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Ethnicity and health in cervical cancer survivors : understanding vulnerability and resilience

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ETHNICITY AND HEALTH IN CERVICAL CANCER SURVIVORS: UNDERSTANDING VULNERABILITY AND RESILIENCE

BY

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B.A., Psychology, University of Michigan, 2007

THESIS

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ABSTRACT

Health disparities among U.S. Hispanic populations continue to be a significant and costly public health concern. Both vulnerability and resilience factors may play a crucial role in understanding the extent of health disparities in a disease and may lead to better ways for reducing the disparities. The purpose of this study was to examine potential vulnerability and resilience factors that may explain differences in health and functioning between Hispanic (n = 52) and Non-Hispanic White (NHW; n = 135) cervical cancer survivors. New Mexico Tumor Registry participants diagnosed with cervical cancer completed general physical and mental health questionnaires including a measure of depression. Measures of vulnerability, including low income and education, and measures of resiliency, including coping, optimism, social support and spirituality, were also completed. No differences were found between Hispanic and NHW women on the physical health, mental health or depression measures. Hispanic women scored higher in spirituality and coping and lower in education than the NHW women. Income, optimism, and social support were all related to better physical and

mental health and less depressive symptoms in the whole sample. Future studies should continue to examine population specific vulnerability and resilience factors in cervical cancer in efforts to better understand health disparities and guide prevention and treatment.

Keywords: Cervical cancer, vulnerability, resilience, ethnicity, health disparity

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Ethnicity and Health in Cervical Cancer Survivors: Understanding Vulnerability and Resilience

Cervical cancer and its treatment can have a devastating impact on the health and quality of life of its survivors (Andersen, 1996; Ashing-Giwa et al., 2006; Bradley, Rose, Lutgendorf, Costanzo, & Anderson, 2006). Nevertheless, many of the factors that result in increasing or decreasing the likelihood of the negative effects on health and functioning are not well understood at this time (Aziz & Rowland, 2002; Pearman, 2003). The notion of negative effects on health and functioning as used in this manuscript refers to factors including poorer physical and/or mental health and functioning and poorer prognosis overall such as higher mortality rates. These negative consequences may be more prevalent and magnified for underserved and ethnic minority populations than for Non-Hispanic Whites (NHWs) (Aziz & Rowland, 2002; Pearman, 2003). Nevertheless, relatively little attention has been paid to ethnicity or the factors related to ethnic group differences in health and functioning of cervical cancer survivors (Ashing-Giwa, et al., 2006; Aziz & Rowland, 2002; Huerta, 2003). Regarding vocabulary in this manuscript, the terms Caucasian versus non-Hispanic White and Hispanic versus Latino/a are used interchangeably.

Cervical Cancer Background

Cervical cancer is defined as malignant cellular changes in the cervix, primarily caused by persistent infection with a high-risk strain of the human papillomavirus (HPV) (Fleurence, Dixon, Milanova, & Beusterien, 2007; Likes & Itano, 2003). Approximately 20 million individuals are infected with HPV in the United States (Centers for Disease Control and Prevention, 2009). HPV is the most frequently sexually transmitted viral infection in the United States (American Cancer Society, 2009). This highly prevalent virus affects nearly

80% of women by age 50 (Cates, 1999; Koutsky, Galloway, & Holmes, 1988; Myers, McCrory, Nanda, Bastian, & Matchar, 2000). In addition to cervical cancer, genital warts are another possible outcome of infection with a high-risk strain of HPV (American Cancer Society, 2009).

The American Cancer Society (2009) estimated that there would be more than 11,250 cases of invasive cervical cancer diagnosed in the United States in 2009, resulting in approximately 4,070 deaths. Cervical cancer is classified as invasive when the abnormal cells have spread from the surface of the cervix to the deeper tissue in the same area or to other parts of the body (American Cancer Society, 2009). Two vaccines called Gardasil and Cervarix have been a part of the effort to decrease the rate of new cases of cervical cancer (American Cancer Society, 2009). Although the vaccines do not treat cervical cancer they may help to prevent it by immunizing against certain high-risk strains of HPV. These high risk strains include types 6, 11, 16, and 18 for Gardasil and types 16 and 18 for Cervarix (American Cancer Society, 2009). Treatment of cervical cancer consists of surgery, radiation, and/or chemotherapy (American Cancer Society, 2009; Pearman, 2003).

Approximately $2 billion is spent annually to prevent and treat cervical cancer in this country (U.S. Cancer Statistics Working Group, 2009). In order to aid treatment and prevention, it is important to understand the factors that make an individual more vulnerable or resilient to the potential negative effects of cervical cancer on health and functioning. In general, survival rates are increasing and people with cervical cancer are living longer (Ashing-Giwa et al., 2004; Aziz & Rowland, 2002). In fact, over the past two decades the incidence of cervical cancer for Non-Hispanic White (NHW) women in the U.S. has decreased by approximately 60% (American Cancer American Cancer Society, 2009).

Unfortunately, not every ethnic group has benefitted from the reduction in cervical cancer that has been seen among NHW women in this country.

Health Disparities and Cervical Cancer

Health disparities are defined as inequalities, gaps, or adverse differences in the quality of health, including incidence, mortality, survivorship, disease burden and health care access among particular groups (National Cancer Institute, 2009; US Department of Health and Human Services, 2000). The definition proposed by the World Health Organization adds that these disparities in health are not only unnecessary and avoidable, but are also unfair and unjust (Whitehead, 1991). Some populations that have been documented to experience health disparities include ethnic minorities, sexual orientation minorities, persons of low socioeconomic status, women, children, the elderly, those who live in rural areas and those who are disabled (National Cancer Institute, 2009). These disparities generally involve rates of how frequently a disease affects a particular group, how many members of that group become ill, and how often the disease will cause death (National Cancer Institute, 2009). Health disparities may be especially prevalent for ethnic minorities compared to NHWs in the U.S. (Goldberg, Hayes, & Huntley, 2004; Ward et al., 2004; Williams & Jackson, 2005).

There are significant disparities between ethnic groups in the incidence and mortality rates associated with cervical cancer (Ashing-Giwa et al., 2004; Aziz & Rowland, 2002). Ethnic minorities overall have a higher likelihood of being diagnosed with more advanced stages of cancer than NHW women (Jemal et al., 2006). African American women are 50% more likely to be diagnosed with cervical cancer than NHW women (American Cancer American Cancer Society, 2009; Wasserman et al., 2006). Although the incidence rate of cervical cancer has gone down for NHW women, Hispanic and Asian American women are

experiencing increased incidence rates of cervical cancer (Ashing-Giwa et al., 2004; Ashing-Giwa et al., 2006). In contrast, American Indian/Alaska Native female populations have an incidence rate that is 0.9 times less than that of NHW women (National Cancer Institute, 2008). There has been little research that has focused specifically on cervical cancer prevalence and mortality in racially/ethnically mixed women.

Cervical cancer is most common in Hispanic women, who have twice the risk of developing the disease and a 40% higher mortality rate compared to NHW women (Ashing-Giwa et al., 2006; Wilcher, Gilbert, Siano, & Arredondo, 2000). In addition to higher incidence rates overall, Hispanic women generally bear an increased burden of cervical cancer compared to NHW women (Ashing-Giwa et al., 2004; Aziz & Rowland, 2002; Buki, Jamison, Anderson, & Cuadra, 2007; Clegg, Li, Hankey, Chu, & Edwards, 2002). This greater burden of disease includes a lower five-year survival rate, greater morbidity, an average younger age and more advanced stage of cancer at diagnosis (Ashing-Giwa et al., 2004; Aziz & Rowland, 2002; Buki et al., 2007; Clegg et al., 2002; Li, Malone, & Daling, 2002).

Hispanics are the fastest growing ethnic group in the United States (Ashing-Giwa et al., 2004; Huerta, 2003). Even so, most of the studies conducted in the U.S. regarding cervical cancer and health and functioning have utilized a primarily NHW sample (approximately 90% of the participants on average) (Andersen, 1996; Shingleton & Orr, 1995; Thranov & Klee, 1994; Yeo & Perera, 1995). The lack of research that focuses on minority populations with cervical cancer makes it difficult to obtain an accurate picture of the disease and potential vulnerability and resilience factors in Hispanics and other ethnicities. Nevertheless, due to the greater burden of disease that Hispanic women in

particular bear regarding cervical cancer, it is extremely important to study the factors that may make them more or less vulnerable to poorer health and functioning compared to NHW women.

In cancer as well as other diseases, disparities related to health can occur on multiple levels. These include lack of access to resources, lack of health insurance, lower rates of screening, greater incidence, higher mortality, and worse health outcomes compared to NHWs (Adler et al., 1994; Goldberg et al., 2004; National Cancer Institute, 2009; Ward et al., 2004; Williams & Jackson, 2005). The sources and maintaining factors of health disparities are multi-level and complex. They include unequal distribution of wealth/access to resources including health care coverage and other socioeconomic factors (Hadley, 2003; National Cancer Institute, 2009) historical and current racism (Harrell, 2000; Jones, 2000; Shinagawa, 2000) societal structure and hierarchies, unequal living environments (Wagstaff & Van Doorslaer, 2000; Williams, 2005) as well as factors related to the educational system (Adler et al., 1994; Winkleby, Jatulis, Frank, & Fortmann, 1992). Freeman and colleagues (2005) argue that cancer-specific disparities in mortality rates develop when beneficial biomedical interventions are not shared equally, due to factors such as access, cost, or insurance coverage. Chu and colleagues (2007) also posit that differences in primary prevention may be at least partially responsible for some health disparities.

Although the existence of health disparities related to cervical cancer has been noted, currently little is known about the ways in which ethnic differences may impact survivors' health and functioning (Ashing-Giwa et al., 2006; Aziz & Rowland, 2002). Many of the studies that focus on cervical cancer in ethnic minorities investigate issues related to incidence, mortality, screening or sexual functioning outcomes (Andersen, 1996; Morgan,

Behbakht, & Benjamin, 1996; Shingleton & Orr, 1995; Thomas, Unger, & Johnson, 1995; Thranov & Klee, 1994; Yeo & Perera, 1995). However, in order to reduce health disparities related to this disease, it is important to understand the overall physical and mental health effects and the influence of ethnicity-related factors on this relationship.

Identifying and measuring health disparities by examining trends for various ethnicities is important to be able to understand their causes in order to reduce them (Chu et al., 2007). Health disparities between minorities and NHWs can be measured in multiple ways (Canto & Chu, 2000; Harper & Lynch, 2005; Keppel et al., 2005; Paltoo & Chu, 2004). However, one of the most traditional ways to measure cancer-related disparities is to ascertain whether a particular group bears an excess cancer burden. This is defined as when a minority group has a rate of disease that is higher than that of the reference group, which is almost always NHWs (Chu et al., 2007). Through this comparison one can determine if and to what extent, a differential burden of disease exists for the minority group (Chu et al., 2007).

There is a significant need for additional research regarding factors that influence health and functioning outcomes. In particular, more research is warranted in terms of these factors as they relate to ethnic group differences in cervical cancer survivors. This need is especially pronounced for Hispanic women, given that they exhibit the highest incidence and mortality rates of any ethnic group for cervical cancer, in addition to being the fastest growing population in the U.S. (Ashing-Giwa et al., 2004; Ashing-Giwa et al., 2006; Huerta, 2003).

Ethnicity and Cervical Cancer: A Model of this Relationship Including Potential Vulnerability and Resilience Factors

The relationship between ethnicity and health and functioning following cervical cancer is complex and not yet fully understood. There appear to be some factors, such as lower income and education, which may make ethnic minorities more vulnerable to disease and poorer health and functioning outcomes (Hadley, 2003; Wagstaff & Van Doorslaer, 2000). These factors are generally the most well-known due to a tendency to examine ethnic minority populations from a deficit model perspective, in which vulnerability or risk factors are considered to be the most relevant to outcomes (Betancourt, Green, Carrillo, & Ananeh-Firempong, 2003; Penn, Kar, Kramer, Skinner, & Zambrana, 1995).

At the same time, there are other factors that may make ethnic minorities more resilient to diseases such as cervical cancer, including aspects related to the Hispanic Paradox, increased spirituality and social support. Resilience has been defined as the ability to be resistant to illness, to adapt or thrive despite adversity, and to recover following stressful circumstances (Carver, 1998; Tusaie & Dyer, 2004). The Hispanic Paradox is defined and described n a separate section below. It is possible that the influence of these and other potential resilience factors may increase the likelihood of better health and functioning outcomes, particularly in minority cervical cancer survivors.

I am proposing a model (Figure 1) to assist in illuminating the relationship between ethnicity and health and functioning in cervical cancer survivors. Two important aspects of this model are the potential vulnerability factors as well as the potential resilience factors that may influence the relationship between ethnicity and health. These factors may help to explain ethnic group differences in vulnerability and resilience to disease and effects on

health for minority cervical cancer survivors. On a broader level, such a model may also be useful in understanding factors related to health disparities, with the hope of reducing and ultimately eliminating them.

The model in Figure 1 includes multiple ethnicities and potential resilience factors including personality characteristics, social support, adaptive coping, health care access, community resources and genetic contributions. The model also includes potential vulnerability factors such as personality characteristics, social conflict, negative coping, low socioeconomic status (SES)/access barriers, discrimination, and genetic contributions. General indicators of health and functioning are also listed including physical health, mental health and depression. Finally, two modes of assessing these constructs are noted, including subjective means, such as self-report measures and objective means, such as physical examination or observation.

In the current study, there were multiple factors that were examined from the proposed model in Figure 1. The ethnic groups compared in the present study were Hispanic and NHW cervical cancer survivors. All of the measures were self-report instruments. Based on previous studies, income and education were included as potential vulnerability factors because lower levels of these constructs have been shown to be related to poorer outcomes for survivors of multiple types of cancer, including cervical cancer (Adler & Newman, 2002; Hadley, 2003; Wagstaff & Van Doorslaer, 2000; Ward et al., 2004). However, some studies have shown that Hispanic women with lower income and education fare worse than NHWs (Ashing-Giwa et al., 2006; Aziz & Rowland, 2002; Bollini & Siem, 1995; Wagstaff & Van Doorslaer, 2000). Meanwhile, other studies have found that Hispanic women who have less education and are poorer do not fare worse than NHWs (Markides & Eschbach, 2005; Page,

2007). The current study was helpful to clarify some of the mixed findings in the literature regarding ethnicity in the context of income and education as vulnerability factors.

Social support and spirituality were included as potential resilience factors due to some support for their relationship with better health outcomes for a number of cancers, including cervical cancer (Cohen & Syme, 1985; Filazoglu & Griva, 2008; Friedman et al., 2006; Tarakeshwar et al., 2006). Some studies have found that Hispanic women with higher spirituality and social support fare better than NHWs (Goodwin, Hunt, & Samet, 1991; Mindel, 1980; Sabogal, Marín, Otero-Sabogal, Marín, & Perez-Stable, 1987; Taylor, 2001). Conversely, other authors have not found that Hispanic women with greater spirituality and social support have better outcomes compared to NHW women (Aziz & Rowland, 2003; Thune-Boyle, Stygall, Keshtgar, & Newman, 2006).

