivers

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APPENDIX B: METHODS MANUSCRIPT –  
STRUCTURAL EQUATION MODELING AND SECONDARY DATA ANALYSIS IN  
HEALTH CARE RESEARCH

### Abstract

Secondary data analysis is an efficient and cost-effective way of generating new knowledge. Structural equation modeling (SEM) is a useful approach when performing secondary data analysis, especially when addressing theoretical constructs. These two techniques, while powerful, require special attention to avoid introducing bias, especially when used in tandem. The purpose of this methodological integrative review is to describe current methods in using secondary data analysis to perform SEM in health care research. A literature search was performed in PubMed, PsychInfo, and CINAHL for articles that used secondary data analysis for SEM. A total of 34 articles were identified following a review of articles according to overlap and inclusion and exclusion criteria. Articles were analyzed to identify methodological patterns that increase or decrease bias. Thirty-three articles were analyzed, and the following themes were noted: alignment of data to study purpose, identification of purpose and procedures with primary data, patterns of missingness, model specifications *a priori* with theory and model fit, and sample size estimations. There are key methodological issues related to both secondary data analysis and SEM. There was inconsistent reporting of researchers regarding key issues related to internal validity. Future research should focus on standardized approaches for both conducting and reporting secondary data analysis and SEM procedures.

Key words: secondary data analysis, structural equation modeling, health care research

## Structural Equation Modeling and Secondary Data Analysis in Health Care Research

With the advent of Big Data and the increasing number of large datasets, there are growing opportunities to engage in analysis of secondary data in health care research. Secondary analysis of existing datasets is a cost-effective approach for generating of new knowledge and testing hypotheses, especially when resources are limited (Boo & Froelicher, 2013; Johnston, 2014). Data can be analyzed using secondary analysis for a new purpose or to refine the original purpose of the primary study (Cheng & Phillips, 2014). Secondary data analysis is a flexible approach for both qualitative and quantitative data and can be applied to large or small datasets. Structural equation modeling (SEM) is a data analysis method that may be used with large datasets in secondary data analysis. Structural equation modeling may involve multiple methods of multivariate modeling and is valuable in social science and health care research where multi-factor surveys are used to represent theoretical constructs such as spiritual well-being, self-efficacy, or quality of life. Structural equation modeling is a key approach when developing and testing models involving latent versus observed variables (Bowen, 2012). As large datasets in health care become more prominent, it is important for researchers to understand the current utilization, strengths, and limitations of SEM in the analysis of secondary data. The purpose of this methodological review is to provide an integrative overview of the state of current research with secondary data analysis and SEM.

### **Strengths and Pitfalls of Secondary Data Analysis**

As with any methodological approach, there are specific strengths and limitations related to secondary data analysis of which researchers need to be mindful to prevent the introduction of bias (Boo & Froelicher, 2013; Cheng & Phillips, 2014). As described above, secondary data

analysis is an economical approach to develop new knowledge, refine existing knowledge, and generate new hypotheses in health care research (Johnston, 2014). It is an efficient use of resources, because data have already been collected. Secondary data analysis may provide other benefits such as answering questions that can only be addressed with secondary data analysis, utilizing large datasets that have greater generalizability, and providing a starting point for further research and policy decisions (Cooke & Iwashyna, 2013).

Secondary data analysis has been described as analyzing data that were collected by someone else for a different primary purpose (Johnston, 2014), although Cheng (2014) asserts that analyzing data for a purpose other than the primary purpose should be considered secondary analysis of existing data. Whether researchers were involved in primary data collection or they are utilizing data collected by another researcher, there are key methodological issues that need to be addressed when utilizing secondary data analysis. These issues include: ensuring alignment between study purpose and data, having an analytic plan (*a priori* hypotheses), understanding the strengths and limitations of the dataset including measurement methods, generating definitions of variables, and understanding patterns of missingness in the data (Boo & Froelicher, 2013; Cheng & Phillips, 2014; Cooke & Iwashyna, 2013). There can be challenges to secondary data analysis including being limited to the data that have already been collected in terms of variables and sample size (Cooke & Iwashyna, 2013).

### **Strengths and Pitfalls of Structural Equation Modeling**

Structural equation modeling can be a powerful tool for evaluating relationships among variables. It is an especially useful technique when trying to model complex relationships, which are common in healthcare research (Newman, Vance, & Moneyham, 2009). Structural equation

modeling should always occur using a theoretical or research-based model to guide the analysis process (Bowen, 2012; Hox, 1998). Newman et al. (2009) recommend following a sequence of steps for developing the model starting with a baseline model, which is also referred to as the measurement model. This includes the indicator and latent variables. Latent variables are variables that cannot be directly measured, so are represented by the indicator variables. In this model the relationships among variables are not measured, but the loadings of indicator variables on the latent variable are evaluated to confirm the indicator variables that will be included in the final analysis (Newman et al., 2009). The next step is the full causal model where path analysis occurs to address the relationships among the variables. This is followed by trimming data and pathways with non-significant relationships (Newman et al., 2009). Structural equation modeling is not an exploratory procedure, and each of these steps should be conducted using a firm theoretical basis (Bowen, 2012; Hox, 1998; Newman et al., 2009).

Structural equation modeling is a systematic process, so there are specific methodological issues to consider directly related to secondary data analysis. These issues were examined in the literature reviewed. First, sample size is an issue in SEM, but researchers do not always have control over the sample size when using secondary data analysis. A very large sample may result in overestimation of significant relationships, while a small sample may not be adequate to evaluate the proposed model (Wolf, Harrington, Clark, & Miller, 2013). Several rules of thumb have been proposed such as a minimum number of 100-200 cases, five to ten cases per parameter, or ten cases per variable, although these rules may fail to address the model specifically (Hox, 1998; Wolf et al., 2013). An additional issue in structural equation modeling is the propensity towards confirmation bias (Robles, 1996). Evaluating patterns of missingness is

important in reducing bias, so researchers utilizing secondary data analysis need to be aware of the limitations of the dataset they are using (Cheng & Phillips, 2014; Robles, 1996). Identifying patterns of missingness such as missing completely at random, missing at random, or missing not at random will help researchers handle and interpret data appropriately (Schminkey, von Oertzen, & Bullock, 2016).

Model fit is another step where there is risk of confirmation bias in SEM. Robles (1996) describes concerns when using post-hoc model specifications, because these may result in the researcher focusing on the model fit versus the theoretical basis for the variables and pathways (Hox, 1998). Chi-square testing is sensitive to large sample sizes, so alternative fit indexes that are less sensitive to sample size include root mean square error of approximation (RMSEA), goodness of fit (GFI), adjusted GFI (AGFI), non-normed fit index (NNFI), and normed fit index (NFI) (Hox, 1998). Hox (1998) reiterates the need for using theoretical foundations to guide any model modifications to limit confirmation bias and suggests favoring the most simplistic model when two models have the same goodness of fit. Model specification and goodness of fit parameters should always be specified *a priori* using prior research or theory (Hox, 1998; Iacobucci, 2001; Newman et al., 2009). Robles (1998) even recommends specifying an alternative model *a priori*. Assertions of causality can also be problematic in SEM, due to sensitivity of the sample size and limitations of establishing directionality in cross-sectional data (Iacobucci, 2001).

### **Literature Search Strategy**

To understand the current application of SEM in secondary data analysis, a systematic literature search using PubMed, CINAHL, and Psycinfo was conducted in July 2018. The

following search terms were used: Structural Equation Modeling AND Secondary Analysis AND Health Care. Figure 1 provides an overview of the search process. One-hundred and twenty-eight articles were identified with the initial search. Article titles and abstracts were reviewed and articles were eliminated according to the following inclusion criteria: published between 2013-2018, addressed a healthcare concern, utilized secondary analysis of existing data, used structural equation modeling for data analysis, obtainable through library resources. Articles were excluded if they were focused on questionnaire development. After initial review for overlap and inclusion and exclusion criteria, 44 articles remained. These full articles were reviewed using the same inclusion and exclusion criteria, with eleven more articles eliminated. This left a total of 33 articles for this review. Articles were then analyzed for methodological issues related to secondary analysis of existing data and structural equation modeling. Table 1 provides an overview of the articles.