Coping and optimism were also included as potential resilience factors due to findings relating these constructs to better health outcomes in cancer, including cervical cancer (Carver et al., 1993; Scheier & Carver, 1985; Segerstrom, Taylor, Kemeny, & Fahey, 1998). More research is needed in terms of studies that focus on ethnic differences for Hispanic women with cervical cancer compared to NHWs. In summary, the findings were mixed or inconclusive regarding the effect that spirituality, social support, optimism, and coping have as potential resilience factors on the relationship between ethnicity and health in cervical cancer survivors. Thus, the current study was important to help illuminate the nature of the aforementioned relationships.

The health indicators included in the current study were physical health, mental health, and depressive symptoms because much of the disparities in health in terms of cervical cancer are encompassed within these outcome measures (Baron-Epel & Kaplan,

2009; Chu et al., 2007; Lindsay Nour, Elhai, Ford, & Frueh, 2009; Loerzel & Bushy, 2005; Sacker, Head, Gimeno, & Bartley, 2009). An overview of the relationship between cervical cancer and the potential vulnerability and resilience factors and the health and functioning constructs included in the current study is given below.

Ethnic Minorities and Potential Vulnerability Factors: Socioeconomic Status, Education, and Income

Socioeconomic status and cervical cancer. Given the mixed or inconclusive findings regarding ethnicity and health in cervical cancer survivors, what may account for the cases where minorities with cervical cancer demonstrate worse health and functioning than NHWs with the same disease? One major factor may be differences in socioeconomic status (SES). SES is generally assessed by measuring factors including income, education, and job status (National Center for Education Statistics, 2008). SES factors often interact with other social factors including ethnicity and gender and result in health disparities between groups (Krieger, Williams, & Moss, 1997; Mackenbach et al., 1999; Marmot, Ryff, Bumpass, Shipley, & Marks, 1997; Williams, 1999). Besides ethnic minorities, low SES women are one of the groups most often afflicted by this disease (Ashing-Giwa et al., 2004; McBride & Scholes, 2002; Reynolds, 2004). Unfortunately, ethnic minorities, specifically Hispanics, are more likely to be of lower SES than NHW (Ashing-Giwa et al., 2006; Pearman, 2003).

Cervical cancer is a cancer of economically disenfranchised women (Ashing-Giwa et al., 2004). Lower SES may contribute to minorities more often being diagnosed with later stages of cancer than NHWs (Aziz & Rowland, 2002). Lower SES is one of the factors that has been linked to increased psychological distress and poorer mental health outcomes in women with cervical cancer (Ashing-Giwa et al., 2006; Pearman, 2003). Additionally, low-

SES immigrant Latina women are more likely to have higher levels of depression, likely to due correspondingly higher amounts of stress than NHW women in this country (Briones et al., 1990; Ross, Mirowsky, & Cockerham, 1983; Salgado de Snyder, Cervantes, & Padilla, 1990; Vega & Kolody, 1985).

If cervical cancer is detected early, there is a high likelihood of preventing death due to the disease (Reynolds, 2004). Worse health outcomes among minorities are likely due to a number of factors, including minorities in general having less access to adequate medical care, fewer resources, and less preventative care (Ashing-Giwa et al., 2004; Page, 2007). The papanicolaou (pap) smear test is extremely important because it is the primary tool used to screen for precancerous lesions and cervical cancer (Ashing-Giwa et al., 2004; Documet et al., 2008; Reynolds, 2004). Indeed, adhering to routine pap smear screenings has reduced the risk of death from cervical cancer by 60 to 90% over the past several decades (Daly, Bookman, & Lerman, 1995). However, low SES is often the primary barrier to women being able to access good quality and affordable health care resources including pap smear tests and biopsies (National Center for Education Statistics, 2008; Waggoner, 2003).

Given that SES can encompass a number of factors that may or may not be related to each other including job status, education and income, it is helpful to examine aspects of SES as independent vulnerability factors in relation to health and functioning (Winkleby et al., 1992). Two of the major components of SES are income and education. It is useful to examine them separately, because although they are generally correlated (Muller, 2002), they can also lead to distinct findings depending on which variable is utilized (Winkleby et al., 1992). Therefore, examining the individual contributions of education and income to health and functioning may be more informative than combining them into one indicator of SES.

Education and cervical cancer. Less formal education may have distinct effects on health and functioning from those effects that are related to lower income. For example, someone with lower income may still go to a community health clinic for screening for a particular illness. In contrast, an individual with an adequate income who has less education may not get screened because of lack of awareness (Buki et al., 2007). Moreover, Hispanic women without health insurance who reported being exposed to cancer-related education were more likely to be up-to-date with their Pap smear screenings compared to women who did not receive such educational exposure (Buki et al., 2007). Women who have greater than a sixth-grade formal education are also more likely to have had a pap smear than those with less education (Buki et al., 2007). A higher level of education is one of the predictors of better psychosocial adjustment following breast, prostate and other undisclosed types of cancer (Schnoll, Knowles, & Harlow, 2002). Unfortunately, 99% of the participants in this study were NHW, nevertheless, the use of virtually all NHW samples are common in cancer research (Andersen, 1996; Shingleton & Orr, 1995; Thranov & Klee, 1994; Yeo & Perera, 1995).

Concordantly, less formal education has been found to be a risk factor for poorer psychosocial adjustment to cervical cancer (Chan et al., 2001; Miller, Pittman, & Strong, 2003). The participants in Miller and colleagues study (2003) included patients with cancer of the cervix, uterus, ovary, vulva, and undisclosed other types. The participants in this study were 49.5% NHW and 50.5% African-American. The participants in the Chan and colleagues (2001) study included cervical, uterine, and ovarian, and a racial/ethnic breakdown of the participants was not given. Miller and colleagues (2003) suggest that the reason that less formal education may predict poorer psychosocial adjustment to cervical

cancer is because lower education may be reflective of less knowledge regarding health issues, a less supportive social environment, and poorer health overall. Increased education may also allow the individual to be more accepting of treatments that they may view with caution or suspicion due to lack of familiarity (Chu et al., 2007)

Income and cervical cancer. There have been relatively few studies that have examined income and education as independent factors related to health and functioning in cancer survivors, including those who have survived cervical cancer. Many studies focus on SES as a composite variable (Adler & Ostrove, 1999; Chu et al., 2007). However, the American Cancer Society (2009) cites low income as an independent risk factor for development of cervical cancer. Ward and colleagues (2004) found that people who live in counties that are >20% below the poverty level experienced a 13% greater cancer mortality rate for males and a 3% greater mortality rate for females, compared to people who lived in counties with <10% living below the poverty level.

Hispanics are the poorest ethnic minority group and also report the greatest uninsured rate of all racial and ethnic groups (Huerta, 2003; Vega, Rodriguez, & Gruskin, 2009). In 2006, more than 22% of Hispanics were found to be living below the poverty line, compared with 10% of NHWs (Vega et al., 2009). However, the true percentage for Hispanics is likely much higher due to difficulties with estimations related to the quantity of immigrants in this population. Furthermore, Hispanics are more likely to incur additional cancer-related expenses compared to NHW women (Guidry, Aday, Zhang & Winn, 1998a). These include additional cost-associated barriers related to medications, diagnostic tests, and hospitalizations, as well as significant out-of-pocket expenses for the cancer treatments that they receive (Guidry, Aday, Zhang, & Winn, 1998a).

Although there is a significant proportion of minorities who are also poor, the relationship between lower income and higher rates of cervical cancer remains even after controlling for ethnicity (McBride & Scholes, 2002). At the same time, ethnicity has also been found to be related to health even when controlling for income (Simon, Zeng, Wold, Haddock, & Fielding, 2003; Weinick, Zuvekas, & Cohen, 2000). Thus, it is also important to also consider the latter relationship because there is evidence that even within the same level of SES, there may be differences across ethnic groups as well (Anderson & Armstead, 1995; Braveman et al., 2005; Chu et al., 2007).

Ethnic Minorities and Potential Resilience Factors: The Hispanic Paradox, Social Support, and Spirituality

The Hispanic paradox and cervical cancer. Beyond investigating some of the factors that may make minorities more vulnerable to poor health following cervical cancer, there are other factors that may make minorities more resilient to its effects on health and functioning. Many of the findings on minority health suggest that minority status would be associated with worse health outcomes when compared with NHWs overall (Adler et al., 1994; Adler & Newman, 2002; Bollini & Siem, 1995). However, some research suggests that being Hispanic actually affords people equal or better health outcomes and lower mortality rates, despite a host of economic and social disadvantages, including higher levels of poverty, lower levels of education, and less health care coverage (Flack et al., 1995; Markides & Eschbach, 2005; National Center for Health Statistics, 1990; Page, 2007; Turra & Goldman, 2007). This phenomenon has been referred to as the Hispanic Paradox and its overall effect of increasing health outcomes and decreasing mortality rates has been found in outcomes including better cardiovascular, pregnancy, and cancer (lung, colon, breast, and prostate)

outcomes, lower infant, stroke-related and all-cause mortality rates for Hispanics relative to NHWs (Franzini, Ribble, & Keddie, 2001; Markides & Coreil, 1986; Markides & Eschbach, 2005; Page, 2007; Sorlie, Backlund, Johnson, & Rogot, 1993; Thiel, Gany, & Fruchter, 1993).

There have been mixed findings as to whether the Hispanic Paradox has been found in cervical cancer. Some studies have concluded that it is not present in cervical cancer (Markides & Coreil, 1986; Turra & Goldman, 2007). While other studies have demonstrated that it has been found in cervical cancer populations (Coker, Eggleston, Du, & Ramondetta, 2009; Eggleston et al., 2006). Thus, the current study is useful in adding to the literature regarding the existence of the Hispanic Paradox in cervical cancer survivors, particularly in the context of examining vulnerability and resilience factors that may affect their health and functioning.

In general, the Hispanic Paradox appears to apply to Hispanics overall compared to Non-Hispanic Whites in the context of the aforementioned diseases (Abraido-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999). However, this phenomenon seems to be most prominent in Mexican Americans and of that group, middle-aged and older members appear to receive the greatest advantage. Nevertheless, the Hispanic Paradox has not been found in diabetes, liver disease, AIDS, or homicide (for Hispanic males), in that Hispanics exhibit higher mortality rates than NHWs in these areas (Markides & Coreil, 1986; National Center for Health Statistics, 1990; Sorlie et al., 1993; Thiel et al., 1993).

Explanations for the Hispanic Paradox fall into two primary categories. The first is related to the notion that the lower mortality rates that Hispanics exhibit in certain cases is real and is related to this population engaging in more favorable health behaviors, possessing

less risk and genetic factors, and greater family support and spirituality than NHWs (Markides & Coreil, 1986; Page, 2007; Scribner, 1994, 1996). One example of a more favorable health behavior finding is that male and female Hispanics drink less alcohol, which lowers their risk for cancer and heart disease, compared to NHWs (National Center for Health Statistics, 1993; Perez-Stable, Marin, & Marin, 1994). In sum, these factors appear to contribute to the Hispanic Paradox in that they may be responsible for attenuating the negative health effects of the aforementioned socioeconomic disadvantages that Hispanics may bear.

The second primary explanation for the Hispanic Paradox postulates that the lower mortality rates that this group exhibits are not genuine. Instead, these rates are caused by migratory factors including the "Healthy Migrant Hypothesis" and the "Salmon Bias" (Franzini et al., 2001; Markides & Eschbach, 2005; Turra & Goldman, 2007). The "Healthy Migrant Hypothesis" posits that only the healthiest people from their country migrate and complete their journey to the U.S. (Shai & Rosenwaike, 1987; Sorlie et al., 1993). Studies do show that immigrants do have better health (e.g. self-reported health and functioning, less limitations in various activities, and fewer days sick in bed) than respondents who were born in the U.S. (Stephen, Foote, Hendershot, & Schoenborn, 1994). In addition, recent Hispanic immigrants have been found to be healthier compared to those who have lived in the U.S. for longer periods of time (Stephen et al., 1994).

One of the other major theories argued to account for the Hispanic Paradox is the "Salmon Bias" (Pablos-Mendez, 1994; Shai & Rosenwaike, 1987). This theory states that many Hispanics feel a desire to return to their country of origin in order to die in their birthplace (Pablos-Mendez, 1994; Shai & Rosenwaike, 1987). As a result, this group is

rendered “statistically immortal”, because their information cannot be incorporated into U.S. mortality statistics (Pablos-Mendez, 1994). Thus, this leads to a mortality rate that is artificially low (Pablos-Mendez, 1994).

However, one study that investigated the veracity of the “Salmon Bias” and the “Healthy Migrant hypothesis” concluded that neither theory adequately accounted for the Hispanic Paradox, and that there must be other factors at work that are leading to the lower mortality rates in Hispanics. This study utilized a sample for whom the “Salmon Bias” was not feasible (e.g. Cubans who experienced barriers to returning to their country of origin, Puerto Ricans, whose deaths in Puerto Rican are included in the U.S. statistics on mortality rates, and U.S. born individuals, to whom neither the “Salmon Bias” nor the “Healthy Migrant hypothesis” was applicable.) The authors found that the Cubans and Puerto Ricans experienced lower mortality rates compared to the NHWs in the study. Furthermore, the U.S. born Hispanics had lower mortality rates than the U.S. NHWs (Abraido-Lanza et al., 1999). Other studies have reached similar conclusions regarding the fact that the “Salmon Bias” and the “Healthy Migrant hypothesis” do not fully account for the Hispanic Paradox (Markides & Eschbach, 2005; Vega et al., 2009).

The role that acculturation appears to play in the Hispanic Paradox is a debated one. Some authors argue that it is not acculturation, or living longer in the U.S. that leads to poorer health outcomes for Hispanics, but rather it is changes in health promoting behaviors that is the culprit (Carter-Pokras et al., 2008). For example, rates of smoking, particularly for women, tend to increase with level of acculturation (Haynes, Harvey, Montes, Nickens, & Cohen, 1990; Marin, Perez-Stable, & Marin, 1989). Furthermore, there is evidence to support

the assertion that health behaviors in general tend to worsen as acculturation increases (Haynes et al., 1990; Marin et al., 1989).

Ultimately, the Hispanic Paradox may be an important factor to consider in the relationship between ethnicity and health in cervical cancer survivors, particularly when examining the relative contributions of vulnerability and resilience factors. This is because the Hispanic Paradox may play a role in attenuating the negative effect of certain vulnerability factors on health and functioning in Hispanic cervical cancer survivors.