## **Results**

The goal of this review was to understand the use of structural equation modeling in secondary data analysis with a focus on areas of methodological importance. Thirty-three articles representing secondary analyses using SEM were included in this review. Of the 33 articles, nine were analyses from large regional, national, or organizational databases (Ahn & Lee, 2016; Ballard, Boyle, & Bott, 2016; Cowden & Cummings, 2015; Gilmartin & Sousa, 2016; Hodge & Wolosin, 2014; Jackson, Whisner, & Wang, 2013; Rizzo & Kintner, 2013; Simpson, Hyner, & Anderson, 2013; Tao, Liu, & Xiao, 2013); ten were analyses from randomized controlled trials (Ahn, Song, & Choi, 2016; Alsayed et al., 2017; Ellis et al., 2017; Faller, Strahl, Richard, Niehues, & Meng, 2017; Gitlin, Szanton, Huang, & Roth, 2014; Gobin et al., 2018; Hayasaka et

al., 2015; Kim, Xue, Walton-Moss, Nolan, & Han, 2018; McVay, King, Jeffreys, Coffman, & Voils, 2015; Yeom & Heidrich, 2013); six were from longitudinal studies (Azouvi et al., 2016; Beal, Hillman, Dorn, Out, & Pabst, 2015; Chen, Hsu, Tung, & Pan, 2013; Giurgescu, Slaughter-Acey, Templin, & Misra, 2017; Mimiaga et al., 2013; Minichino et al., 2017); and eight were from cross-sectional studies (Chui, Look, & Mott, 2014; Geng et al., 2018; Kenzik, Huang, Rizzo, Shenkman, & Wingard, 2015; Laschinger, Wong, & Grau, 2013; Roche, Spence Laschinger, & Duffield, 2015; Vellone et al., 2015; Wong & M. Giallonardo, 2013; Wong & Spence Laschinger, 2015). The results of the review will be discussed below according to study purpose and participant population, method and purpose of primary study, data collection procedures, missingness, model specifications, and sample size.

### **Study Purpose and Participant Population**

The purposes of the secondary analyses varied among the articles reviewed. Structural equation modeling is an approach commonly used to build or test theoretical models (Bowen, 2012), and this was the case in ten of the 33 articles (Alsayed et al., 2017; Ballard et al., 2016; Cowden & Cummings, 2015; Gilmartin & Sousa, 2016; Jackson et al., 2013; Kim et al., 2018; Rizzo & Kintner, 2013; Roche et al., 2015; Wong & M. Giallonardo, 2013; Wong & Spence Laschinger, 2015). Twenty-three of the articles focused on relationship analysis without a specific theoretical model they were testing, although a relationship model was developed.

An important issue when using secondary data is the alignment of the population with the study purpose (Boo & Froelicher, 2013; Cheng & Phillips, 2014). This alignment was clear in all but three of the studies. One study did not specify the population of interest when describing the study purpose and data analysis (Tao et al., 2013), while the other two studies did not

specifically relate the study purpose to discrete populations, African American (Gitlin et al., 2014) and Korean Americans (Kim et al., 2018), versus general populations.

### **Method and Purpose of Primary Study**

It is important for researchers conducting secondary data analysis to understand and identify the original purpose of the data (Cheng & Phillips, 2014). While all articles did describe a source for the data used for secondary analysis, there was variability in the specificity used to describe the purpose of the primary data collected. This was especially consistent among many of the studies that utilized large regional, national, or organizational datasets. The datasets were identified, but the primary purpose for collecting and utilizing these data was not defined (J.-A. Ahn & Lee, 2016; Ballard et al., 2016; Gilmartin & Sousa, 2016; Jackson et al., 2013; Rizzo & Kintner, 2013; Tao et al., 2013). On the other hand, eight studies utilizing data from a randomized controlled trial did provide at least a brief description of the trial purpose (S. Ahn et al., 2016; Ellis et al., 2017; Faller et al., 2017; Gitlin et al., 2014; Gobin et al., 2018; Hayasaka et al., 2015; Kim et al., 2018; McVay et al., 2015).

### **Data Collection Procedures**

Another key aspect of utilizing secondary data for analysis is understanding how the data were collected, so the researcher can identify potential sources of bias (Boo & Froelicher, 2013; Cheng & Phillips, 2014). Twenty-seven studies included in this review provided some explanation of the recruitment and data collection procedures, although six provided little to no description of these processes (S. Ahn et al., 2016; Alsayed et al., 2017; Faller et al., 2017; Hodge & Wolosin, 2014; Rizzo & Kintner, 2013; Tao et al., 2013). All of the studies described measurement of the variables of interest. For those ( $n = 6$ ) with limited description of data

collection procedures, some referred to previous publications that outlined the methods for participant recruitment and data collection (Geng et al., 2018; Giurgescu et al., 2017).

### **Missingness**

Patterns of missingness may be a source of bias in any study when they occur in a systematic fashion, and are especially concerning in secondary data analysis due to the constraints of existing data (Kang, 2013). Therefore, it is imperative that researchers understand their data and whether missingness is present or a threat to the validity of findings. A pattern of missingness was not addressed in 23 of the 33 articles (S. Ahn et al., 2016; Alsayed et al., 2017; Ballard et al., 2016; Chen et al., 2013; Chui et al., 2014; Cowden & Cummings, 2015; Faller et al., 2017; Geng et al., 2018; Gilmartin & Sousa, 2016; Gitlin et al., 2014; Giurgescu et al., 2017; Gobin et al., 2018; Hayasaka et al., 2015; Kim et al., 2018; Laschinger et al., 2013; McVay et al., 2015; Minichino et al., 2017; Rizzo & Kintner, 2013; Simpson et al., 2013; Tao et al., 2013; Vellone et al., 2015; Wong & M. Giallonardo, 2013; Yeom & Heidrich, 2013). Five of these articles described a process for addressing the missingness without identifying whether the missingness followed a pattern (J.-A. Ahn & Lee, 2016; Cowden & Cummings, 2015; Faller et al., 2017; Giurgescu et al., 2017; Minichino et al., 2017). Other articles (n = 2) identified missingness in terms of pattern and approach to handling missing data (Roche et al., 2015; Wong et al., 2015). Researchers approached missing data with a range of strategies including dropping cases with missing data (J.-A. Ahn & Lee, 2016; Giurgescu et al., 2017; Jackson et al., 2013; Kenzik et al., 2015); using pairwise or listwise deletion when running the models (Mimiaga et al., 2013; Roche et al., 2015); imputing using the mean, regression imputation, the predictive model, or expectation-maximization algorithm procedure (Azouvi et al., 2016; Hodge &

Wolosin, 2014; Mimiaga et al., 2013; Minichino et al., 2017; Wong & Spence Laschinger, 2015); and full information maximum likelihood estimation (Beal et al., 2015; Cowden & Cummings, 2015; Ellis et al., 2017; Faller et al., 2017).

### **Model Specifications**

The articles were reviewed for model specification, including a priori and theoretically based models, and presence of goodness of fit indexes prior to data analysis.

**A priori.** All but one clearly specified their models a priori, whether it be one model or multiple models. Ahn and Lee (2016) described theoretical underpinnings for their model, but it was unclear if the models were developed prior to data analysis. An alternative model was specified a priori in one study (Beal et al., 2015). Many researchers used a figure of the model they planned to test prior to conducting the data analysis (S. Ahn et al., 2016; Ballard et al., 2016; Cowden & Cummings, 2015; Gilmartin & Sousa, 2016; Kim et al., 2018; Laschinger et al., 2013; McVay et al., 2015; Rizzo & Kintner, 2013; Roche et al., 2015; Vellone et al., 2015; Wong & M. Giallonardo, 2013; Wong & Spence Laschinger, 2015; Yeom & Heidrich, 2013), while others (n = 13) presented a pictorial representation of the model following data analysis (S. Ahn et al., 2016; Alsayed et al., 2017; Azouvi et al., 2016; Beal et al., 2015; Chen et al., 2013; Faller et al., 2017; Gobin et al., 2018; Hayasaka et al., 2015; Hodge & Wolosin, 2014; Jackson et al., 2013; Minichino et al., 2017; Simpson et al., 2013; Tao et al., 2013). Six studies described specific hypotheses that would be tested with the analysis (Chen et al., 2013; Gitlin et al., 2014; Gobin et al., 2018; McVay et al., 2015; Tao et al., 2013; Yeom & Heidrich, 2013). Optimally, researchers will provide a figure of the a priori model and describe study hypotheses which are derived from the model prior to data analysis.

**Theoretically driven.** All researchers presented prior research or theory that would support the models they proposed. Ahn & Lee (2018) did not specifically delineate theoretically proposed pathways among variables of interest: peer attachment, self-concept, and parenting style.

Thirteen studies used existing theoretical frameworks or models for structural equation model development (Alsayed et al, 2017; Ballard et al., 2016; Geng et al., 2018; Gilmartin & Sousa, 2016; Kim et al., 2018; Laschinger et al., 2013; Rizzo & Kintner, 2013; Roche et al., 2015; Simpson et al., 2013; Vellone et al., 2015; Wong & Giallonardo, 2013; Wong et al., 2015; Yeom & Heidrich, 2013), while remaining studies relied on concepts and prior research. When model adjustments occurred during data analysis, Rizzo et al (2013) described trimming data according to theoretical constraints (Rizzo & Kintner, 2013).