Social support and cervical cancer. Social support may be important for both minorities and non-minorities alike in dealing with cervical cancer. Cervical cancer may place new stress on, and require additional assistance from, one's existing support network (Meyerowitz, Formenti, Ell, & Leedham, 2000). Therefore, social support that is directed specifically at dealing with cancer, including cervical cancer, and the effects of treatment may increase an individual's well-being (Meyerowitz et al., 2000). The participants in this study consisted of indigent Hispanic women with cervical cancer. Cancer-related social support has been related to increased psychological well-being (Ell, Mantell, Hamovitch, & Nishimoto, 1989; Gotcher, 1992; Lichtman, Taylor, & Wood, 1988).

Social support has been shown to significantly reduce the risk and negative impact of illness and is also associated with better emotional adjustment (Berkman & Syme, 1979; Cohen & Syme, 1985; Helgeson, Cohen, & Fritz, 1998; Meyerowitz et al., 2000; Presberg & Levenson, 1993; Wortman, 1984). Two meta-analytic studies demonstrated that being involved in support groups for various types of cancer may result in improved health outcomes (Devine & Westlake, 1995; Meyer & Mark, 1995). However, Hispanic subgroups of an adequate size were not included in these studies (Devine & Westlake, 1995; Meyer &

Mark, 1995). Similarly, a lack of social support has been linked to greater levels of psychological distress and poorer mental health outcomes in Hispanic women with cervical cancer (Ashing-Giwa et al., 2006; Pearman, 2003).

The amount of social support that Hispanic cervical cancer patients perceived from various family members was related to better adjustment outcomes (Meyerowitz et al., 2000). A number of studies have found that Hispanics appear to have more access to social support networks when compared to NHW (Goodwin et al., 1991; Mindel, 1980; Sabogal et al., 1987). While one study found that ethnic minority women were approximately equally as likely to feel that they had as good of a social support network as NHW women (Aziz & Rowland, 2002).

Hispanics appear to hold greater value for family ties and what has been called "familism" than NHWs (Goodwin et al., 1991; Mindel, 1980; Sabogal et al., 1987). Familism is a form of social support that involves strong interdependence within the familial network as the primary or sole source of support (Meyerowitz et al., 2000; Sabogal et al., 1987). Formal support groups that are congruent with the values and the beliefs of its members were found to the most effective (Barg & Gullatte, 2001). Formal support groups appear to provide emotional assistance for NHWs as well as Hispanics. However, informal support networks may be more helpful for minorities than for NHWs (Barg, 2001). This information is useful when designing as well as evaluating interventions with a cancer-related social support component, particularly if it includes minority participants.

Social support as a way of dealing with cervical cancer has also included some novel forms. One such innovation has been computer-based support networks which overall have been found to be beneficial (Gustafson et al., 2008). One study found that this type of

internet-based (Barg & Gullatte, 2001) support was both more helpful for and more often used by ethnic minority women than NHW women (McTavish, Pingree, Hawkins, & Gustafson, 2003). This platform enables women to overcome access barriers that may be especially prevalent for Hispanic and low SES women. Examples of these barriers include lack of program availability in one's area, lack of affordable or feasible transportation to an in-person support group, and lack of awareness regarding services offered (Aziz & Rowland, 2003; McBride & Scholes, 2002). These access barriers are reduced or eliminated by the fact that this social support network can be utilized from the convenience of one's home or wherever an individual most frequently accesses the internet such as a library or community center.

Spirituality/religiosity and cervical cancer. Spirituality can be a powerful way to deal with stressful or adverse events for some individuals (Taylor, 2001). Spirituality refers to a search for significance in the sacred that does not depend on a collective or institution (Pargament, 1997). Religiosity refers to a similar search for the sacred. However, in this case this pursuit occurs by means of an organized religion (Pargament, 1997). Religion and spirituality may play a role in coping with adverse events, including cancer (Jenkins & Pargament, 1995; Pargament, 1997). Other studies have found a similar beneficial effect of spirituality/religiosity in coping with diseases such as cancer (Feher & Maly, 1999; Thune-Boyle et al., 2006).

Hispanics and other ethnic minorities may have higher levels of spirituality and religious involvement as compared with NHWs (Culver, Arena, Antoni, & Carver, 2002). In a 2001 study Hispanic cancer patients of undisclosed types were shown to be more religious, identify more spiritual needs and obtain more benefit from religious coping strategies than

NHW women (Taylor, 2001). Moreover, in Hispanic populations there appears to be a particularly strong reliance on faith in God for comfort, healing, strength, and consolation. For women who are particularly religious or spiritual, many believe that their faith may play a role in the outcome of their illness (Ashing-Giwa et al., 2004). Indeed, lower levels of religious faith was found to be a risk factor for maladjustment to cervical cancer overall (Chan et al., 2001; Pearman, 2003).

Possible Resilience Factors in Ethnic Differences: Coping and Optimism

What other factors beyond education, income, spirituality/religiosity, and social support may explain differences in health and functioning between ethnic groups? Previously, I have reviewed the evidence suggesting that the aforementioned factors may play a role in this relationship. However, optimism and coping may also help to explain ethnic differences in health and functioning. While lower income and education have been shown to be risk factors for poorer outcomes in multiple types of cancer (Buki et al., 2007; Scarinci, Beech, Kovach, & Bailey, 2003; Valdez et al., 2001), higher social support and spirituality has been linked to better outcomes in various cancers (Ell et al., 1989; Feher & Maly, 1999; Holland & Holahan, 2003; Roussi, Krikeli, Hatzidimitriou, & Koutri, 2007; Schnoll et al., 2002; Taylor, 2001).

One reason why it may be important to study the potential role of optimism and coping is that they have strongly and consistently been related to health and functioning in cancer patients (Carver et al., 1993; Scheier & Carver, 1985; Segerstrom et al., 1998). Thus, where there are ethnic differences in optimism and coping, they may be likely to help explain differences in health and functioning between ethnic groups.

Coping and cervical cancer. For Hispanic cervical cancer survivors, cultural and familial factors appear to be related to coping and well-being (Ashing-Giwa et al., 2006). Much of the research on coping in Hispanic cancer survivors is related to social support, familism, and religiosity, (Ashing-Giwa et al., 2004; Sabogal et al., 1987; Taylor, 2001), which has been discussed in previous sub-headings of the introduction. The current study utilized a measure of change in coping from diagnosis to the current time rather than a more standard measure of coping ability. Further research on change in coping is needed, including comparing Hispanic and NHW cervical cancer survivors.

Although social support and spirituality/religiosity may be involved in coping, it is useful to examine coping as a separate construct (Aziz & Rowland, 2002). For example, a disengaged coping style, such as denial or avoidance of problems, has been shown to be a risk factor for maladjustment following cervical cancer (Carver et al., 1993; Kershaw, Northouse, Kritpracha, Schafenacker, & Mood, 2004; Pearman, 2003). This maladjustment includes higher levels of mood disturbance and decreased physical and mental well-being (Carver et al., 1993; Kershaw et al., 2004; Pearman, 2003).

One coping strategy that has been found to be beneficial for cancer patients is positive reframing, which has been related to greater physical well-being in breast cancer patients (Carver et al., 1993). Other coping mechanisms that have been shown to be beneficial for cancer patients are acceptance, use of humor and religiosity/spirituality (Carver et al., 1993). One study of gynecological and breast cancer survivors found that the most common primary coping strategies for participants were acceptance, religion, and distraction (Lauver, Connolly-Nelson, & Vang, 2007). These strategies were viewed as being highly helpful coping mechanisms for dealing with the effects of gynecological and breast cancer (Lauver et

al., 2007). Other findings of common coping strategies for cancer survivors include the aforementioned positive reframing, humor, and religion, as well as the use of emotional support, venting, and distraction (Kershaw et al., 2004). More research is needed regarding particular coping mechanisms used by minority cervical cancer survivors in particular.

Optimism and cervical cancer. It is possible that there are ethnic or cultural differences in optimism. For example, some cultures including Hispanic ones appear to see "fatalism" as a positive value that may enable people to better cope with inevitable changes and losses (Kagawa-Singer, 1987; Lampic et al., 1994; Perez-Stable, Sabogal, Otero-Sabogal, Hiatt, & McPhee, 1992). For these cultures, fatalism may sometimes be equated or confused with a lack of optimism about favorable future outcomes. However, fatalism is more akin to the notion of simply accepting suffering and death as inevitable parts of life (Kagawa-Singer, 1987; Perez-Stable et al., 1992). Unfortunately, few studies have evaluated ethnic differences in mean levels optimism between Hispanic and NHW cancer patients or differences in the correlations between optimism and measures of health. However, one such study conducted by Friedman and colleagues (2006) found no significant ethnic/racial differences in women with breast cancer in terms of optimism.

Optimism has been shown to play an influential role in a number of behavioral and psychological outcomes that result when people are confronted with adversity, including cancer (Carver et al., 1993; Scheier & Carver, 1985). In another study conducted by Carver and colleagues on the effect of optimism on distress for breast cancer patients, optimism was inversely related to distress at each time point during the study. The time points occurred at 1 day and 10 days after surgery and then at 3, 6, and 12 months. The inverse relationship between optimism and distress remained even after controlling for prior distress that patients

had experienced (Carver et al., 1993). Optimism has also been associated not just with a reduction in distress, but also an increase in well-being (Miller, Manne, Taylor, Keates, & Dougherty, 1996). The beneficial correlates of optimism may be at least partially attributable to the utilization of adaptive coping mechanisms including active rather than passive coping (Aspinwall & Taylor, 1992).

General Health and Functioning Indicators and Cervical Cancer: Physical Health, Mental Health, and Depression

Physical health and cervical cancer. What is known about how cervical cancer affects physical and mental health and functioning? Cervical cancer can have significant negative effects on an individual's physical health (Maher & Denton, 2008). Cervical cancer patients and survivors often show lower scores on self-report or subjective measures of physical health such as the physical health sub-scales of the SF-36 (Filazoglu & Griva, 2008). These sub-scales assess physical functioning, the impact of physical health limitations, bodily pain, and general health (Ware, 1992). One of the major physical consequences of cervical cancer is a negative impact on a person's sexual response including difficulty reaching orgasm, vaginal dryness, and pain during intercourse (Basen-Engquist, Paskett, & Buzaglo, 2003). The negative impacts on an individual's sexual response are some of the most studied outcomes when physical health and functioning are assessed in gynecological cancer patients and survivors (Basen-Engquist et al., 2003).

Other physical effects following gynecological cancer treatment may include hot flashes, vaginal dryness, possible surgical scarring, ovarian function loss, changes to skin and hair, lack of energy, gastrointestinal symptoms, diarrhea, sleep disturbances, genitourinary tract dysfunction, decreased bowel and bladder function and possible infertility (Bye, Ose, &

Kaasa, 1995; Cull et al., 1993; Meyerowitz et al., 2000; Pearman, 2003). Unfortunately, most of these women continue to have some degree of decreased sexual and physical functioning (Ashing-Giwa et al., 2004; Basen-Engquist et al., 2003). A study by Andersen and colleagues (1996) reported estimates as high as 40% of women who had received a diagnosis of cervical cancer reporting a decrement in sexual functioning.

Women who are treated with radical surgery (radical hysterectomy and lymph node dissection) and radiotherapy for cervical cancer may demonstrate severe physical complications following their surgery. These physical complications may include bowel obstruction, severe leg edema, and ureteral obstruction, the rates of which range from 5%-25% of patients (Feeney, Moore, Look, Stehman, & Sutton, 1995; Grigsby, 1996; Soisson et al., 1990). Loss of ovarian function is related to a number of changes associated with early menopausal symptoms including weight gain, changes in body fat distribution, increased loss of bone mineral, and premature cardiovascular disease (Grigsby, Roberts, & Perez, 1995). These changes may persist over time and have a significant negative impact on one's overall health and functioning (Pearman, 2003).

Manifestations of physical symptoms may be even more important to attend to in Hispanic cancer patients than in NHW women. This finding may be due to the higher prevalence of somatic manifestations of psychological distress and depression among less-acculturated portions of Hispanic populations (Kaplan & Marks, 1990). More research is needed regarding the physical health outcomes comparing Hispanic cervical cancer survivors to NHW ones. However, two studies that have been done show that Hispanic women with cervical cancer report poorer physical health outcomes on the SF-36 Health Survey (Ware & Sherbourne, 1992) and the Watts Sexual Functioning Questionnaire (Watts, 1982) than NHW

women overall (Baezonde-Garbanati, Portillo, & Garbanati, 1999; Meyerowitz, Richardson, Hudson, & Leedham, 1998).

Mental health and cervical cancer. Mental health is another dimension of health that may be profoundly negatively impacted by cervical cancer (Bradley et al., 2006). The participants in this study included cervical and endometrial cancer patients. Of the cervical cancer participants, 95% were NHW, 4% Native American and 1% Latina (Bradley et al., 2006). Cervical cancer patients and survivors often show lower scores on self-report or subjective measures of mental health such as the mental health scale of the SF-36 (Bradley et al., 2006). These sub-scales assess mental health, vitality, the impact of decreased mental health, and social functioning (Ware, 1992), Cancer and its by-products may disrupt one's daily activities and require a large amount of energy to deal with the stress brought on by the illness (Corney, Everett, Howells, & Crowther, 1992). Participants in this study consisted of women who had undergone surgery for cervical or vulva cancer, and there were no Hispanic participants in this study (Corney et al., 1992). A number of studies have found that one of the main treatments for cervical cancer, radiation therapy, and the presence of cervical cancer in general may be related to increased psychological and emotional distress (Andersen, 1985; Corney et al., 1992; Decker, Cline-Elsen, & Gallagher, 1992; Evans & Connis, 1995; Forester, Kornfeld, Fleiss, & Thompson, 1993; Irwin, Kramer, Diamond, Malone, & Zivin, 1987).

Additional mental health consequences of cancer, including cervical cancer, may entail increased anxiety and anger and a loss of self-esteem (Corney et al., 1992). Patients may experience particular anxiety regarding cancer recurrence and issues related to poor body image due to scarring or feelings of physical unattractiveness resulting from changes

due to the disease or its treatment (Schnoll et al., 2002). Some of the common effects on mental health are anger about reproductive function loss, decrease in sexual interest/drive, and feelings of being sexually undesirable or flawed as a woman. These effects on mental health may be related to an increased vulnerability to sexual dysfunctions (Andersen, 1996; Ashing-Giwa et al., 2004; Basen-Engquist et al., 2003). In addition, minority women may face additional psychological stressors that may also apply to NHW, such as difficult socio-economic conditions, or that may not be applicable, such as stressors associated with immigrant status or racism (Harrell, 2000; Jones, 2000; Shinagawa, 2000).

Currently, relatively little is known regarding psychological and emotional distress in ethnic minority cancer patients (Meyerowitz et al., 1998). More research is needed regarding mental health outcomes comparing Hispanic cervical cancer survivors to NHW ones. Nevertheless, one study did show that women with cervical cancer report more negative mood than survivors of endometrial cancer or healthy controls (Bradley et al., 2006). The authors also found that being unemployed or living alone are risk factors for mood and mental health difficulties in cervical cancer survivors (Bradley et al., 2006). Although informative, this study unfortunately did not compare Hispanic and NHW cervical cancer survivors directly.

Depression and cervical cancer. The construct of depression often significantly overlaps with the construct of mental health. Nevertheless, it is important to study depression independently because it continues to be one of the most well-researched and important mental health outcomes in cancer patients (McGee, Williams, & Elwood, 1994). Meyerowitz and colleagues (2000) found that Hispanic cervical cancer patients experience depression, as well as other significant psychological and daily life stressors, related to their

illness. This study is one of the few that focuses on health outcomes, including depression, for minority women with cervical cancer (Ashing-Giwa et al., 2006; Meyerowitz et al., 1998). The authors also found that the level of depression in a sample of 50 Hispanic cervical cancer patients was much greater relative to other cancer patients and healthy community samples of Mexican Americans and NHW. Golding and Burnam (1990) also found depression to be higher in Latinos overall, specifically Mexican Americans, when compared to NHW. One predictor of depression among Latinos in particular is lack of access to social support (Baezonde-Garbanati et al., 1999; Briones et al., 1990; Golding & Burnam, 1990).

Cancer and its treatment may increase the risk of depression (Meyerowitz et al., 2000). Indeed, the average rate of depression among various types of cancer patients is approximately 24% across studies (McDaniel, Musselman, Porter, & Reed, 1995). Patients being treated for early stage cervical cancer using radiation cite depression as one of the most common effects that they experience (Cull et al., 1993). One factor that may precipitate depression in this population is the deep disappointment that one may feel regarding the loss of physical well-being due to the effects of cancer (Shingleton & Orr, 1995). Research in psychoneuroimmunology suggests that depression may negatively impact immune system functioning, which could thereby influence disease progression and even survival (Toubassi, Himel, Winton, & Young-Nyhof, 2007).

The Current Study

The purpose of this study was to examine the vulnerability and resilience factors that may explain ethnic differences in health and functioning in cervical cancer survivors. The current study included Hispanic and non-Hispanic women in the sample. The assessments of health and functioning utilized were self-report measures including the physical and mental

health sub-scales of the Short Form-36 Health Survey (SF-36) (Ware & Sherbourne, 1992),and the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). Not surprisingly, there was some overlap between the CES-D (Radloff, 1977), which measures depressive symptoms and the mental health sub-scale of the SF-36 (Ware, Snow, Kosinski, & Gandek, 1993), which assesses mental health and functioning. This overlap may have contributed to the significant correlation between the two measures. An example of an item from the SF-36 was "Have you felt so down in the dumps that nothing could cheer you up?" (Appendix A). This item was similar to "I felt that I could not shake off the blues even with the help from my family or friends" on the CES-D (Appendix D). Another example of item overlap was the "Have you been happy?" question from the SF-36 (Appendix A), which mirrored the "I was happy" item on the CES-D (Appendix D).

Income and education were included in the current study as potential vulnerability factors that may explain the relationship between ethnicity and health and functioning. Social support and spirituality were included as potential resilience factors. Optimism and coping were also included as possible resilience factors because they are often related to health and functioning in cancer patients (Carver et al., 1993; Scheier & Carver, 1985; Segerstrom et al., 1998) and may help explain differences between the ethnic groups. Due to the potential for vulnerability (e.g. low income, low education) as well as resilience factors (high social support, high spirituality, the Hispanic Paradox) to be present and influence the relationship between ethnicity and health, it was difficult to predict whether the Hispanic women would demonstrate better or worse health and functioning following cervical cancer than the NHW women in this study.

Research Aims and Hypotheses

Exploratory Research Aim 1 Rationale: Due to the fact that Hispanic women may present vulnerability as well as resilience factors, one of the aims of this study was to investigate the relationships between these factors and ultimately how they influence the relationship between ethnicity and health in cervical cancer survivors. Previous research in this area has not revealed the exact nature of this relationship, which the current study attempted to further elucidate. There is evidence in the literature that suggests that Hispanic women would have poorer health outcomes than NHWs due to vulnerability factors related to health disparities such as lower income and/or less education. However, there is also evidence in the literature that suggests that Hispanic women would have better health outcomes compared to NHWs due to resilience factors such as higher levels of spirituality, social support, and/or factors related to the Hispanic Paradox. Alternative hypotheses are presented for this exploratory research aim in order to investigate both sides of the relationship between ethnicity and health in Hispanic and NHW cervical cancer survivors.

Exploratory Research Aim 1: To determine whether there is a difference between Hispanic and NHW women with cervical cancer in health and functioning (e.g., physical health, mental health, depressive symptoms).

Alternative Hypothesis 1.a: The Hispanic participants will have worse physical health, mental health, and higher levels of depressive symptoms than the NHW participants.

Alternative Hypothesis 1.b: The Hispanic participants will have better physical health, mental health and lower levels of depressive symptoms than the NHW participants.

Research Aim 2: To determine whether there is a difference between the Hispanic and NHW women on the magnitude of proposed vulnerability and resilience factors (e.g., education, income, social support, spirituality, optimism, coping).

Hypothesis 2.a.: Hispanic women will have lower income and less education than NHW women.

Hypothesis 2.b.: Hispanic women will have more social support and higher levels of spirituality than NHW women. There were no predictions made regarding optimism and coping because although they have been shown to be related to health, (Carver et al., 1993; Scheier & Carver, 1985; Segerstrom et al., 1998) little is known about how they differ in Hispanic and NHW cervical cancer survivors.

Research Aim 3: To determine whether the proposed vulnerability and resilience factors (e.g., education, income, social support, spirituality, optimism, coping) are related to measures of health and functioning (e.g., physical health, mental health, depressive symptoms) and whether the relationships vary depending on ethnic status.

Hypothesis 3.a.: Vulnerability factors: lower income and less education will be related to worse physical and mental health and higher levels of depressive symptoms in both ethnic groups.

Hypothesis 3.b.: Resilience factors: greater social support, spirituality, optimism, and coping will be related to better physical and mental health, and lower levels of depressive symptoms in both ethnic groups.

Research Aim 4: To determine whether the vulnerability and resilience factors mediate the effects of ethnicity on health and functioning.

Hypothesis 4.a.: If NHW women have better health and functioning than Hispanic women, then income and education will mediate these effects.

Hypothesis 4.b.: If Hispanic women have better health and functioning than NHW women, then social support and spirituality will mediate these effects.

Methods

Participants

One hundred and ninety-seven women who had been diagnosed with cervical cancer between 1980 and 1999 participated in the original study involving the New Mexico Tumor Registry and conducted by Dr. Baumgartner. Ten participants did not report being either Hispanic or NHW in the original study, therefore they were not included in the analyses for the current study. The eligibility criteria to participate in the original study included having received a diagnosis between 1980 and 1999 of either invasive cervical cancer (defined previously) or carcinoma in situ (abnormal cells which have not yet spread but may later develop into cancer and do so) (National Cancer Institute, 2009). The eligibility criteria also included being: Hispanic or NHW, between the ages of 25 and 79, and a New Mexico resident at the time of diagnosis. Figure 2 displays a flow chart of the recruiting and screening process of the participants from who were eligible to those who enrolled in and participated in the study (Baumgartner, 2003).

There are several reasons why it may be particularly useful to utilize participants from New Mexico in a study such as the present one on cervical cancer survivors. First, it is one of 12 states that has the highest range of cervical cancer incidence rates (8.7-12.8 per 100,000 people) (U.S. Cancer Statistics Working Group, 2009). Second, New Mexico is also among the 10 states that have the highest range of cervical cancer mortality rates (2.9- 3.7 per 100,000 people) (U.S. Cancer Statistics Working Group, 2009). Third, approximately 45% of New Mexico residents are Hispanic (U.S. Census Bureau, 2008b). Thus, participants from New Mexico appear to provide an excellent opportunity for understanding the health disparity that Hispanic women experience with cervical cancer (e.g. the highest incidence

and mortality rates of any ethnicity) (U.S. Census Bureau, 2008b), in the context of vulnerability and resilience factors that may contribute to this.

Procedures

The study was approved by the University of New Mexico Human Research and Review Committee. The participants were ascertained using the New Mexico Tumor Registry (NMTR), which is one of 18 U.S. cancer registries that comprise the Surveillance Epidemiology and End Results (SEER) Program. Demographic and contact information for the diagnosing physician of each patient was were obtained from the NMTR. An introductory letter describing the study along with a brochure that further explained the study purpose and goals, the study questionnaire, and the role of NMTR was sent to both the physicians and later the patients. The physicians indicated if a patient should not be contacted and non-response was considered passive approval. Only two physicians refused to allow patients to be contacted for the study.

The study questionnaire was mailed to participants who met the eligibility criteria and who agreed to participate in the study. Sending and receiving questionnaires by mail is a common way of conducting health research, including with cancer patients (Evans, Peterson, & Demark-Wahnefried, 2004). Participation in the study was voluntary and no monetary incentive was provided. Studies with similar populations have shown little or no effect of financial incentives on increasing return rates (Nakash, Hutton, Jorstad-Stein, Gates, & Lamb, 2006; Rosoff et al., 2005). Follow-up phone calls were utilized to attempt to increase the return rate of the questionnaires. This method has been shown to improve response rates to questionnaire studies (Nakash et al., 2006).

This study utilized an archival dataset to attempt to answer the research questions of interest. There are advantages as well as disadvantages to this method of conducting research. One disadvantage of using pre-existing data is that it may not contain the variables that are important for answering the research questions. A second disadvantage is that the data may not be in the format and/or scale in which one would prefer to examine it. Additionally, if there are certain methodological aspects of the study that are less than ideal, such as inappropriate or inadequate measures, this cannot be altered due to the data already having been collected.

The advantages of using a secondary dataset include: it is often much less costly and time-intensive than carrying out an original study, the amount of pre-existing data that one utilizes is flexible, e.g., anywhere from a single figure to an entire sample can be used to answer research questions and/or improve the validity of a study (Colorado State University, 2009). Furthermore, using archival data may make it possible to utilize larger samples. Additionally, individuals or groups to which the researcher may not otherwise have had direct access can be used that may otherwise have been possible to obtain (Colorado State University, 2009). Overall, archival datasets can be extremely useful as long as they are used appropriately and their limitations are recognized.

Measures

The study measures included single-item assessments of income, education, and ethnicity and multi-item measures of coping, depressive symptoms, mental health, physical health, optimism, spirituality, and social support. The multi-item scales were added to create summary scores that were used in the analyses.

Independent Variable (Ethnicity)

Ethnicity. The question regarding ethnicity was phrased: "Which of the following best describes **your** racial or ethnic background?" The response options were on a 7 point scale from 0 = "White, not of Hispanic origin", 1 = "Hispanic", 2 = "Black, not of Hispanic origin", 3 = "Asian or Pacific Islander", 4 = "American Indian or Alaska Native", 5 = "Other *(specify)*" and 6 = "Don't know/Not sure". Participants were asked to mark only one response and only those who marked 0 or 1 were included in the study.

Potential Vulnerability Factors

Education. The level of education of participants was assessed using a single item asking: "How many years of schooling have you completed?" The response options were on a 6 point scale from: 1 = "8^{th} grade or less", 2 = "Some high school", 3 = "High school graduate", 4 = "Some college or technical school", 5 = "College graduate", to 6 = "Graduate School".

Income. The level of income of participants was assessed using a single item asking: "Please choose from the list on the right the appropriate number that corresponds to your household income **before** taxes (for the year 2000)." The response options were on a 6 point scale from: 1 = "Under $10,000 ", 2 = "Between $10,000 and $14,999", 3 = "Between $15,000 and $19,999", 4 = "Between $20,000 and $29,999", 5 = "Between $30,000 and $49,999", 6 = "$50,000 or more".

Potential Resilience Factors

Coping. This measure included seven items assessing specific coping skills e.g., "I try to talk to people close to me about concerns in my life." These items were based on the "I Can Cope" Support Group Program developed by the American Cancer Society (2001). The

participants were asked how much of a change they had experienced since their cancer diagnosis on the seven items. The items were scored on a 6 point scale from 1 = "no change" to 6 = "very great change." Cronbach's alpha was .937.

Optimism. The Life Orientation Test Revised (LOT-R) (Scheier & Carver, 1985) was used to assess optimism. The LOT-R has eight items, which are used to assess general expectations about the future. There are four items that assess positive expectations, (e.g., "in times of uncertainty, I usually expect the best") and four items that measure negative expectations about future (e.g., "I hardly ever expect things to go my way"). The negative expectation items were reverse coded in order to have the scale assess positive expectations as a whole regarding the future. The eight items were scored on a 5 point scale from 1 = "strongly disagree" to 5 = "strongly agree". Cronbach's alpha was .87. Internal-consistency reliability was .91 (Park & Fenster, 2004). This measure has been used reliably with Hispanic populations (Schutte & Hosch, 1996; Young et al., 2007).

Social Support. The Medical Outcomes Social Support Survey (MOS) (Sherbourne & Stewart, 1991) was used to assess social support. There are 19 items e.g., "Someone to confide in or talk to about yourself or your problems", that are scored on a 5 point scale from 1 = "None of the time" to 5 = "All of the time". Cronbach's alpha was .93. Internal-consistency reliability was .94 (Sherbourne & Stewart, 1991). This measure has been used reliably with Hispanic populations (Ell & Haywood, 1995).

Spirituality. The Duke Religiosity Index (Koenig, Parkerson, & Meador, 1997) was used to assess spirituality. The measure includes items assessing various aspects of spirituality and religion, including organized religion, non-organized spirituality/religion, and intrinsic spirituality/religion. There are five or six response options depending on the item.

The 5 point scale was converted to a 6 point scale in order to give equal value to each item. The scale was called "spirituality" because the items were modified to focus on spirituality rather than religion. For example, the item "How often do you attend church, synagogue, or other religious meetings?" was modified to be: "How often do you attend faith community or other religious/spiritual meetings?" Cronbach's alpha was .86. Internal-consistency reliability was .91 (Sherman et al., 2000).

Dependent Variables (Health and functioning measures)

Depressive symptoms. The Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) was used to assess depressive symptoms. The CES-D includes 20 items e.g., "I felt that I could not shake off the blues even with help from my family or friends." The items are scored on a 4 point scale from 1 = "Rarely or none of the time *(less than 1 day*)" to 4= "Most or all of the time (5-7 days)." Cronbach's alpha was .90. The internal-consistency reliability was .89 (Devins, Orme, Costello, & Binik, 1988). This measure has been used reliably with Hispanic populations (Liang, Tran, Krause, & Markides, 1989; Roberts, 1980).