**Goodness of fit indexes.** Ten of the 33 studies did not specify goodness of fit parameters *a priori* (Ahn & Lee, 2016; Ahn et al., 2016; Azouvi et al., 2016; Chen et al., 2013; Geng et al., 2018; Gilmartin & Sousa, 2016; Jackson et al., 2013; Laschinger et al., 2013; Minichino et al., 2017; Rizzo & Kintner, 2013; Tao et al., 2013). Hodge & Wolosin (2014) specified one goodness of fit parameter (RMSEA) but did not specify cutoffs for the CFI or parsimony goodness-of-fit index (PGFI). Four studies did not describe the use of goodness of fit indexes at all (Chui et al., 2014; Gitlin et al., 2014; Mimiaga et al., 2013; Yeom & Heidrich, 2013), and two studies used one goodness-of-fit index (Ahn & Lee, 2016; Cowden & Cummings, 2015).

Whether specified a priori or not, 24 studies used multiple indexes including chi square, RMSEA, standardized root mean square residual (SRMR), and the Tucker-Lewis Index (TLI) (Ahn et al., 2016; Alsayed et al., 2017; Azouvi et al., 2016; Ballard et al., 2016; Beal et al., 2015; Chen et al., 2013; Ellis et al., 2017; Faller et al., 2017; Geng et al., 2018; Gilmartin & Sousa,

2016; Giurgescu et al., 2017; Gobin et al., 2018; Hayasaka et al., 2015; Jackson et al., 2013; Kenzik et al., 2015; Kim et al., 2018; Laschinger et al., 2013; McVay et al., 2015; Minichino et al., 2017; Rizzo & Kintner et al., 2013; Roche et al., 2015; Simpson et al., 2013; Vellone et al., 2015; Wong & Giallonardo, 2013; Wong et al., 2015). The chi-square statistic had limited use due to the sensitivity with large sample sizes (Cowden & Cummings, 2015; Faller et al., 2017; Gilmartin & Sousa, 2016; McVay et al., 2015).

### **Sample Size**

Sample size was another area with immense variability among the studies reviewed. Twenty-four studies did not describe a systematic process for determining the appropriate sample size (J.-A. Ahn & Lee, 2016; Alsayed et al., 2017; Azouvi et al., 2016; Beal et al., 2015; Chen et al., 2013; Chui et al., 2014; Ellis et al., 2017; Faller et al., 2017; Gitlin et al., 2014; Giurgescu et al., 2017; Gobin et al., 2018; Hayasaka et al., 2015; Hodge & Wolosin, 2014; Jackson et al., 2013; Kenzik et al., 2015; Kim et al., 2018; McVay et al., 2015; Mimiaga et al., 2013; Rizzo & Kintner, 2013; Simpson et al., 2013; Tao et al., 2013; Vellone et al., 2015; Wong & M. Giallonardo, 2013; Yeom & Heidrich, 2013), while nine described using a specific method to ensure the appropriate sample size for the SEM model. Strategies to ensure appropriate sample size included: rule of thumb of ten to fifteen events per one predictor (S. Ahn et al., 2016; Wong & Spence Laschinger, 2015), assumption of 100 (Ballard et al., 2016), rule of thumb over 200 or ten cases per factor (Cowden & Cummings, 2015; Roche et al., 2015), minimum sample required for SEM (no number provided) (Geng et al., 2018), power analysis (Gilmartin & Sousa, 2016), maximum likelihood estimation assumes sample size of at least 200 (Laschinger et al., 2013), or

five participants per parameter (Minichino et al., 2017). Sample sizes ranged between 85 (Azouvi et al., 2016) and 131,784 (Jackson et al., 2013).

### **Discussion**

The findings from this review provide key insights into the use of structural equation modeling in secondary data analysis for health care research. The first interesting point was the relatively small number of articles obtained from the search process in relation to the burgeoning amount of data with electronic health records, large datasets from primary research, and population level data. This could have been due to the constraints of the search itself, the relative recent growth of secondary data analysis in healthcare research, or the current use of SEM in secondary data analysis by health care researchers. With the growing availability of data through electronic health records, population-based datasets and large controlled trials, the use of these methods may increase.

Although there are specific methodological concerns related to both secondary data analysis and structural equation modeling, the consistency in which researchers attended to these issues in the reviewed studies was mixed, especially in the areas of missing data and description of the primary dataset. Clearly identifying the amount of missing data, analyzing the pattern of missing data, and utilizing acceptable techniques for handling missing data are all important to limit bias (Kang, 2013). Most studies in this review did not review missingness patterns, although when researchers did handle missing data, most of them used multivariate techniques such as regression imputation or maximum likelihood estimation, which are generally superior to more simplistic procedures simple imputation with the variable mean (Bowen, 2012; Kang, 2013).

Many of the studies provided a cursory overview of the primary dataset, but they did not provide descriptions regarding the aims of the primary research or the methods of data collection. There are multiple points where bias can be introduced into the research process starting with sampling design, measurement processes, data collection and management techniques, and finally, data analysis (Trochim, 2006). While the researchers may have understood these key issues themselves, it is a matter of scientific integrity to clearly report this information (Kazdin, 2017). This allows other researchers and consumers of research to make decisions about how to interpret and apply the research findings.

### **Limitations**

There are limitations to this integrative methodological review that may affect broad applicability of the findings. First, the initial literature review was conducted by one researcher, and then confirmed by the whole team. While bias may be introduced with the perspective of only one researcher, the inclusion of a wider team may counterbalance this issue. Second, the literature search only yielded an initial 128 articles and the final number of 33 articles from three databases. A wider search and more articles may provide broader insights regarding the use of SEM in secondary data analysis, therefore the results presented should be interpreted in that light. Third, article inclusion was limited to 2013-2018 to provide a contemporary perspective of the use of structural equation modeling with secondary data analysis. Relevant articles prior to that timepoint were excluded, so the pool of articles was smaller.

### **Future Considerations**

Although there are limitations to the current review, there are inherent strengths. First, there is limited research regarding the use of secondary data analysis and structural equation

modeling, so this literature review fills a specific research gap with regards to methodological approaches. There is a need to understand the state of current research in this area, with the exponential growth in the number of available health care datasets. Also, the application of structural equation modeling is an effective approach when utilizing latent variables, which occurs routinely with the use of indirect health care measures. The next logical step would be to establish guidelines regarding the use of structural equation modeling in secondary data analysis. This would be an area for future consideration to ensure researchers are following systematic processes that limit bias. Second, while the literature search yielded a small number of articles, the search was conducted in a systematic manner to promote clarity and understanding of SEM in secondary data analysis (Gentles, Charles, Nicholas, Ploeg, & McKibbin, 2016). This review highlights methodological issues that should be addressed when conducting both secondary data analysis and SEM. Future research can build on the findings from this methodological integrative review to ensure that methodological considerations are accounted for when approaching SEM in secondary data analysis.

### **Conclusion**

The use of secondary data analysis will continue to grow with the availability of large datasets. In health care research, structural equation modeling is an important modality for both model building and analysis of latent variables. The combination of these two approaches provides exciting opportunities for new knowledge through hypothesis generation and testing. With these opportunities comes greater researcher responsibility to ensure research procedures have been conducted to limit bias including clear communication of primary data collection

procedures, secondary data analysis procedures, and use of theoretical underpinnings to develop models for SEM.

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APPENDIX C: DATA ANALYSIS MANUSCRIPT –  
SELF-EFFICACY MODEL IN CAREGIVERS OF LATINA BREAST CANCER SURVIVORS

### Abstract

**Purpose:** The purpose of this research project was to test a model of self-efficacy in caregivers of Latina breast cancer survivors.

**Background:** Cancer caregivers are at risk for physical, mental, and emotional consequences related to their caregiving role. Caregivers of Latina breast cancer survivors have the additional risk of being a predominantly minority group with challenges related to social determinants of health.

**Conceptual Framework:** Bandura's Social Cognitive Theory serves as the conceptual framework for this study, with self-efficacy playing a moderating role between caregiver characteristics and health outcomes.

**Methods:** This is a secondary analysis of a baseline dataset from an experimental study testing two psychoeducational interventions with Latina breast cancer survivors and their caregivers. Caregiver data were analyzed for correlational relationships, simple moderation analysis, and path analysis. The interaction effect of caregiver self-efficacy on caregiver characteristics and health outcomes was addressed.