Mental and Physical Health. The Short Form 36 (SF-36) Health Survey (Ware et al., 1993) was used to assess health and functioning. The mental and physical health subscales were used for this study. The mental health subscale includes 14 items (e.g., "how much of the time during the past 4 weeks have you felt calm and peaceful?"). The physical health subscale includes 21 items (e.g., "my health is excellent"). There are three to five response options depending on the individual item. Cronbach's alpha was .90 for the physical health subscales and .93 for the mental health subscales. The internal-consistency reliability for both sub-scales was .96 (Stewart, Ron, & Ware, 1988). This measure has been used reliably with

Hispanic populations (Arocho, McMillan, & Sutton-Wallace, 1998; Peek, Ray, Patel, Stoebner-May, & Ottenbacher, 2004).

Statistical Analyses

All of the analyses were performed using SPSS 16.0 (SPSS Inc., 2007) and an alpha of .05 was the criterion used for statistical significance. The research aims were examined and the hypotheses were tested using independent samples t-tests, Pearson correlation, stepwise multiple regression, mediation analyses, and Fisher's z test (Cohen & Cohen, 1983). The Fisher's z test was used to determine whether there were significant differences in the correlations between the ethnic groups (Cohen & Cohen, 1983). Cohen's d was used as an effect size measure for differences between the Hispanic and NHW groups using the guidelines that a small effect = .20, a medium effect = .50, and a large effect = .80 (Cohen, 1988). Stepwise multiple regression analyses were used in order to select only the variables that were significant predictors for the model (Cohen & Cohen, 1983).

In addition, the data were examined for the presence of outliers and indicators of normality. First, there were no data that were outside the range of the response options for each item. There were measure summary scores that were more than three standard deviations from the mean on depression, mental health, and physical health indicating high depression and low mental and physical health. However, these scores were not deleted because they were within a reasonable range for this sample and identical to or close to the scores of other participants. Second, the data for each study variable was close to normally distributed in that none of the study variables had a skewness or kurtosis rating of more than 1.5 or less than -1.5.

The first research aim regarding differences between the Hispanic (n = 52) and NHW women (n=135) on the health measures was examined using independent samples t-tests. The second research aim regarding differences between Hispanic and NHW women on the vulnerability and resilience factors was also examined using independent samples t-tests. The third research aim regarding the relationship between the vulnerability and resilience factors and the measures of health was examined using correlation analyses, the Fisher's z test to compare correlations between ethnic groups, and stepwise multiple regression analyses.

The fourth research aim regarding whether the vulnerability and resilience factors mediated any effects of ethnicity on health was examined using the three primary meditational analysis steps outlined by Baron and Kenny (1986). The first step is that the independent variable (IV) (ethnicity) must be related to the dependent variable (DV) (the health measures). The second step states that the IV must be related to the mediator variable (MV) (the vulnerability and resilience factors). The final step is that the MV must still be related to the DV while controlling for the IV.

Results

The descriptive statistics for the study variables are displayed in Table 1. The mean age at the time of the study (51.39 years) was 10.40 years greater than age at the time of diagnosis (40.99 years). There was no significant difference between the Hispanic and NHW group in age at the time of the study or the age of diagnosis ($d = -.097$, $t = .601$). The average income range for the total sample was $20,000-29,000. The average education range for the whole sample was some college or technical school.

In addition, religious affiliation was also assessed. The entire sample was 32% Catholic, 32% Protestant, 13% other Christian, 11% other, and 18% none. The Hispanic group was 74% Catholic, 6% Protestant, 8% other Christian, 4% other, and 4% none. The NHW group was 15% Catholic, 42% Protestant, 7% other Christian, 14% other, and 22% none. A significantly greater proportion of Hispanics were Catholics as compared with the NHW's ($d = 1.449$, $t = -8.343$, $p < .01$) and a significantly greater proportion of NHW women were Protestant as compared with Hispanics ($d = -.932$, $t = 6.582$, $p < .01$).

The purpose of the first research aim was to determine whether the Hispanic group differed from the NHW group in terms of health and functioning. Differences between the two ethnic groups on the physical health, mental health, and depressive symptom measures are displayed in Table 1. Two alternative hypotheses were proposed in order to examine both sides of the relationship between ethnicity and health and functioning. The first alternative hypothesis was that Hispanic group would display poorer health and functioning than NHW cervical cancer survivors. The second alternative hypothesis was that Hispanic group would display better health and functioning than the NHW cervical cancer survivors.

The results of the independent samples t-tests to investigate the first research aim are displayed in Table 1. No significant difference was found on the SF-36 physical health scores between the Hispanic (m = 71.07) and the NHW women (m = 73.00) and the effect size was very small (d = -.091, t = .601). No significant difference was found on the SF-36 mental health scores between the Hispanic (m = 62.15) and NHW women (m = 65.23) and the effect size was small (d = -.173, t = 1.025). Finally, no significant difference was found in terms of depressive symptoms scores on the CES-D between the Hispanic (m = 17.30) and the NHW women (m = 16.69), and the effect size was very small (d = .057, t = -.338). Although the Hispanic women appear to be slightly less healthy on all three measures, the effects sizes were small to very small and none of the differences were significant. Thus, neither one of the alternative hypotheses for the first research aim was supported because the ethnic groups did not significantly differ on the health and functioning measures.

The second research aim was to determine whether there were differences between the means of the Hispanic and NHW women on the proposed vulnerability and resilience factors. Table 1 displays the differences between the ethnic groups on the measures of vulnerability and resilience factors. The first hypothesis regarding the second research aim was that the Hispanic women would have lower income and less education than the NHW women. There was no significant difference between the Hispanic (m = 4.05) and NHW women (m = 4.41) in terms of income and the effect size was very small (d = -.139, t = 1.371). However, the Hispanic women (m = 3.61) did have significantly less education (d = -.658, t = -4.217, $p < .01$) compared to the NHW women (m = 4.40) and the effect size was between medium and large. Thus, the first hypothesis for this aim was partially confirmed in

that the Hispanic women reported less education but not lower income than the NHW women.

The second hypothesis regarding the second research aim was that the Hispanic women would be higher in social support and spirituality than the NHW women. There was no significant difference between the Hispanic (m = 72.28) and the NHW women (m = 72.31) on the MOS Social Support scores (d = -.001, t = .011) and the effect size was negligible. However, the Hispanic women (m = 20.65) did score higher in spirituality on the Duke Religiosity Index (d = .449, t = -2.682, $p < .01$) than the NHW women (m = 18.21), and the effect size was medium. Thus, the second hypothesis for this aim was partially confirmed in that Hispanic women scored higher on spirituality but not on social support compared to the NHW women.

As part of the second research aim, the goal was also to determine whether there were ethnic differences in optimism or coping. There was no significant difference in optimism scores on the LOT-R (d = .002, t = -.007) between the Hispanic (m = 29.53) and the NHW women (m = 29.52) and the effect size was negligible. However, the Hispanic women (m = 18.54) did score significantly higher in coping change on the "I Can Cope" measure (d = .538, t = -3.327, $p < .01$) than the NHW women (m = 12.66). There were no predictions made regarding the differences in optimism and coping between the two ethnic groups because although these constructs have been shown to be related to health, (Carver et al., 1993; Scheier & Carver, 1985; Segerstrom et al., 1998) little was known about how they differed in Hispanic and NHW cervical cancer survivors.

The third research aim was to determine whether the proposed vulnerability and resilience factors were related to measures of health and functioning and whether those

relationships varied by ethnic status. Table 2 displays the results for the correlation analyses between the study variables for all participants. The first hypothesis regarding the third research aim was that the vulnerability factors (e.g., less education and lower income) would be related to worse health for all participants together. The results of the correlation analyses showed that both education ($r = .305$, $p < .01$) and income ($r = .360$, $p < .01$) were positively related to physical health for all participants together. Education ($r = .153$, $p < .05$) and income ($r = .356$, $p < .01$) were also positively related to mental health for all participants together. Finally, education ($r = -.166$, $p < .05$) and income ($r = -.256$, $p < .01$) were negatively related to depressive symptoms for all participants together. Thus, the first hypothesis was fully confirmed for this aim in that less education and lower income were related to worse health for both the Hispanic and NHW women.

The second hypothesis regarding the third research aim was that the resilience factors (e.g., greater optimism, social support, spirituality, and coping) would be related to better health for all participants together. The results showed that optimism ($r = .340$, $p < .01$) as well as social support ($r = .463$, $p < .01$) were both positively related to physical health for all participants together. In addition, optimism ($r = .450$, $p < .01$) and social support ($r = .572$, $p < .01$) were positively related to mental health for both the Hispanic and NHW women together. Finally, for all participants together, optimism ($r = -.580$, $p < .01$) and social support ($r = -.491$, $p < .01$) were negatively related to depressive symptoms. For all participants together, spirituality and coping were not significantly related to any of the health measures. Thus, the second hypothesis for this aim was partially confirmed in that greater optimism and social support were related to better health for all participants together. However, spirituality

and coping change were not significantly related to any of the health and functioning measures.

Table 2 displays the correlations between all of the health and functioning measures and also between the individual vulnerability and resilience factors for all of the participants together. Although there were no research aims regarding these associations, it is interesting to note the nature of some of these relationships. Regarding the health measures for all the participants together, physical and mental health were positively correlated with each other ($r = .706$, $p < .01$) and both physical health ($r = -.474$, $p < .01$) and mental health ($r = -.672$, $p < .01$) were negatively correlated with depressive symptoms. Education was positively correlated with income ($r = .319$, $p < .01$) as well as with social support ($r = .200$, $p < .01$). Additionally, education was negatively related to spirituality ($r = -.156$, $p <.05$). Furthermore, spirituality was also positively related to coping change ($r =.258$, $p < .01$) and optimism ($r -.153$, $p < .05$). Finally, optimism was positively related to social support ($r =.334$, $p < .01$) for all participants together.

Next, analyses were conducted to determine whether there were any significant differences in the correlations in Table 2 between the NHW women and Hispanic women. Tables 3 and 4 display the correlation matrices for the NHW women and Hispanic women, respectively. Fisher's z test was used to compare the 36 correlations and there was only one correlation that was significantly different between the two ethnic groups. The correlation between mental health and depression in the NHW women ($r = -.729$, $p < .01$) was significantly larger ($z = -2.54$, $p < .01$) than the same correlation in the Hispanic women ($r = -.464$, $p < .01$). However, with a Bonferroni correction for 36 correlations, the p value would

be .00028 and the difference in the correlation between mental health and depression would no longer be significant.

As part of the third research aim, stepwise multiple regression analyses were conducted to determine the best model of significant predictors for each of the three health measures for all participants together, the NHW women individually and the Hispanic women individually. Table 5 displays the results for the stepwise multiple regressions predicting physical health, mental health, and depressive symptoms for all participants together. Income ($\beta = .247$, $p < .01$), optimism ($\beta = .222$, $p < .01$), and social support ($\beta = .352$, $p < .01$) were positively related to physical health, while spirituality was negatively ($\beta = -.140$, $p < .05$) related to physical health ($R^2 = .343$, $F(4,182) = 23.758$, $p < .01$).

In addition, for all participants together, income ($\beta = .222$, $p < .01$), optimism ($\beta = .302$, $p < .01$), and social support ($\beta = .438$, $p < .01$) were positively related to mental health, while spirituality ($\beta = -.123$, $p < .05$) was negatively related to mental health ($R^2 = .474$, $F(4,182) = 41.083$, $p < .01$) for both ethnic groups combined. Finally, income ($\beta = -.153$, $p < .01$), optimism ($\beta = -.464$, $p < .01$), and social support ($\beta = -.305$, $p < .01$) were negatively related to depressive symptoms for all participants together. The full model explained 46% of the variance in depressive symptoms ($R^2 = .459$, $F(3,183) = 51.674$, $p < .01$). Thus, greater income, optimism, and social support were related to better physical and mental health and less depressive symptoms, while greater spirituality was associated with poorer physical and mental health for all participants together.

Table 6 depicts the results for the stepwise multiple regressions predicting physical health, mental health, and depressive symptoms for the NHW participants. Income ($\beta = .257$, $p < .01$), optimism ($\beta = .249$, $p < .01$), and social support ($\beta = .278$, $p < .01$) were positively

related to physical health. The full model explained 30% of the variance in physical health (R^2 = .303, F(3,131) = 18.962, p < .01). Additionally, income (β = .251, p < .01), optimism (β = .298, p < .01), and social support (β = .392, p < .01) were positively related to mental health. The full model explained 45% of the variance in mental health (R^2 = .450, F(3,131) = 35.753, p < .01).

Finally, for the NHW women, income (β = .173, p < .01) was positively related to depressive symptoms, while optimism (β = -.504, p < .01) and social support (β = -.283, p < .01) were negatively related to depressive symptoms. The full model explained 51% of the variance in mental health (R^2 = .507, F(3,131) = 44.852, p < .01). Thus, for the NHW group, higher income, optimism, and social support were found to be related to better physical and mental health. This mirrors the results from all participants together. However for the NHW group, greater income was related to increased depressive symptoms, while higher levels of optimism and social support were associated with less depressive symptoms.

Table 7 displays the results for the stepwise multiple regressions predicting physical health, mental health, and depressive symptoms for the Hispanic participants. Coping change (β = -.254, p < .01) was negatively related to physical health, while income (β = .289, p < .01) and social support (β = .534, p < .01) were positively related to physical health. The full model explained 48% of the variance in physical health (R^2 = .479, F(3,48) = 14.711, p < .01). Income (β = .211, p < .01), optimism (β = .246, p < .01), and social support (β = .540, p < .01) were positively related to mental health. The full model explained 50% of the variance in mental health (R^2 = .504, F(3,48) = 16.226, p < .01). Finally, optimism (β = -.303, p < .01), and social support (β = -.387, p < .01) were both negatively related to depressive symptoms, while coping change (β = .252, p < .01) was positively related to depressive

symptoms. The full model explained 38% of the variance in depressive symptoms (R^2 = .376, $F(3,48) = 9.640$, $p < .01$) for the Hispanic group.

Thus, the results of the regression analyses for the Hispanic group show that greater income and social support were related to better physical health, while greater income, optimism, and social support were related to better mental health. These findings mirror the results from the NHW group individually, as well as all participants together. For the Hispanic women, higher coping change was found to be related to worse physical health and increased depressive symptoms. This relationship between coping change and health was not found for either NHW women individually, or for all participants together. Greater optimism and social support were related to less depressive symptoms in the Hispanic group as well as both ethnic groups combined. The most striking finding was that the vulnerability and resilience factors explained more variance in physical health in the Hispanics as compared with the NHW sample (48% vs. 30%). Also, the beta weight for social support for the Hispanic was nearly twice as large as that of the NHW group (.534 vs. .278).

The fourth research aim was to determine whether the vulnerability and resilience factors explained any differences between the ethnic groups on the health measures. The Baron and Kenny (1986) steps for testing mediation were not carried out beyond the first step because ethnicity was not related to physical health ($d = -.091$, $t = .552$), mental health ($d = -.173$, $t = 1.025$), or depressive symptoms ($d = .057$, $t = -.338$).

Discussion

The purpose of this study was to examine the vulnerability and resilience factors that may explain ethnic differences in health and functioning in cervical cancer survivors. There is strong evidence of a health disparity for minorities with cervical cancer compared to those who are NHW. This disparity takes the form of minorities experiencing higher incidence and mortality of cervical cancer overall compared to NHWs, and these rates are highest among Hispanic women (Ashing-Giwa et al., 2006; Aziz & Rowland, 2003; Buki et al., 2007). Hispanics are also the fastest growing population in the U.S. (Ashing-Giwa et al., 2006; Huerta, 2003), which means that if not addressed, the health disparities for Hispanics in relation to cervical cancer will continue to be present and likely even increase.

The current study was important in that it helped to fill in some of the gaps in the existing literature regarding differences in health and functioning between Hispanic and NHW cervical cancer survivors. The present study was particularly helpful in illuminating the contributions that certain vulnerability and resilience factors make to the overall relationship between ethnicity and health in Hispanic and NHW survivors of cervical cancer. One of the most striking and potentially important findings of this study was that the model of vulnerability and resilience factors explained more variance in the health measures in the Hispanic group. In addition, the larger effect for social support appeared to account for much of this difference. Furthermore, optimism was not a significant predictor of physical health in the final regression model for the Hispanic group as it was for the NHW group. Thus, while optimism may not be as important for this sample of Hispanic women with cervical cancer, social support may have been more important. If the construct of familism could have been

measured in this study, then the difference may have been even more pronounced. Additional primary findings from each of the four research aims of this study are discussed below.

Did Hispanic women differ from NHW women on the health and functioning measures? (Exploratory Research Aim 1)

Neither of the alternative hypotheses that Hispanic women would have either worse (Alternative Hypothesis 1.a) or better health than the NHW women (Alternative Hypothesis 1.b) was supported. Although the NHW women had slightly better physical and mental health and slightly less depressive symptoms, the effect sizes ranged from very small to small and the differences were not significant. The fact that the Hispanic and NHW women did not differ significantly in terms of their health and functioning is interesting in light of research on health disparities. One of the significant predictors of disparities in health is disparities in income (Kawachi & Kennedy, 1999; Wagstaff & Van Doorslaer, 2000; Williams & Jackson, 2005). There was no significant difference in income found between the Hispanic and NHW women in this study. This finding is not typical of comparisons between Hispanic and non-Hispanic populations in other parts the U.S., where Hispanics generally have lower income levels (Franzini et al., 2001; Staveteig, 2000). As previously noted, more than 22% of Hispanics were found to be living below the poverty line, compared with 10% of NHWs in 2006 (Vega et al., 2009). However, the true percentage of severely impoverished Hispanics is likely much higher due to difficulties with estimations related to the quantity of immigrants in this population.

This lack of income difference between the ethnic groups may be due in part to unique characteristics of the Hispanic population in New Mexico. Overall, the Hispanic population in the state is fairly well established and well integrated. Indeed, 82% of the

Hispanic participants in the original study reported that they were lifelong residents of New Mexico (Baumgartner, Fetherolf, Hunt, & Wheeler, 2003). Thus, the lack of significant differences in health and functioning may reflect the fact that the New Mexican Hispanic population is fairly well established and is not of lower income than the NHW population in the current study. In contrast, less established Hispanic populations in other parts of the U.S. generally report lower incomes, as previously noted, (Franzini et al., 2001; Staveteig, 2000), which has also been linked to manifesting worse health overall (Hadley, 2003; Wagstaff & Van Doorslaer, 2000). Therefore, because the Hispanic women in this study did not have lower income than the NHW participants, this may help explain why the two groups also did not differ significantly on the health and functioning measures.

The finding of no significant difference in health between the Hispanic and NHW group may also be a manifestation of the Hispanic Paradox. This paradox states that despite being higher on vulnerability factors such as low SES, Hispanics have a lower all-cause mortality rate and better health outcomes in the context of certain diseases, compared to NHWs (Franzini et al., 2001; Page, 2007; Turra & Goldman, 2007). Thus, although the Hispanic women in this study did have significantly less education than the NHWs, the groups did not differ on the health measures, which may be a function of the Hispanic Paradox.

In addition, the Hispanic women were higher on spirituality and coping change than the NHW women. Spirituality has been shown to be related to the Hispanic Paradox as well (Hill, Angel, Ellison, & Angel, 2005). The use of spirituality as a coping mechanism has also been previously established in the literature (Feher & Maly, 1999; Jenkins & Pargament, 1995; Tarakeshwar et al., 2006). Furthermore, Hispanic and NHW women did not differ in

income, social support, or optimism, which have been shown to be related to better health (Carver et al., 1993; Scheier & Carver, 1985; Segerstrom et al., 1998). These findings provide further evidence that the Hispanic population in New Mexico may differ from Hispanics in other parts of the U.S.

Were there differences between Hispanic and NHW women in terms of the proposed vulnerability and resilience factors? (Research Aim 2)

The first hypothesis for this aim that the Hispanic women would have lower income and less education than the NHWs was partially confirmed. The Hispanic women did have less education but were not lower on income compared to the NHW women. Even though the Hispanic women did not report attaining as much education, it may be that being a well-established ethnic group in New Mexico has helped them to reach income levels comparable to those of the NHW women in this study.

The second hypothesis for this aim that the Hispanic group would have greater social support and spirituality than the NHWs was also partially confirmed. The Hispanics did display higher levels of spirituality, but were not higher on social support than the NHW women. The higher levels of spirituality of the Hispanic population in New Mexico may be tied to the central place of the Catholic Church in the Hispanic community (Castro et al., 1995). Indeed, the Hispanic group was significantly more Catholic (74%) than the NHW women (15%) in the current study ($d = 1.449$, $t = -8.343$, $p < .01$). The fact that there were no differences between the ethnic groups on social support may be due to the fact that social support was assessed as a general construct rather than as "familism". As note previously, familism is a form of social support that involves strong interdependence within the familial network as the primary or sole source of support (Meyerowitz et al., 2000; Sabogal et al.,

1987). Familism has also been found to be a more common form of social support for Hispanics than for NHWs (Goodwin et al., 1991; Mindel, 1980; Sabogal et al., 1987).

There were no predictions made regarding coping and optimism in relation to this research aim because although these constructs have been shown to be related to better health (Carver et al., 1993; Scheier & Carver, 1985; Segerstrom et al., 1998), little is known about how they differ in Hispanic and NHW cervical cancer survivors. Nevertheless, the Hispanic women in this study were found to be higher on coping than the NHW women. While this is an interesting finding, it is important to note that the measure of coping used for the study was atypical in that it assessed changes in coping over time (since diagnosis) rather than the level of coping at one point in time. A number of studies with cancer patients have found measures of coping to be associated with better health (Lauver et al., 2007; Miller et al., 1996; Stanton & Snider, 1993). This finding provides further support that the measure of coping used in this study was atypical because it did not behave as a traditional measure of coping in that it was not related to any of the health indicators. Changes in coping, specifically positive ones, may be important as measures of benefit finding or posttraumatic growth (Tedeschi & Calhoun, 1996). However, they may not always be related to other measures of health as has also been the case with other measures of positive change (Helgeson, Reynolds, & Tomich, 2006).

Were the proposed vulnerability and resilience factors related to health and functioning and if so, did these relationships vary by ethnic status? (Research Aim 3)

The first hypothesis for this aim that the vulnerability factors (e.g., lower income and education) would be related to worse health for both ethnic groups combined was fully confirmed. Specifically, lower income and less education were related to poorer physical and

mental health and higher levels of depressive symptoms for both Hispanic and NHW women together. These outcomes coincide with what has been consistently found in research on socioeconomic and health disparities (Adler et al., 1994; Williams, 1999).

The second hypothesis for this aim that the resilience factors (e.g., greater optimism, social support, spirituality, and coping) would be related to better health for both Hispanic and NHW women combined was partially confirmed. Specifically, optimism and social support were related to better physical health, mental health and less depressive symptoms for both groups together. These findings have been replicated in previous research (Carver et al., 1993; Scheier & Carver, 1985; Segerstrom et al., 1998). Finally, neither coping nor spirituality were related to any of the health measures in the correlation analyses for both ethnicities together. Although spirituality and coping were not related to the health measures in this study, they may be related to other measures of health that were not assessed in the current study. Examples of such constructs include positive affect, life satisfaction, or posttraumatic growth. (Helgeson et al., 2006). Furthermore, as previously noted, coping may not have been related to the health measures in the current study because it was not a typical measure of coping.

Another component of the third research aim was to determine whether the relationships between the vulnerability and resilience factors and health varied by ethnic status. No such differences were found. One reason that ethnic group status may not have had any substantial impact on the relationship between vulnerability and resilience factors and health may be due to the comparatively small sample size of the Hispanic (n = 52) participants relative to the NHWs (n = 135). This may have made it more difficult to detect differences between the ethnic groups, particularly in the context of this research aim.

An additional intention of the third research aim was to determine the relative value of the vulnerability and resilience factors in predicting the measures of health for all participants and the total variance explained by these factors. This was accomplished using stepwise multiple regression analyses. The primary finding here was that optimism, social support, and income were all related to better health on each of the three health measures for both ethnic groups combined. This suggests that aspects of personal characteristics, social characteristics, and broader socioeconomic facts may all be important for cervical cancer survivors.

An intriguing additional finding here was that higher levels of spirituality were related to poorer physical and mental health for all participants together. Pargament, Smith, Koenig, and Perez (1998) have found that individuals use spirituality and religion in ways that are both helpful and harmful to their health. Although spirituality and religion have been shown to be generally related to better health, in this study it may be that the harmful effects were somewhat greater than the helpful effects (Pargament et al., 1998). Because the data were cross-sectional, there is the possibility that poorer physical and mental health was related to higher levels of spirituality. It is possible that some of the participants may have perceived themselves as becoming more spiritual in response to the distress experienced in relation to having cervical cancer.

In addition to examining both ethnic groups together, stepwise multiple regression analyses were conducted for the NHW women and the Hispanic women independently. One of the primary findings was that greater income and social support were related to better physical and mental health and less depressive symptoms for both ethnic groups together, Hispanic women alone, and NHWs alone. This mirrors findings in the literature linking

income (Chu et al., 2007; Wagstaff & Van Doorslaer, 2000; Ward et al., 2004) and social support (Holland & Holahan, 2003); (Maly, Umezawa, Leake, & Silliman, 2005) to better health. Greater optimism was related to less depressive symptoms in both ethnic groups together, Hispanic women alone, and NHWs alone as well. This relationship between optimism and depression has also been previously established in the literature (Puskar, Sereika, Lamb, Tusaie-Mumford, & Mcguinness, 1999; Weinstein, 1989).

Interestingly, coping change was only related to health in Hispanic women. Specifically, greater coping change was associated with poorer physical health and higher levels of depressive symptoms in the Hispanic group. Due to the cross-sectional nature of the data, it is impossible to know whether the higher coping change preceded or followed the poorer physical health and increased depressive symptoms in the Hispanic participants. This is similar to the finding regarding the relationship between poorer mental health and greater spirituality in the overall sample. The Hispanic women may have perceived themselves as having greater incentive to change their coping over time than the NHWs, given the possibility that their poorer physical health and increased depression may have preceded rather than followed the onset of their cervical cancer. Additionally, this result may be related to a domain of benefit finding (Tedeschi & Calhoun, 1996), in that the Hispanic women may have been more motivated to search for more benefits than the NHWs if their poorer physical health and greater depression did precede their cervical cancer diagnosis.

Did the proposed vulnerability and resilience factors mediate the effects of ethnicity on health and functioning? (Research Aim 4)

Due to the lack of a significant difference between the ethnic groups on the health and functioning measures, mediation in this sample could not be established. The steps for testing

mediation could not be completed because the lack of ethnic differences in health meant that the data did not meet the criterion for the first step for testing mediation proposed by Baron and Kenny (1986). Thus, it was not possible to pursue the fourth research aim to determine whether the vulnerability and resilience factors mediate the effects of ethnicity on health. As mentioned previously, the lack of significant differences in health may be due to the lack of differences in income, the uniqueness of the Hispanic population in New Mexico, or manifestations of the Hispanic Paradox.

Implications

This study underscores the importance of considering both the vulnerability and resilience factors that may affect the health and functioning of different ethnic groups in the context of cervical cancer survivorship. Oftentimes ethnic minorities are simply considered to be more vulnerable to disease and poorer health outcomes compared to NHW (Betancourt et al., 2003; Penn et al., 1995). This is due in part to the tendency to examine phenomena regarding minority populations from a deficit model perspective in which vulnerability or risk are considered as the primary relevant factors in outcomes (Betancourt et al., 2003; Penn et al., 1995). However, the findings from this study highlight the fact that understanding health and functioning differences between Hispanics and NHWs may not be so clear-cut.

In this study, the Hispanic group was higher on one of two potential vulnerability factors (e.g., less education) as well as on two of four proposed resilience factors (e.g., higher spirituality and coping change). The manner in which vulnerability factors, that may predispose an individual to poorer health, and resilience factors, that may increase of the probability of better health, interact may make it less likely that differences in health by ethnicity will be found or will yield the expected results. This was the case in the current

study. Identifying resilience factors that are higher in Hispanics and attempting to better understand the nature of the relationship between the resilience and vulnerability factors with ethnicity and health may help us to understand what lies at the heart of the Hispanic Paradox.

The results of this study also have important implications for health disparity interventions and health policy. Lower income was found to be related to worse health on each of the health measures (physical health, mental health, and depressive symptoms) and less income was still related to worse health in the multiple regression analyses for the total sample. These findings are consistent with studies showing that income may play a primary role in health and points to reducing financial barriers to accessing adequate health care (Adler & Newman, 2002; Andrulis, 1998; Wagstaff & Van Doorslaer, 2000). Although the Hispanic participants in this study did not significantly differ in income from the NHW group, this is likely due to the uniqueness of the Hispanic population in New Mexico. This finding does not give an accurate picture of the income disparity between Hispanics and NHWs in the U.S. overall. Results from studies with Hispanic populations in other parts of the country do support the need for programs to increase employment and income given the relationship of income being a vulnerability factor for multiple dimensions of worse health outcomes (Adler & Newman, 2002; Wagstaff & Van Doorslaer, 2000; Williams & Jackson, 2005).

Less education was related to poorer health and functioning on all of the health measures in the current study (e.g. worse physical health, worse mental health, and greater depressive symptoms) in the overall sample. The link between education and health outcomes that was found in this study provides additional evidence to support the great need for programs to increase education, both in terms of formal schooling and disease specific

education. This is because less formal education has been found to be a risk factor for poorer health regardless of minority status (Valdez et al., 2001; Ward et al., 2004; Winkleby et al., 1992). Nevertheless, ethnic minorities are also less likely to have as much formal education as NHWs overall (Buki et al., 2007). Additionally, cancer-specific education has been shown to increase screening and likelihood of having a current pap smear for uninsured Hispanic women, which is extremely important for early detection and better prognosis for cervical cancer (Buki et al., 2007).