**Results:** There were 233 caregivers included in the study. A high proportion were female, with education levels of high school or below, and income of 50,000 or below. Self-efficacy measures were significantly correlated with global health and depression. Significant moderating relationships were noted for self-efficacy on acculturation and depression and global health and informational support on depression.

**Implications:** Nurses and other healthcare providers should assess Latino caregivers for contextual factors, such as culture, that may impact their navigation of the healthcare system and

overall health. The provision of informational support for self-care and care of the survivor is one intervention that may promote improved health outcomes for caregivers of Latina breast cancer survivors.

Conclusions: The moderating role of self-efficacy was noted for acculturation and informational support and health outcomes in caregivers of Latina breast cancer survivors. Further research is needed to examine how healthcare providers can provide culturally relevant care, bolster self-efficacy, and best communicate information regarding care to caregivers of Latina breast cancer survivors.

### Self-Efficacy Model in Caregivers of Latina Breast Cancer Survivors

Caregivers are foundational to the health care system in the United States, and their contributions amount to significant cost savings for the U.S. health care system (Reinhard et al., 2015). They care for cancer survivors physically, mentally, emotionally, spiritually, and financially (National Cancer Institute, 2017). Informal caregiving is more common for Latinos than their white counterparts. The physical and financial contributions of Latino caregivers are also greater than in their white counterparts, and this population is at higher risk of poor health outcomes due to social determinants of health (Council on Social Determinants of Health, 2008; National Alliance for Caregiving & AARP, 2015; National Hispanic Council on Aging, 2017; Reinhard et al., 2015). Along with greater risks related to social determinants of health, Latino caregivers may have sources of greater resilience with cultural norms related to spirituality and reliance on family and the community (Badger et al., 2019b). Both spirituality and social support are important factors in influencing perceptions of caregiving and health outcomes (Aranda & Cordero, 2017; Delgado-Guay et al., 2017; Herrera, Lee, Nanyonjo, Laufman, & Torres-Vigil, 2009). Self-efficacy in cancer caregiving is a key behavioral factor contributing to health outcomes through caregivers' beliefs in their ability to carry out the caregiving role and care for themselves (Bandura, 1977). The intersections of risk and potential buffers related to social support and spirituality creates a prime environment to investigate a model of self-efficacy in caregivers of Latina breast cancer survivors. Therefore, the purpose of this study was to test a moderating model of self-efficacy in caregiver global health and depression (Figures 1 & 2).

Figure 1: Moderating Model of Self-Efficacy in Caregiver Global Health

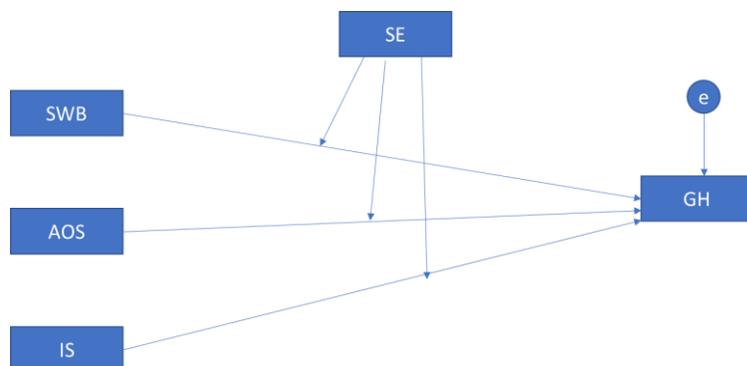
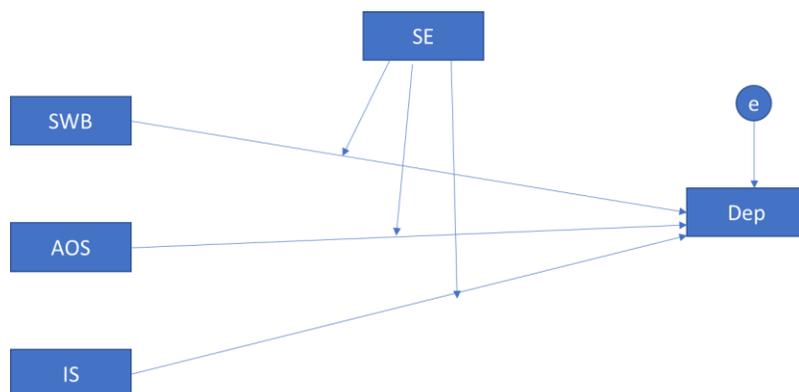


Figure 2: Moderating Model of Self-Efficacy in Caregiver Mental Health



### Background

The incidence of breast cancer in the Latino population is 91.9 per 100,000 individuals with a mortality rate of 14.2 per 100,000 individuals (American Cancer Society, 2018). Overall, cancer is the leading cause of death in Hispanic Americans. The incidence and mortality rates of breast cancer are lower in Latinos than in non-Hispanic whites in the United States, but the rates of caregiving in the Latino population are the highest of any ethnic group in the United States (American Cancer Society, 2018; Rainville, 2016). Twenty-one percent of Latinos identify themselves as caregivers, these caregivers are more often women, and they spend more time in caregiving activities (Evercare & NAC, 2008; Rainville, 2016). Latino or Hispanic are often used

interchangeably to refer to someone of Hispanic origin (ACS, 2018). Hispanic is a socially and politically constructed federal designation in the United States that is separate from race.

Individuals of Hispanic origin may self-identify as any race, while Latino or Latina are self-designated terms of ethnicity (ACS, 2018).

Acculturation is an important factor in Hispanic health, with individuals who are more acculturated experiencing disease at higher rates, but also being more likely to access health care (Perez, 2015). Many researchers have noted the influence of acculturation on health outcomes, with situation-dependent relationships between degree of acculturation and better or worse health (Abraido-Lanza, Echeverria, & Florez, 2016; DeSanto-Madeya et al., 2009; Dominguez, 2015; Escarce, 2006; Teruya & Bazargan-Hejazi, 2013). Caregiver end-of-life decision-making is affected by acculturation with less acculturated individuals seeking less information and relying more on the community than the medical team for support (DeSanto-Madeya et al., 2009).

There are cultural norms which reinforce patterns of caregiving through *marianismo* for women, living a virtuous life through excellent caregiving, and *machisimo* for men, being the provider and protector for the family (Badger et al., 2019b). In addition to these cultural norms, *familism* is another cultural norm which emphasizes loyalty to and support of the family. Social support is an important facet of Latino culture with *familism* (Badger et al., 2019b), although the individual experiences with this cultural norm may be varied based on caregiver age and acculturation (Flores et al., 2009; Toro et al., 2018). Family support may affect physical and mental health in Latina caregivers, and there is evidence that mental health in Latina breast cancer survivors may be impacted by loneliness in their partners, who are often their caregivers (Mulvaney-Day et al., 2007; Segrin, Badger, and Pasvogel, 2015). In addition to family, Latino

caregivers rely on healthcare providers for information and support in their caregiving role (Aranda & Cordero, 2017; Evercare & NAC, 2008). One major challenge is the lack of culturally sensitive support, including written and verbal information presented in Spanish (Evercare & NAC, 2008; Escarce, 2006; Gallagher-Thompson et al., 1997; Napoles, Chadiha, Eversley, & Moreno-John, 2010).

Spirituality may be a protective factor in Latino and Hispanic caregivers. It is a Hispanic cultural norm that may affect the Hispanic paradox through the connection between spirituality and community (Badger et al., 2018b; Gallegos & Segrin, 2018). This idea was noted in a qualitative study, with caregivers describing the connection between their spiritual practice and family (Koerner et al., 2013). Spirituality has also been described as an anchor during the cancer caregiving experience for Latinos, and both internal and organizational spirituality may result in lower perceived caregiver burden (Delgado-Guay et al., 2017; Herrera, Lee, Nanyonjo, Laufman, & Torres-Vigil, 2009). Latina cancer caregivers may even be selected by survivors for their caregiving role due to their religious beliefs (Badger et al., 2017). Spirituality may act as a buffer for adverse health outcomes in caregivers of cancer survivors (Newberry et al., 2013), which may be a connection point between self-efficacy and spiritual well-being.

### **Conceptual Framework**

In caregivers of Latina breast cancer survivors, these risk and resilience factors for health outcomes may be moderated by self-efficacy. The concept of self-efficacy comes from Bandura's Social Cognitive Theory in which behavioral, personal, and environmental factors influence behavior change through reciprocal determinism (Bandura, 2001). Self-efficacy is fundamental to this behavioral change due to the nature of individuals having agency, or the

ability to act for themselves, and the importance of believing in their ability to accomplish goals or enact behavioral change (Bandura, 1977). Self-efficacy in cancer caregivers is vital, because they are responsible for the care of themselves and the cancer survivor. Cancer caregivers have the responsibility to meet the needs of the cancer survivors physically, mentally, emotionally, and financially. They may not feel prepared for their role, nor feel that they have a choice in their role as a caregiver (NCI, 2017). Latino caregivers, specifically, are significant contributors to the care of their loved ones, while navigating the challenges of being an ethnic minority (Evercare & NAC, 2008). Latino caregivers may be more prone to neglect their own needs while taking care of others (Badger et al., 2018; Evercare & NAC, 2008), therefore increasing their risk of negative physical, mental, and emotional consequences due to their caregiving role. Self-efficacy has been described in the context of resilience, and may interact with risk factors and resilience factors in promoting physical and mental health outcomes (Schwarzer & Warner, 2013).

### **Methods**

This is a secondary analysis of a primary experimental study testing two psychosocial interventions in Latina breast cancer survivors and their nominated caregivers in Southwestern United States (Badger et al., 2019a). Baseline data were used to test the model of self-efficacy.

### **Sampling**

In the primary study, purposive sampling of cancer survivors occurred through direct contacts at regional cancer centers, community health clinics serving primarily Latina/o residents, survivorship conferences, breast cancer support groups, placement of brochures in oncology and women's health clinics, and referrals from health care personnel (Badger et al., 2019a). Caregivers were recruited following designation by the cancer survivor, and they

completed informed consent procedures to participate in the study. Family caregivers were contacted independently of cancer survivors by a bilingual trained data collector for the baseline assessment. They could opt to participate in either English or Spanish. After the baseline assessment was completed, the participants received a thank-you letter and a \$20 gift card to a retail merchant.

In the current study, the sample included 233 nominated caregivers of Latina breast cancer survivors. Inclusion criteria from the primary study for informal caregivers were: nominated by the cancer survivor, over 21 years of age, English or Spanish speaking, access to and ability to speak on the telephone, and not diagnosed with cancer themselves. In the secondary analysis, caregivers were excluded for ten percent or more of each variable of interest, or ten percent of data collectively. Twenty-four individuals were excluded for missing all acculturation items and one individual was excluded for missing over ten percent of the study variables of interest.

### **Protection of Human Subjects**

The primary study was approved by the University of Arizona Institutional Review Board, individuals were informed of the risks and benefits of participant in the study, and they completed consent forms (Badger et al., 2019a). This secondary analysis was designated as non-human subjects research by the University of Arizona Institutional Review Board.

### **Data Collection Methods**

The data from the primary study were collected from both survivors and caregivers. Caregivers were contacted independently from cancer survivors through telephone calls. The data were collected by trained data collectors who were bilingual in English and Spanish. Calls

were audio-taped and data were entered into an encrypted database rather than collected with paper and pencil questionnaires (Badger et al., 2019a).

For this secondary analysis, only baseline caregiver data were used. The caregiver data included in the analysis were demographic, socio-economic, and socio-cultural data in addition to the measures described below.

### **Constructs and Measures**

**Caregiver contextual factors.** These were measured based on demographics and level of acculturation. *General demographics* were collected including age, gender, number of children, number of children living in the home, and race. Additional demographic information addressed social determinants of health such as education level, employment, and annual household income. Anglo-orientation was used as a measure of acculturation. This was included as a predictor variable, and education level was included as a control variable.

*Anglo-orientation*, orientation towards non-Hispanic white culture, was measured using the Anglo-Orientation Scale (AOS) from the Acculturation Rating Scale for Mexican Americans II (ARSMA-II) (Cuellar, Arnold, & Maldonado, 1995). This was adapted from the original 13-item subscale to a 7-item scale. The mean score was used in this current study. In the primary study, the scale had a Cronbach's alpha of .86 (C. Segrin et al., 2018). Jimenez et al. (2010) noted internal consistency of the AOS with a Cronbach's alpha of .93. This scale has been used in older adults and caregiver populations (Gallagher-Thompson et al., 1997; Haan et al., 2003; Jimenez, Gray, Cucciare, Kumbhani, & Gallagher-Thompson, 2010).

**Disease related self-efficacy.** Self-efficacy was represented by two 1-item measures. The first item was a Likert scale question assessing an individual's level of confidence in their knowledge

to make treatment-related decisions. A lower score represents lower self-efficacy levels. This measure was developed by Badger (T. Badger, personal communication, February 2018) and has been used in multiple studies over the past twenty years (Marshall et al., 2013; T. Badger, personal communication, February 2018). In Marshall et al. (2013), it correlated significantly with items from the Cancer Knowledge Questionnaire. This expected relationship is an example of construct validity.

The second item was a question from the General Symptom Distress Scale, developed by Badger, Segrin, and Meek (2011). This item assesses how well a participant manages their symptoms on a scale of one (cannot manage at all) to ten (can manage extremely well). The overall GSDS had satisfactory test-retest reliability ( $r=.72$ ) and the item assessing symptom management was correlated as expected with depression, positive affect, negative affect, and general health (Badger et al., 2011).

**Spiritual well-being.** This was measured with a 2-item spiritual well-being subscale from the Quality of Life-Breast Cancer version questionnaire developed by Ferrell, Dow, & Grant (2012). This assesses the influence of breast cancer on spirituality. Responses range from 1 (not at all) to 10 (a great deal) (Ferrell, 2012). For this analysis, only the first two items were included due to poor factor loading for the full scale. These items address involvement in religious activities and spiritual practice. Factor loading for the spiritual well-being items one and two were .90 and .92, respectively, and Cronbach's alpha was .87.

**Global health.** *Global health* was measured with the PROMIS Global Health scale rating level of health, quality of life, physical health, and mental health. The total score is computed as a sum of the items, and then converted to a T-Score, with high score indicating greater level of health

(Patient Reported Outcomes Measurement Information System, 2017). PROMIS measures have been broadly studied and well-validated (PROMIS, 2013).

**Informational Support.** *Informational support* was assessed using the 6-item PROMIS Informational Support Short Form. This assesses the frequency of informational support with response ranges from never (1) to always (5), with high scores indicating higher levels of informational support (PROMIS, n. d.b). The total score is the sum of all items, which is then converted to a T-score. PROMIS measures were developed using patient interviews and expert review panels. They have been widely studied and have demonstrated adequate psychometric properties (PROMIS, 2013).

**Mental Health.** *Mental health* was measured using the PROMIS Emotional Distress-Depression Short Form, an 8-item form assessing frequency of symptoms of depression from never (1) to always (5). The total from the items is tabulated and then converted to a standardized T-score. High score reflects more frequent occurrence of depressive symptoms (PROMIS, 2018b). The depression form was tested in a cervical cancer population by Wilford et al. (2018) and internal consistency was greater than 0.95 for both measures. The measure also demonstrated sensitivity to change with improvement following a counseling intervention (Wilford et al., 2018).

### **Data Analysis**

Data were analyzed using SPSS for frequencies, descriptive statistics, and correlational analysis. Moderation analysis was completed using PROCESS and path analysis for a moderation model was examined using AMOS. The authors set model fit parameters for path models at: chi-square  $>.05$ ; RMSEA with less than 0.01, 0.05, and 0.08 as indicators of

excellent, good, and poor fit (MacCallum, Browne, & Sugawara, 1996); and  $GFI \geq .95$ ,  $AGFI \geq .90$ , Tucker Lewis Index  $\geq .95$ ,  $CFI \geq .90$  (Cornell University, n.d.).

### Results

Data from 233 participants were used for data analysis. Of the participants included in the analysis, the mean age was forty-three ( $SD=13$ ), the majority were women (70%). Most participants were of Hispanic or Mexican American descent (94%). Approximately one-quarter were a spouse or significant other to the survivor participating in the study (25.8%), and 68% were married. Most participants had an income of 50,000 dollars per year or lower (92.3), over half had high school or some college (54%), and just under half were employed full time (43.8%). In addition, these participants had an average of 3.5 children ( $SD: 1.7$ ), and reported approximately three children living in the home ( $SD: 1.4$ ) (see Table 1).