Limitations

This study had several limitations. First, the data were cross-sectional, and the temporal relationship between the vulnerability factors, resilience factors and the measures of health cannot be determined. Therefore, it is not possible to know if the vulnerability and resilience factors preceded the development of cervical cancer or vice versa. Moreover, the measures of health were self-report assessments and therefore subjective measurements. Because of this, the instruments may have been prone to bias compared to more objective tools such as physiological measures, physician examinations, behavioral observation, or a multi-method assessment that included both objective and self-report measures. The fact that the measure of coping in the current study was one of coping change rather than present coping was also a limitation of the current study. The measure was not a typical measure of coping and therefore may not have behaved as or have been representative of coping as it is traditionally defined.

An additional limitation of the study was that the return rate of the questionnaires was low, which makes it difficult to generalize the findings to the larger population. Nevertheless, this study used recruitment methods that were similar to those used in studies of breast

cancer and other cancers, which yielded varied response rates (Smith et al., 2007). One problematic factor was that only 59% of the participants who were presumed to have received the questionnaire had working phone numbers on file. Furthermore, of the participants who had incorrect addresses 39% had to be later classified as "unable to locate" when a search for a more recent address was unsuccessful. In addition, the follow-up phone call reminders that were intended to help bolster the response rate were delayed. Ideally, all of the participants should have been given reminder calls between 2-4 weeks after receiving the questionnaire. However, this occurred for only about 50% of the participants. This delay may have decreased the likelihood of the phone calls boosting the return rates of the questionnaires.

Due to the low response rate, another limitation in this study is that the participants may not be representative of the overall population of cervical cancer survivors. It is possible that only the higher functioning survivors participated. If this were the case, then this may have also contributed to the lack of significant differences between the Hispanic and NHW women on the health measures. Additionally, the low response rate may have been partly due to the fact that being 55 years or older and being an ethnic minority (as significant portions of the sample were both) are associated with lower response rates to surveys (Smith et al., 2007).

Future Directions

This study contributed to the existing literature by examining a specific Hispanic subgroup and vulnerability and resilience factors that could explain ethnic differences in health. Future research should investigate vulnerability and resilience factors in other subgroups of Hispanic people. However, it must also be noted that the lower response rates

in this study among the Hispanic group make it difficult to generalize to the New Mexican subgroup of Hispanic people.

Future studies might also examine health and functioning in cervical cancer survivors beyond physical health, mental health and depressive symptoms. Other combinations of components from the model proposed herein (Figure 1) may be a useful starting point to further our understanding of the relationship between ethnicity and cervical cancer in the context of the contributions of various vulnerability and resilience factors. This may be important in order to gain a broader understanding of the effects of cervical cancer on the health and functioning of survivors. For example, it would be useful to include health and functioning measures that have been shown to be related to spirituality as well as positive adaptation, including positive affect, life satisfaction or posttraumatic growth (Helgeson et al., 2006). This would make it more likely to understand the potential value of resilience factors such as spirituality in Hispanics and other ethnic minorities.

An additional topic for future research would be to examine "familism" as a construct that is related to social support but may be more likely to shed light on a potential resilience factor in Hispanic cultures than measures that do not include this. Moreover, qualitative methods should be considered as additional techniques to validate and expand on the existing measures for Hispanic women (Abraido-Lanza, Guier, & Colon, 1998). Finally, other types of Hispanic populations should be investigated to determine how vulnerability and resilience factors may differ for Hispanics who are less established in a geographic region or have lower incomes than Hispanics in New Mexico.

Conclusion

This study increased our understanding of vulnerability and resilience in cervical cancer survivors as factors that may explain differences in health and functioning between Hispanic and non-Hispanic women. The Hispanic women in this study presented with both vulnerability as well as resilience factors, in that they were lower on education but higher on spirituality and coping change than the NHW cervical cancer survivors. The fact that the Hispanic group was higher on both vulnerability and resilience factors may help to further our knowledge regarding the Hispanic Paradox and why there were no differences between the two ethnic groups on the health and functioning measures.

This study also showed that income, optimism, and social support appear to be the most important factors for women with cervical cancer, due to their relationship to greater physical health, mental health, and less depressive symptoms. Interventions for cervical cancer survivors may want to target these factors as important components of vulnerability and resilience in relationship to health and functioning. Future studies should continue to examine vulnerability and resilience in cervical cancer survivors and how they may influence health disparities related to this disease.

Table 1

Descriptive Statistics for the Study Variables for All Participants (Hispanic and NHW Cervical Cancer Survivors) (n = 187)

	All (n = 187) M(SD)	Range	Hispanic (n = 52)	Non-Hispanic White (n = 135)	t[a]	d
Sample Demographics						
Age at Study	51.39 (8.96)	26.00-72.00	50.75 (9.37)	51.63 (8.81)	.601	-.097
Age at Diagnosis	40.99 (9.14)	21.00-67.00	40.83(8.67)	41.06(9.34)	.155	-.026
Years Since Diagnosis	10.47 (5.08)	1.00-22.00	10.57(5.20)	10.19(4.82)	.455	-.075
Dependent Variables						
Depressive Symptoms	16.86 (11.00)	4.00-60.00	17.30(9.65)	16.69(11.50)	-.338	.057
Mental Health	64.37 (18.43)	6.50-93.67	62.15(16.41)	65.23(19.14)	1.025	-.173
Physical Health	72.47 (21.42)	2.50-100.00	71.07(20.52)	73.00(21.80)	.552	-.091
Vulnerability Factors						
Education	4.18 (1.20)	1.00-6.00	3.61(1.32)	4.40(1.07)	4.217**	-.658
Income	4.31 (1.72)	1.00-6.00	4.05(1.65)	4.41(1.57)	1.371	-.139
Resilience Factors						
Coping Change	14.29 (11.11)	0.00-56.00	18.54(11.14)	12.66(10.70)	-3.327**	.538
Optimism	29.52 (5.59)	11.00-40.00	29.53(4.96)	29.52(5.84)	-.007	.002
Social Support	72.30 (19.89)	19.00-95.00	72.28(20.61)	72.31(19.68)	.011	-.001
Spirituality	18.89 (5.66)	5.00-27.00	20.65(5.11)	18.21(5.73)	-2.682**	.449

Note. [a]Independent samples t-test df = 185. *p < .05, **p < .01.

Table 2

Correlation Analyses among the Health Measures and the Vulnerability and Resilience Factors for All Participants (n=187)

	1	2	3	4	5	6	7	8	9
Dependent Variables									
1. Physical Health	-								
2. Mental Health	.706**	-							
3. Depressive Symptoms	-.474**	-.672**	-						
Vulnerability Factors									
4. Education	.305**	.153 *	-.166*	-					
5. Income	.360**	.356**	-.256**	.319**	-				
Resilience Factors									
6. Coping	-.095	-.007	.022	-.032	.104	-			
7. Optimism	.340**	.450**	-.580**	.090	.103	.019	-		
8. Social Support	.463**	.572**	-.491**	.200**	.083	.058	.334**	-	
9. Spirituality	-.113	-.071	-.028	-.156*	-.026	.258**	.153*	.091	-

Note. *p < .05, **p < .01.

Table 3

Correlation Analyses among the Health Measures and the Vulnerability and Resilience Factors for the NHW Participants (n = 135)

	1	2	3	4	5	6	7	8	9
Dependent Variables									
1. Physical Health	-								
2. Mental Health	.712**	-							
3. Depressive Symptoms	-.491**	-.729**	-						
Vulnerability Factors									
4. Education	.251**	.143	-.144	-					
5. Income	.351**	.377**	-.295**	.296**	-				
Resilience Factors									
6. Coping Change	-.016	.033	-.063	-.100	.037	-			
7. Optimism	.375**	.462**	-.622**	.114	.108	.039	-		
8. Social Support	.427**	.556**	-.501**	.143	.240**	.077	.350**	-	
9. Spirituality	-.108	-.069	-.082	-.232*	-.181*	.277**	.165	.120	-

Note. *p < .05, **p < .01.

Table 4

Correlation Analyses among the Health Measures and the Vulnerability and Resilience Factors for the Hispanic Participants (n = 52)

	1	2	3	4	5	6	7	8	9
Dependent Variables									
1. Physical Health	-								
2. Mental Health	.685**	-							
3. Depressive Symptoms	-.418**	-.464**	-						
Vulnerability Factors									
4. Education	.442**	.128	-.133	-					
5. Income	.377**	.281*	-.141	.325*	-				
Resilience Factors									
6. Coping Change	-.277*	-.052	.256	-.083	-.115	-			
7. Optimism	.229	.412**	-.426**	.231	.041	-.039	-		
8. Social Support	.561**	.635**	-.471**	.323*	.109**	.019	.292*	-	
9. Spirituality	-.105	-.020	-.135	-.028	-.027*	.070**	.123	.017	-

Note. *p < .05, **p < .01.

Table 5

Stepwise Multiple Regressions Predicting Health Measures for All Participants (n = 187)

	Physical Health	Mental Health	Depressive Symptoms
Coping Change	-	-	-
Education	-	-	-
Income	.247**	.222**	-.153**
Optimism	.222**	.302**	-.464**
Social Support	.352**	.438**	-.305**
Spirituality	-.140*	-.123*	-
R^2	.343	.474	.459
Adjusted R^2	.329	.463	.450
F	23.758**	41.083**	51.674**
df	4,182	4,182	3,183

Note. Standardized regression coefficients are shown across the rows where individual variables are listed. *p < .05, **p < .01.

Table 6

Stepwise Multiple Regressions Predicting Health Measures for NHW Participants (n = 135)

	Physical Health	Mental Health	Depressive Symptoms
Coping Change	-	-	-
Education	-	-	-
Income	.257**	.251**	.173**
Optimism	.249**	.298**	-.504**
Social Support	.278**	.392**	-.283**
Spirituality	-	-	-
R^2	.303	.450	.507
Adjusted R^2	.287	.438	.495
F	18.962**	35.753**	44.852**
df	3,131	3,131	3,131

Note. Standardized regression coefficients are shown across the rows where individual variables are listed. *p < .05, **p < .01.

Table 7

Stepwise Multiple Regressions Predicting Health Measures for Hispanic Participants (n = 52)

	Physical Health	Mental Health	Depressive Symptoms
Coping Change	-.254**	-	.252**
Education	-	-	-
Income	.289**	.211**	-
Optimism	-	.246**	-.303**
Social Support	.534**	.540**	-.387**
Spirituality	-	-	-
R^2	.479	.504	.376
Adjusted R^2	.446	.472	.337
F	14.711**	16.226**	9.640**
df	3,48	3,48	3,48

Note. Standardized regression coefficients are shown across the rows where individual variables are listed. *p < .05, **p < .01.

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Figure 1
A model of the effects of ethnicity (Hispanic or Non-Hispanic White) on health and functioning of cervical cancer survivors including potential vulnerability and resilience factors. Constructs that were utilized in the current study are in bold-face type. The self-report (subjective) health and functioning measures assessed were physical health, mental health, and depressive symptoms. The potential vulnerability factors included were income and education. The potential resilience factors utilized were coping, optimism, social support, and spirituality/religiosity.

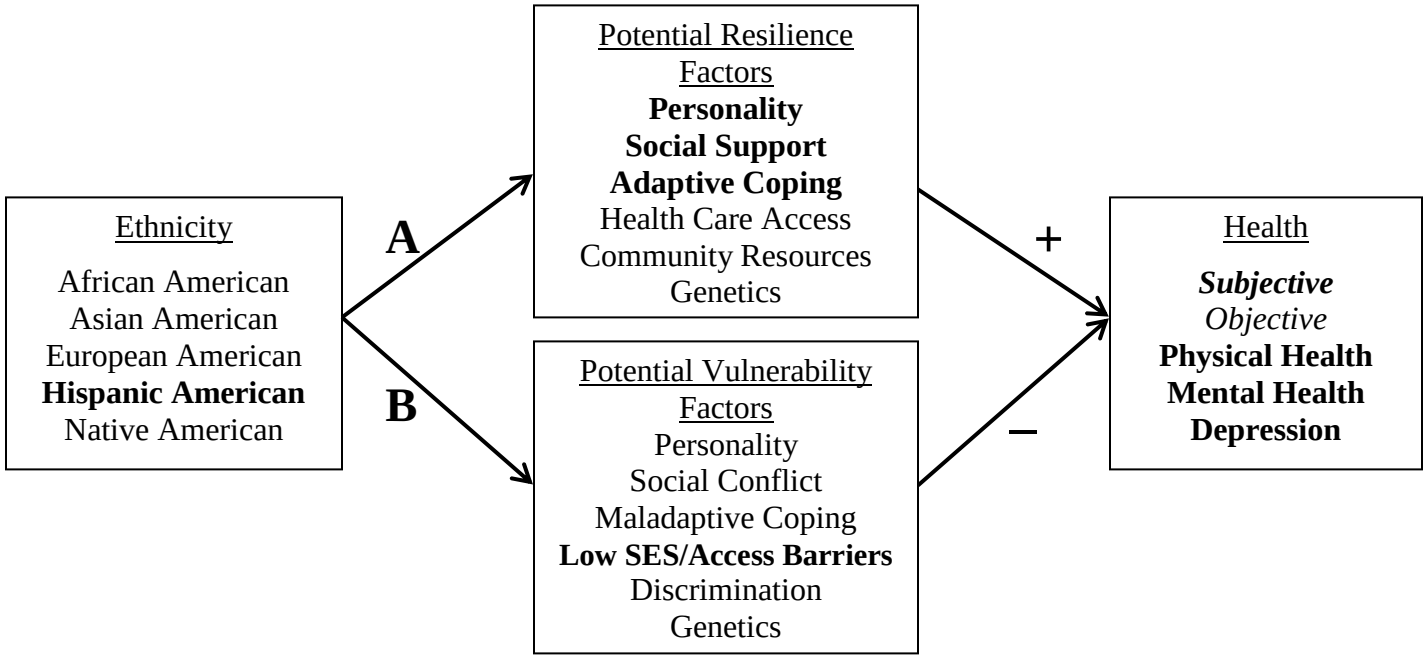
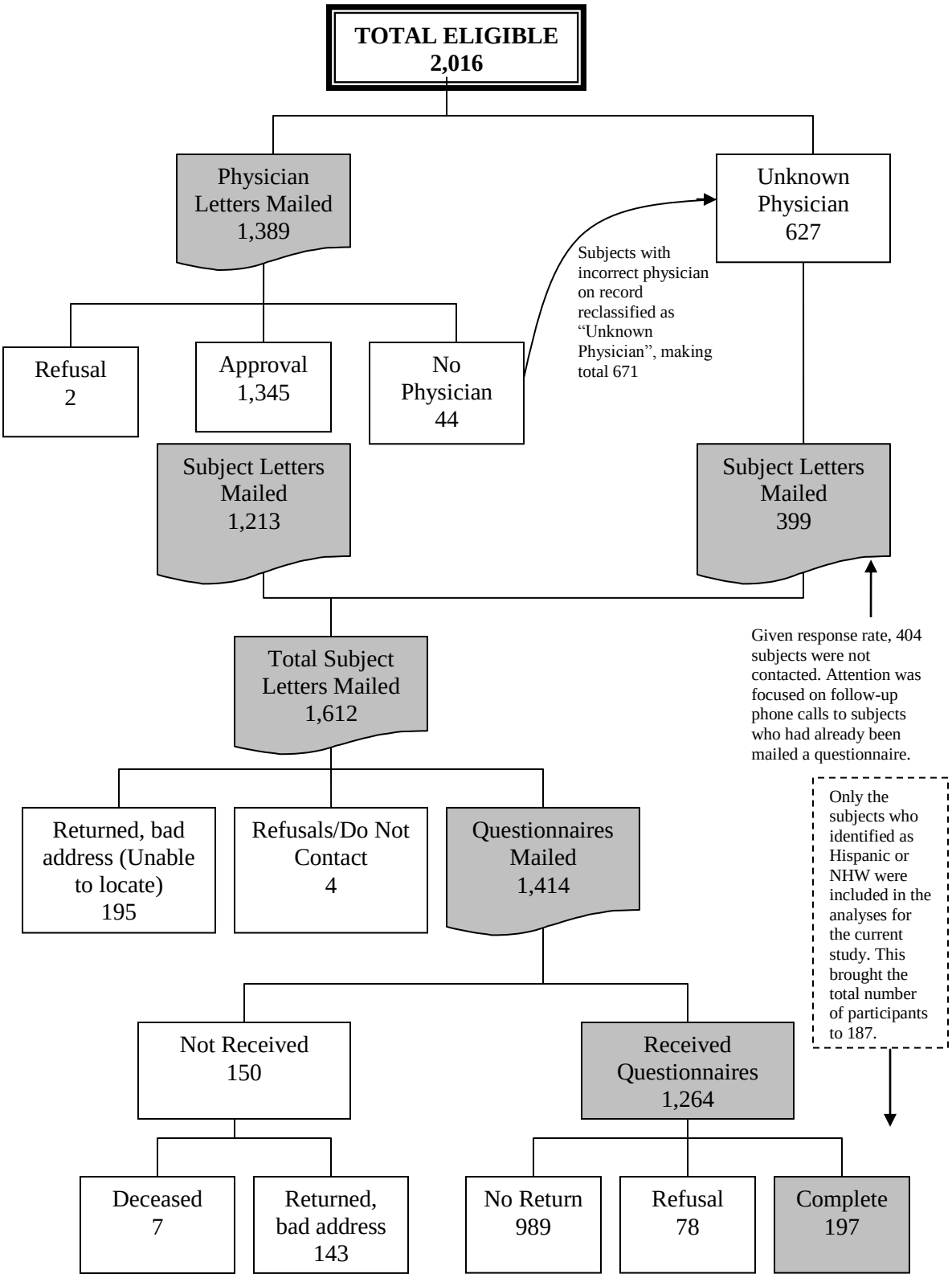