Table 1: Participant Characteristics

	<i>N=233</i>	<i>N (%)</i>	<i>Mean (SD)</i>
<i>Sex</i>	Male	69 (29.6)	
	Female	164 (70.4)	
<i>Ethnicity</i>	Hispanic/Latina	90(38.6)	
	Mexican/MA	129(55.4)	
	South American	9(3.9)	
	Central American	5(2.1)	
<i>Marital Status</i>	Married	157(68)	
	Unmarried	74(32)	
<i>Relationship to Survivor</i>	Spouse/SO	60(25.8)	
	Sibling	37(15.9)	
	Daughter/Son	48(20.6)	
	Friend	25 (10.7)	
	Mother	47(20.2)	
	Other	16(6.9)	
<i>Annual Household Income</i>	Over 100,000	8(3.4)	
	50,000-99,999	33(14.2)	
	10,000-49,999	137(58.8)	
	Under 10,000	45(19.3)	

	No Answer 10(4.3)	
<i>Highest Level of Education</i>	Elementary 24 (10.3) Middle School 47(20.2) High School 65(27.9) Voc/Tech/Some Coll 61(26.2) College 31(13.3) Post Grad/Prof 3(1.3) Other 2(.9)	
<i>Employment Status</i>	Unemployed, but seeking 37(15.9) Part Time 29(12.4) Full Time 102 (43.8) Retired 17(7.3) Disabled 11(4.7) Other 37(15.9)	
<i>Age</i>		43(13)
<i>Number of Children</i>		3.5(1.7)
<i>Number of Children in the Home</i>		2.9(1.4)
<i>Spiritual Well-Being (SWB)</i>		16.8(4.4)
<i>Anglo-orientation (AOS)</i>		2.9(1.2)
<i>Depression (Dep)</i>		50(10)
<i>Global Health (GH)</i>		50(10)
<i>Informational Support (IS)</i>		50(10)
<i>Self-Efficacy Symptom Management (SESx)</i>		7.7(2.5)
<i>Self-Efficacy Cancer Knowledge SECK</i>		5.9(2.9)

Table 2: Correlational Matrix

<i>N=233</i>	<b>AOS</b>	<b>SWB</b>	<b>IS</b>	<b>SECK</b>	<b>SESx</b>	<b>GH</b>	<b>Dep</b>
<i>AOS</i>	1						
<i>SWB</i>	-.18*	1					
<i>IS</i>	.23*	.11	1				
<i>SECK</i>	.10	.15*	.18*	1			
<i>SESx</i>	.21*	-.003	.21*	.09	1		
<i>GH</i>	.27*	.08	.39*	.14*	.27*	1	
<i>Dep</i>	-.13*	-.07	-.43*	-.10	-.33*	-.48*	1

AOS: Anglo Orientation, SWB: Spiritual Well-Being, IS: Informational Support, SECK: Self-Efficacy Cancer Knowledge, GH: Global Health, Dep: Depression. Pearson's  $r$ , \* $p < .05$

#### Correlational Relationships

Global health had significant positive relationships with Anglo-orientation ( $r(233) = .27$ ,  $p < .001$ ), informational support ( $r(233) = .39$ ,  $p < .001$ ), self-efficacy cancer knowledge ( $r(233) = .14$ ,  $p < .05$ ), and self-efficacy symptom management ( $r(233) = .27$ ,  $p < .001$ ). As Anglo-orientation, informational support, self-efficacy cancer knowledge, and self-efficacy symptom management levels increased, global health levels increased. Global health had a significant inverse relationship with depression ( $r(233) = -.48$ ,  $p < .001$ ). So, as depression levels increased, global health levels decreased. Depression had significant inverse relationships with Anglo-orientation ( $r(233) = -.13$ ,  $p = .05$ ), and informational support ( $r(233) = -.43$ ,  $p < .001$ ). As Anglo-orientation and informational support levels increased, depression levels decreased.

Two types of self-efficacy were measured in this study, self-efficacy cancer knowledge and self-efficacy symptom management. Of note, the self-efficacy items were not correlated with each other. Self-efficacy cancer knowledge (SECK) had significant positive associations with spiritual well-being ( $r(233) = .15$ ,  $p < .05$ ) and informational support ( $r(233) = .18$ ,  $p < .05$ ). As

spiritual well-being and informational support levels increased, self-efficacy cancer knowledge levels increased. . Self-efficacy symptom management (SESx) was significantly positively associated with Anglo-orientation ( $r(233)=.21$ ,  $p=.001$ ) and informational support ( $r(233)=.21$ ,  $p=.001$ ), and significantly inversely associated with depression ( $r(233)=-.33$ ,  $p<.001$ ). As informational support and Anglo-orientation levels increased, self-efficacy symptom management levels increased. As depression levels increased, self-efficacy symptom management levels decreased.

Other relationships of note included the significant negative relationship between spiritual well-being and Anglo-orientation ( $r(233)=-.18$ ,  $p=.005$ ) and positive relationship between Anglo-orientation and informational support ( $r(233)=.23$ ,  $p=.001$ ). As Anglo-orientation increased, spiritual well-being decreased. Therefore, higher levels of Anglo-orientation and education were associated with lower spiritual well-being levels. Increased Anglo-orientation levels were associated with higher informational support levels.

#### Moderation Analysis

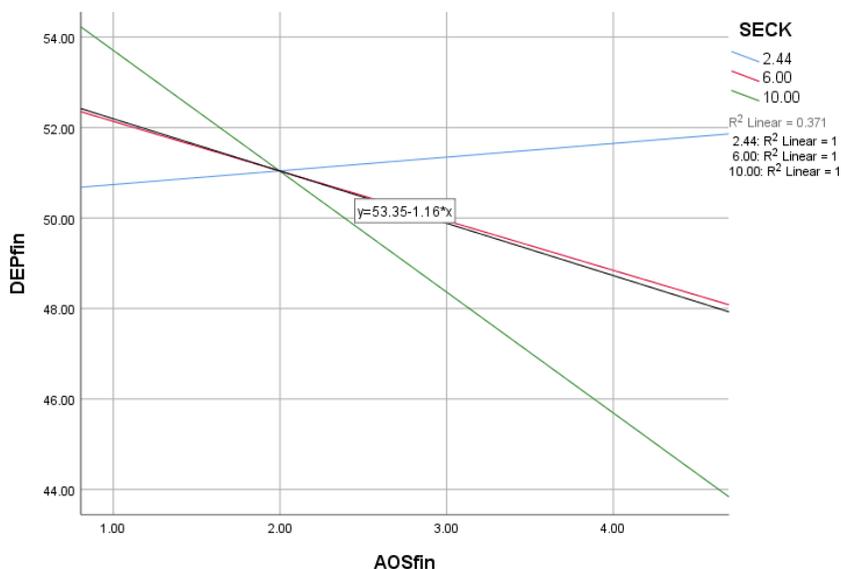
Table 3: Significant Interaction Effects

<i>Variables</i>	<i>R2-change</i>	<i>F</i>	<i>DF1</i>	<i>DF2</i>	<i>p</i>
<i>AOS+SECK=Dep</i>	.0170	4.05	1	229	.05
<i>IS+SESx=Dep</i>	.03	11.00	1	229	<.05

With simple moderation analysis, self-efficacy cancer knowledge had a significant interaction effect on the relationship between Anglo-orientation and depression. Self-efficacy symptom management had a significant interaction effect on the relationship between informational support and depression. Figures 3 and 4 demonstrate these interaction effects at low, medium, and high levels of each type of self-efficacy. Low levels are one standard deviation

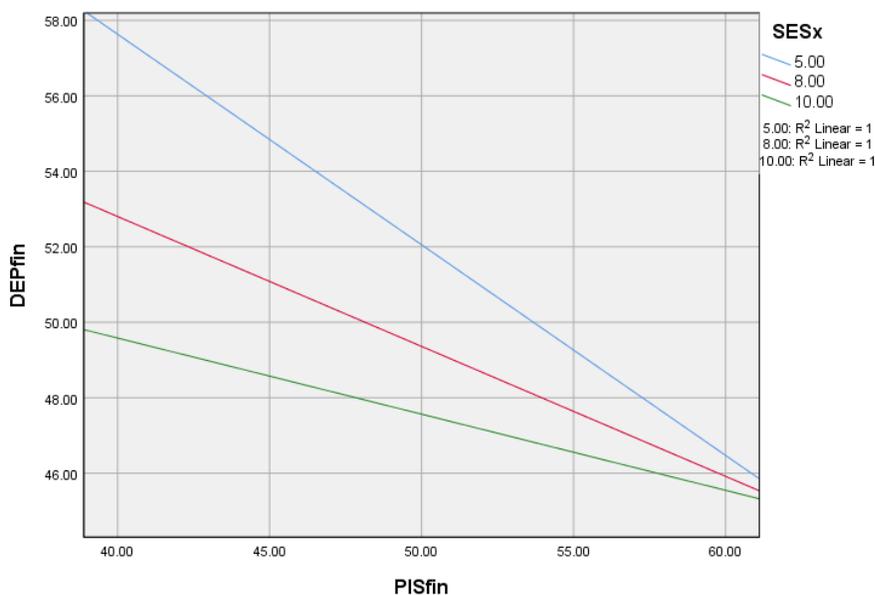
below the mean, medium levels are the mean, and high levels are one standard deviation above the mean for both self-efficacy levels.

Figure 3: Interaction effects of Self-Efficacy Cancer Knowledge on Acculturation and Depression



There was a significant moderating effect of self-efficacy cancer knowledge on the relationship between Anglo-orientation and depressive symptoms. At low levels of self-efficacy there was a positive association between depression and Anglo-orientation levels. At the medium and high levels of self-efficacy, there was a negative relationship between depression levels and Anglo-orientation. So, medium to high levels of self-efficacy cancer knowledge strengthened the negative relationship between depression levels and Anglo-orientation levels.

Figure 4: Interaction Effects of SESx on Informational Support and Depression



There was a significant interaction effect of self-efficacy symptom management on the relationship between informational support and depression. Individuals with low self-efficacy symptom management and low informational support had the highest depression levels. Those with high self-efficacy symptom management and low informational support had lower levels than the low self-efficacy group. Finally, individuals with high self-efficacy symptom management and high informational support had the lowest depression levels.

#### Path Analysis

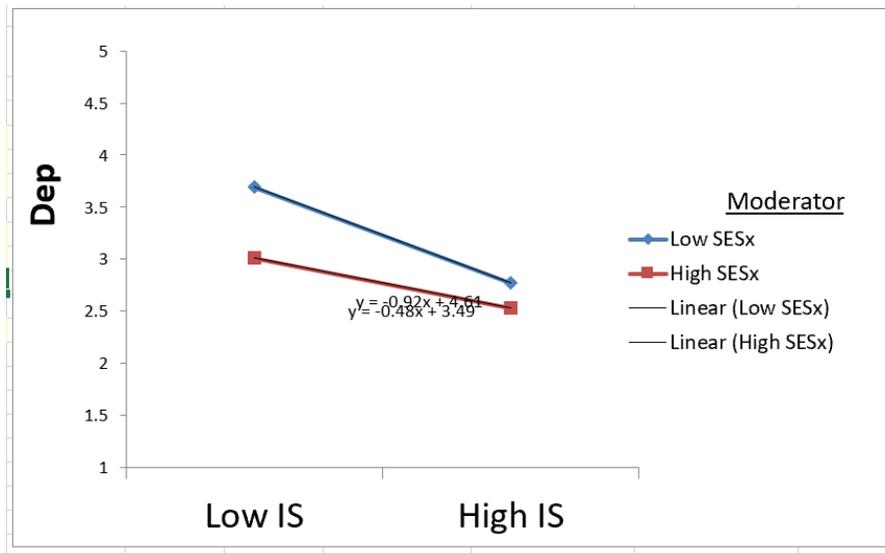
Path analysis to address the proposed models for self-efficacy, global health, and depression was completed. All four models achieved excellent model fit, with non-significant chi-square > .05; GFI > .95; AGFI > .90; NFI > .95; TLI > .95; CFI > .90; and RMSEA < .01. The model with self-efficacy symptom management as moderator for the relationships between spiritual well-being, informational support, and Anglo-orientation and depression had a significant

interaction pathway for the relationship between informational support and depression. Table 4 provides an overview of the pathways in this model and Figure 5 shows the interaction effect with high and low levels of self-efficacy symptom management. High levels are one standard deviation above the mean and low levels are one standard deviation below the mean for self-efficacy symptom management.

Table 4: Pathways in Path Model for Self-Efficacy Symptom Management and Depression

Path	Estimate	SE	CR	p
Depression←Anglo-Orientation Scale (AOS)	.02	.07	.30	.77
Depression←Spiritual Well-Being (SWB)	-.04	.06	-.74	.46
Depression←Informational Support (IS)	-.35	.06	-5.92	<.05
Depression←Self-Efficacy for Symptom Management (SES <sub>x</sub> )	-.23	.06	-3.97	<.05
Depression←SES <sub>x</sub> x SWB (interaction term)	-.02	.05	-.33	.74
Depression←SES <sub>x</sub> x IS (interaction term)	.18	.06	-3.36	<.05
Depression←Education	-.03	.05	-.50	.62

Figure 5: Interaction Effect of Self-Efficacy Symptom Management on IS and Depression



There was a significant interaction effect of self-efficacy symptom management on the relationship between informational support and depression ( $p < .05$ ). Participants with high self-efficacy symptom management and high informational support had lower depression levels, and individuals with low informational support, but high self-efficacy symptom management had lower depression levels than those with low self-efficacy symptom management and low informational support.

The pathways from informational support and self-efficacy symptom management alone to depression were also significant. These were negative relationships where high self-efficacy symptom management and high informational support levels were associated with lower depression levels.

## Discussion

The current study sought to test four moderating models using two types of self-efficacy, self-efficacy symptom management and self-efficacy cancer knowledge in caregivers of Latina breast cancer survivors. Caregiver factors such as Anglo-orientation and perceived informational support were related to physical and mental health outcomes. Both types of self-efficacy were significantly related to some, but not all, predictor and outcome variables. Patterns varied based on the type of self-efficacy, and these patterns bear further discussion due to the specific types of self-efficacy that were measured in this study, self-efficacy cancer knowledge and self-efficacy symptom management. These findings are also significant due to the focused population in this study, caregivers of Latina breast cancer survivors with their specific challenges related to social determinants of health. Finally, each type of self-efficacy had distinctively significant interaction effects on relationships between dependent variables and outcome variables that will be further discussed.

### **Relationships Among Cancer Caregiver Self-Efficacy, Characteristics, and Health**

In caregivers of Latina breast cancer survivors, self-efficacy cancer knowledge and self-efficacy symptom management were not related to each other. This is significant, because it is reflective of situation-specific self-efficacy posited by Bandura (2006). Caregivers who have high self-efficacy regarding their cancer knowledge may not be able to translate this high self-efficacy to managing their own symptoms of distress. Healthcare providers need to be aware of this issue and promote caregiver self-efficacy for both care of the cancer survivor and care of self.

Both self-efficacy measures had significant positive relationships with informational support, along with varied relationships with spiritual well-being, Anglo-orientation, global health, and depression. Social support is an important facet of Latino culture with *familism*, loyalty to and care of family (Badger et al., 2018b) and the reliance on healthcare providers for health information (Aranda & Cordero, 2017; NAC, 2008). Individual experiences with *familism* as a cultural norm may be varied based on caregiver age and acculturation (Flores et al., 2009; Toro et al., 2018). It is important for health care providers to recognize that *familism* can be a source of strength and resilience for Latino caregivers, while also being a constraining force in caregiving (Flores et al., 2009; Toro et al., 2018). For example, women with the cultural norm of *marianismo* may feel greater responsibility to be caregivers, and men, with *machismo*, may not be culturally supported in taking on caregiving roles (Badger et al., 2018b; Flores et al., 2009). One way to address the nuances of family and support for Latino caregivers is completing an assessment of both the meaning of caregiving and the sources of support for caregiving that Latino caregivers are experiencing.

Provision of social support may be one of the areas where interventions can have the greatest impact in caregivers of Latina breast cancer survivors. As noted in a Latino caregiver needs assessment by the AARP, social support programming should focus on delivery at multiple levels—healthcare care system, community-based organizations, faith-based programs, and family support (Aranda & Cordero, 2017). The CARE Act is an example of legislation that may support programming at the healthcare and community level (Caceres & Perez, 2018).

The differing relationships with self-efficacy cancer knowledge and self-efficacy symptom management and global health and depression is important to note theoretically and

clinically. Self-efficacy cancer knowledge was related to global health, but not to depression, while self-efficacy symptom management was related to both depression and global health.

Although research has demonstrated that greater self-efficacy to manage the impact of illnesses and general self-efficacy is related to lower symptom distress and depression, respectively (Ellis et al., 2017; Mystakidou et al., 2013), healthcare providers need to understand that self-efficacy is situation specific. Interventions to promote health in these caregivers should focus on self-efficacy for personal symptom management rather than simply focusing on caregiver self-efficacy for caring for the survivor. Cancer caregivers are at risk for poor health outcomes (Goren et al., 2014), and this risk is even greater for caregivers of Latina breast cancer survivors due to social determinants of health (NHCOA, 2017). Identifying factors, such as greater social support, that may contribute to higher self-efficacy levels for managing the care of self and care of the survivor is compelling both theoretically and clinically. Bandura described the role of performance accomplishments and verbal persuasion as factors promoting self-efficacy (Bandura, 1977). If caregivers are provided with support to succeed in self-care and caregiving behaviors and given positive verbal feedback, this may reinforce greater self-efficacy levels. An additional consideration is the level of Anglo-orientation for caregivers of Latina breast cancer survivors. In this study, Anglo-orientation was positively correlated to self-efficacy symptom management. Further research is needed to examine how Anglo-orientation affects healthcare access, provider bias, and Latino cancer caregiver self-care (Blair et al., 2013; Lopez, Gonzalez-Barrera, & Krogstad, 2018).

### **Moderating Effects of Caregiver Self-Efficacy on Health Outcomes**

Self-efficacy symptom management and self-efficacy cancer knowledge had different interaction effects on the relationships between predictor and outcome variables. Interestingly, during simple moderation, self-efficacy cancer knowledge had significant moderating effects on the relationships between Anglo-orientation and depression. High self-efficacy cancer knowledge and high Anglo-orientation were associated with lower levels of depression. Conversely, the highest depression levels were in participants with low Anglo-orientation and high self-efficacy cancer knowledge. When considering the clinical implications of these findings, healthcare providers should consider screening caregivers of Latina breast cancer survivors regarding Anglo-orientation levels before proceeding with interventions to promote self-efficacy cancer knowledge, because health outcomes may not improve. This is an important finding due to the premise of the Hispanic paradox, where new immigrants are sometimes found to have better health outcomes than American-born Latinos (Teruya et al., 2013). While correlational analysis did not support the Hispanic paradox, the moderation results lend some complexity to these relationships and how self-efficacy cancer knowledge interacts with the relationship between Anglo-orientation and health outcomes.

While interesting theoretically, the clinical implications of acculturation and health are also significant. Timing and content of interventions in caregivers of Latina breast cancer survivors is of utmost importance when considering Anglo-orientation (Aranda & Cordero, 2017). It is important for nurses and other healthcare providers to assess for informational, support, and health needs of cancer caregivers regardless of ethnicity or acculturation levels. Yet, there are significant barriers to accessing information and support for individuals who are ethnic

and racial minorities and who have language barriers. Unfortunately, racial bias continues to persist, both explicit and implicit, towards Latinos in both public and health care settings in the United States (Blair et al., 2013; Lopez, Gonzalez-Barrera, & Krogstad, 2018). In addition to navigating barriers to care related to racial prejudice, there are other substantial cultural issues with health care access such as understanding the mechanics and the culture of the health care system in a new country (Straiton & Myhre, 2017). Expectations such as follow-up, the use of third-party payment structures, emphasis on Western medical practice versus complementary and alternative approaches to care, and primary, secondary, and tertiary settings for care are often taken for granted by healthcare professionals. This is an area where there needs to be greater intersection of research, practice, and health care policy.

Another interesting interaction pattern was the moderating effect of self-efficacy symptom management on informational support and depression, which was the only significant interaction effect supported in path analysis. High self-efficacy symptom management and high informational support were associated with the lowest depression and anxiety levels, although high self-efficacy symptom management was protective for participants with low informational support. Their depression levels were lower than individuals with low self-efficacy symptom management and low informational support. This is a key clinical finding for caregivers of Latina breast cancer survivors, because provision of care that promotes self-efficacy to manage their own symptoms may be protective at all levels of informational support. Prior research has noted improved self-efficacy with educational interventions focused on care of the survivor in cancer caregivers, but no corresponding improvement in mental health (Hendrix et al., 2011). In addition, several studies have focused on informational needs and interventions for cancer

caregivers, but only a few have addressed holistic needs of cancer caregivers (Shin, Kang, Noll, & Choi, 2018). This is a research gap that requires further attention. Cancer caregivers need interventions to help them support cancer survivors, but also to support their own health. A vital aspect of providing this support is how it is delivered. In one survey of Latino caregivers, healthcare providers were the primary source of healthcare information, and technology-based information sources such as texts, emails, and app-based information were not highly utilized (Aranda & Cordero, 2017).

In the current healthcare system with burgeoning technology, it is important for researchers to understand information usage, with respect to both barriers and facilitators of technology delivery. In the Latino population, both a telephone intervention and promotor-delivered interventions in Latino survivors and caregivers demonstrated promising results for survivor and caregiver outcomes (Badger et al., 2019; Marshall et al., 2013). Future research should include greater application of technology in a usable and accessible format for Latino caregivers. Options could include patient portals, text messaging, social media, and wearable devices. When applying complex adaptive systems to this area of research, there may be multiple modes of communication that are required to provide adequate informational support to Latino cancer caregivers.

### **Spiritual Well-Being**

Spiritual well-being was included in the model for this study due to the importance of spirituality in the Latino culture (Badger et al., 2018b). In the present sample, it was related to self-efficacy cancer knowledge, informational support, and acculturation. Interestingly, there was an inverse relationship between Anglo-orientation and spiritual well-being, with higher spiritual

well-being with lower Anglo-orientation levels. This is consistent with the literature that describes the importance of spirituality in the Latino population (Badger et al., 2019b). This relationship deserves more investigation in the wider Latino caregiving population living in the United States, especially with measures that are reflective of hope and purpose rather than religious and spiritual activities.

Health care providers need to be more intentional in addressing spiritual well-being, to prevent distress and to emphasize sources of strength for Latino caregivers. Spiritual well-being is a key aspect of palliative care provision for patients, and it should be extended to caregivers and families more consistently (NCP, 2013). Assessing for spiritual distress and provision of information about chaplain services, support groups, and spiritual practices should be included in caregiver interactions. These approaches may create greater space to share spiritual beliefs and needs in caregivers of Latina breast cancer survivors.

### **Limitations**

This study used path analysis, which is not as robust as full structural equation modeling for examining relationships in a model. But the analyses in this study have provided a starting point for ongoing research to refine the model. Additionally, the population in this study is focused on caregivers of Latina breast cancer survivors, so generalization of findings should not be made to the broader cancer caregiver population.

### **Conclusion**

This study provides additional support for situation-specific self-efficacy in caregivers of Latina breast cancer survivors. Self-efficacy cancer knowledge and self-efficacy symptom management had varied relationships among predictor and outcome variables. In addition, the

interaction effects of these two types of self-efficacy were different. Self-efficacy remains an important factor to consider in supporting caregivers of Latina breast cancer survivors. These caregivers are a unique example of caregiving, due to higher caregiving rates, higher investment of time and money, and greater positive appraisals of caregiving. They are also at risk due to social determinants of health. Strategies to promote greater caregiver self-efficacy to care for the survivor and to provide self-care should be balanced with factors such as Anglo-orientation levels, spiritual well-being, and informational support. Providers can better support caregivers of Latina breast cancer survivors by performing individualized assessments to understand how interventions to promote self-efficacy for care of the survivor and care of self will affect health outcomes.

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APPENDIX D:  
THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD (IRB)  
DETERMINATION LETTER



THE UNIVERSITY OF ARIZONA  
**Research, Discovery  
 & Innovation**

Human Subjects  
 Protection Program

1618 E. Helen St.  
 P.O. Box 245137  
 Tucson, AZ 85724-5137  
 Tel: (520) 626-6721  
<http://rgw.arizona.edu/compliance/home>

**Date:** April 17, 2019  
**Principal Investigator:** Megan Christine Hebdon  


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**Protocol Number:** 1904518399  
**Protocol Title:** THE MODERATING EFFECTS OF SELF-EFFICACY ON HEALTH  
 OUTCOMES IN CAREGIVERS OF LATINA BREAST CANCER  
 SURVIVORS

**Determination:** Human Subjects Review not Required

**Documents Reviewed Concurrently:**

**Data Collection Tools:** *Outlineofrequesteddata\_Hebdon\_IRB.DOCX*  
**HSPP Forms/Correspondence:** *Advisor Confirmation Email.pdf*  
**HSPP Forms/Correspondence:** *Hebdon\_caregiver\_IRB\_edited.pdf*  
**Other Approvals and Authorizations:** *11-0136-02ICFv2018-03-06 Partner 3-7-18 (1).doc*  
**Other Approvals and Authorizations:** *Permission to use data.pdf*

**Regulatory Determinations/Comments:**

- Not Research as defined by 45 CFR 46.102(I): As presented, the activities described above do not meet the definition of research cited in the regulations issued by U.S. Department of Health and Human Services which state that "Research means a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities that meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program that is considered research for other purposes. For example, some demonstration and service programs may include research activities. For purposes of this part, the following activities are deemed not to be research."

The project listed above does not require oversight by the University of Arizona.

If the nature of the project changes, submit a new determination form to the Human Subjects Protection Program (HSPP) for reassessment. Changes include addition of research with children, specimen collection, participant observation, prospective collection of data when the study was previously retrospective in nature, and broadening the scope or nature of the study activity. Please contact the HSPP to consult on whether the proposed changes need further review.

The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00004218).