Figure 2

A flowchart tracking participants from stage of eligibility to completion for the original study and the current study. The recruitment process entailed (in chronological order): mailing letters to physicians, followed by mailing letters to participants, and finally mailing questionnaires to participants.



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Appendix A SF-36 Physical Health and Mental Health Scales

The following questions are designed to assess your general health.

GH1. In general, would you say your health is: (Circle one)
1 Excellent
2 Very good
3 Good
4 Fair
5 Poor

GH2. **Compared to one year ago**, how would you rate your health in general **now**? (Circle one)
1 Much better now than one year ago
2 Somewhat better now than one year ago
3 About the same as one year ago
4 Somewhat worse now than one year ago
5 Much worse now than one year ago

GH3. Physical Functionality - Physical Health Scale 1
The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?
Instructions: Please read each statement and circle one number for each statement using the following scale:
1 = Yes, limited a lot 2 = Yes, limited a little 3 = No, not limited at all

a.	Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	1	2	3
b.	Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3
c.	Lifting or carrying groceries	1	2	3
d.	Climbing several flights of stairs	1	2	3
e.	Climbing one flight of stairs	1	2	3
f.	Bending, kneeling, or stooping	1	2	3
g.	Walking more than a mile	1	2	3
h.	Walking several hundred yards	1	2	3
i.	Walking one hundred yards	1	2	3
j.	Bathing or dressing yourself	1	2	3

GH4. Role Physical - Physical Health Scale 2
During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?
Instructions: Please read each statement and circle one number for each statement using the following scale:

1 = All of the time 2 = Most of the time 3 = Some of the time 4= A little of the time
5 = None of the time

a.	Cut down on the **amount of time** you spend on work or other activities	1	2	3	4	5
b.	**Accomplished less** than you would like	1	2	3	4	5
c.	Were **limited** in the **kind** of work or other activities	1	2	3	4	5
d.	Had **difficulty** performing the work or other activities *(for example, it took extra effort)*	1	2	3	4	5

GH5. Role Emotional - Mental Health Scale 3
During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems *(such as feeling depressed or anxious)*?
Instructions: Please read each statement and circle one number for each statement using the following scale:
1 = All of the time 2 = Most of the time 3 = Some of the time 4= A little of the time
5 = None of the time

a.	Cut down on the **amount of time** you spend on work or other activities	1	2	3	4	5
b.	**Accomplished less** than you would like	1	2	3	4	5
c.	Did you work or other activities **less carefully than usual**	1	2	3	4	5

GH6. Social Functioning – Mental Health Scale 2
During the **past 4 weeks, to what extent** has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups? (Circle one)
1 Not at all
2 Slightly
3 Moderately
4 Quite a bit
5 Extremely

GH7. Bodily Pain – Physical Health Scale 3
How much bodily pain have you had during **the past 4 weeks**? (Circle one)
1 None
2 Very mild
3 Mild
4 Moderate
5 Severe
6 Very Severe

a. What is the pain that you have experienced in the **past 4 weeks** related to? (Circle one)

1 Past cervical disease or cervical cancer or related surgery or treatment
2 Another medical condition, specify: _____

b. Do you take any medication specifically for your pain? (Circle one)
1 Yes
2 No

c. During the **past 4 weeks**, how much did pain interfere with your normal work *(including both work outside the home and housework)*? (Circle one)
1 Not at all
2 A little bit
3 Moderately
4 Quite a bit
5 Extremely

GH8. Vitality and Mental Health - Mental Health Scales 1 and 4

These questions are about how you feel and how things have been with you during the **past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the **past 4 weeks**…
1 = All of the time 2 = Most of the time 3 = Some of the time 4= A little of the time
5 = None of the time

a.	Did you feel full of pep or life?	1	2	3	4	5
b.	Have you been very nervous?	1	2	3	4	5
c.	Have you felt so down in the dumps nothing could cheer you up?	1	2	3	4	5
d.	Have you felt calm and peaceful?	1	2	3	4	5
e.	Did you have a lot of energy?	1	2	3	4	5
f.	Have you felt downhearted and depressed?	1	2	3	4	5
g.	Did you feel worn out?	1	2	3	4	5
h.	Have you been happy?	1	2	3	4	5
i.	Did you feel tired?	1	2	3	4	5

GH9. General Health – Physical Health Scale 4

During the past **4 weeks, how much of the time** has your physical health or emotional problems interfered with your social activities *(like visiting friends, relatives, etc.)*? (Circle one)
1 All of the time
2 Most of the time
3 Some of the time
4 A little of the time
5 None of the time

GH10. General Health – Physical Health Scale 4

How TRUE or FALSE is each of the following statements for you?

1 = Definitely true 2 = Mostly true 3 = Don't know 4= Mostly false 5 = Definitely false

a.	I seem to get sick a little easier than other people	1	2	3	4	5
b.	I am as healthy as anybody I know	1	2	3	4	5
c.	I expect my health to get worse	1	2	3	4	5
d.	My health is excellent	1	2	3	4	5

Appendix B Medical Outcomes Study (MOS) Social Support Survey

The following set of questions asks about your satisfaction with those people involved with your cervical disease or cervical cancer diagnosis, treatment and support.

SP2. People sometimes look to others for support. How often is each of the following kinds of support available to you, if you need it?
1 = None of the time 2 = A little of the time 3 = Some of the time 4= Most of the time
5 = All of the time

Emotional/Informational Support						
a.	Someone you can count on to listen to you when you need to talk	1	2	3	4	5
b.	Someone to give you information to help you understand a situation	1	2	3	4	5
c.	Someone to give you good advice about a crisis	1	2	3	4	5
d.	Someone to confide in or talk to about yourself or your problems	1	2	3	4	5
e.	Someone whose advice you really want	1	2	3	4	5
f.	Someone to share your most private worries and fears with	1	2	3	4	5
g.	Someone to turn to for suggestions about how to deal with a personal problem	1	2	3	4	5
h.	Someone who understands your problems	1	2	3	4	5
Tangible Support						
i.	Someone to help you if you were confined to a bed	1	2	3	4	5
j.	Someone to take you to the doctor if you needed it	1	2	3	4	5
k.	Someone to prepare your meals if you were unable to do it yourself	1	2	3	4	5
l.	Someone to help with daily chores if you were sick	1	2	3	4	5
Affectionate Support						
m.	Someone who shows you love and affection	1	2	3	4	5
n.	Someone to love you and make you feel wanted	1	2	3	4	5
o.	Some who hugs you	1	2	3	4	5
Positive Social Interaction						
p.	Someone to have a good time with	1	2	3	4	5
q.	Someone to get together with for relaxation	1	2	3	4	5
r.	Someone to do something enjoyable with	1	2	3	4	5
s.	Someone to do things with to help you get your mind off things	1	2	3	4	5

Appendix C Life Orientation Test Revised (LOT-R)

The following questions are about your current feelings towards life. Please try not to let an answer to one question affect your answer to other questions.

TA3. How much do you agree or disagree with the following statements?
1 = Strongly disagree 2 = Disagree 3 = Neutral *(in-between)* 4= Agree 5 = Strongly agree

a.	In times of uncertainty, I usually expect the best	1	2	3	4	5
b.	If something can go wrong for me, it will	1	2	3	4	5
c.	I always look on the bright side of things	1	2	3	4	5
d.	I'm always hopeful about my future	1	2	3	4	5
e.	I hardly ever expect things to go my way	1	2	3	4	5
f.	Things never work out the way I want them to	1	2	3	4	5
g.	I rarely count on good things happening to me	1	2	3	4	5
h.	Overall, I expect more good things to happen to me than bad	1	2	3	4	5

Appendix D Center for Epidemiologic Studies Depression Scale (CES-D)

The following questions are about your current feelings towards life. Please try not to let an answer to one question affect your answer to other questions.

TA4. For each of the statements below, please indicate the amount of time you experienced each of the following during the **past week**.
1 = Rarely or none of the time *(less than 1 day*) 2 = Some or a little of the time *(1-2 days)* 3 = Occasionally or a moderate amount of time *(3-4 days)* 4= Most or all of the time (5-7 days)

a.	I was bothered by things that usually don't bother me	1	2	3	4
b.	I did not feel like eating: my appetite was poor	1	2	3	4
c.	I felt that I could not shake off the blues even with help from my family or friends	1	2	3	4
d.	I felt that I was just as good as other people	1	2	3	4
e.	I had trouble keeping my mind on what I was doing	1	2	3	4
f.	I felt depressed	1	2	3	4
g.	I felt that everything I did was an effort	1	2	3	4
h.	I felt hopeful about the future	1	2	3	4
i.	I thought my life had been a failure	1	2	3	4
j.	I felt fearful	1	2	3	4
k.	My sleep was restless	1	2	3	4
l.	I was happy	1	2	3	4
m.	I talked less than usual	1	2	3	4
n.	I felt lonely	1	2	3	4
o.	People were unfriendly	1	2	3	4
p.	I enjoyed life	1	2	3	4
q.	I had crying spells	1	2	3	4
r.	I felt sad	1	2	3	4
s.	I felt that people disliked me	1	2	3	4
t.	I could not get going	1	2	3	4

Appendix E Duke Religiosity Index

This section asks about your religious/spiritual experiences.

RL1. How often do you attend faith community or other religious/spiritual meetings? (Circle one)
1 More than once a week
2 Once a week
3 A few times a month
4 A few times a year
5 Once a year or less
6 Never

RL2. How often do you spend time in private religious/spiritual activities, such as prayer, meditation or Bible study? (Circle one)
1 More than once a day
2 Daily
3 Two or more times a week
4 Once a week
5 A few times a month
6 Rarely or never

RL3. How often do you spend time praying for others? (Circle one)
1 More than once a day
2 Daily
3 Two or more times a week
4 Once a week
5 A few times a month
6 Rarely or never

RL4. In my life, I experience the presence of God or the Divine. (Circle one)
1 Definitely true
2 Tends to be true
3 Unsure
4 Tends **not** to be true
5 Definitely **not** true

RL5. My religious/spiritual beliefs are what really lie behind my whole approach to life. (Circle one)
1 Definitely true
2 Tends to be true
3 Unsure
4 Tends **not** to be true
5 Definitely **not** true

RL6. I try hard to use my religion/spiritual beliefs in all aspects of my life. (Circle one)
1 Definitely true
2 Tends to be true
3 Unsure
4 Tends **not** to be true
5 Definitely **not** true

RL7. What is your religious affiliation?
1 Catholic
2 Protestant
3 Christian
4 Other (specify): _____
5 No religious affiliation

Appendix F "I Can Cope" American Cancer Society

Please read each statement and circle one number for each statement using the following scale:
0 = No Change 1 = Very small change 2 = Small change 3 = Moderate change 4= Great Change 5 = Very great change

a.	I focus on what I can do and what I want to do rather than my limitations	0	1	2	3	4	5
b.	I try to talk to people close to me about concerns in my life	0	1	2	3	4	5
c.	I try to set priorities in my life	0	1	2	3	4	5
d.	When I do not understand something, I am not afraid to ask questions	0	1	2	3	4	5
e.	I give in sometimes, not every argument is worth winning	0	1	2	3	4	5
f.	I try to pace myself, stopping before I get too tired	0	1	2	3	4	5
g.	I am not afraid to say "No"	0	1	2	3	4	5

Appendix G Education (from Socio-Demographics Questionnaire)

This set of questions asks you general information about yourself.

DD5. How many years of schooling have you completed?

	8th grade or less	Some high school	High School graduate	Some college or technical school	College graduate	Graduate school
Currently	1	2	3	4	5	6

Appendix H Income (from Socio-Demographics Questionnaire)

This set of questions asks you general information about yourself.

DD8. Please choose from the list on the right the appropriate number that corresponds to your household income **before** taxes and write that in the appropriate blank. **CHOOSE ONLY ONE RESPONSE**.

	Household Income before taxes	
b. **For the year 2000**	_____ Code	1 Under $10,000 2 Between $10,001 and $14,999 3 Between $15,000 and $19,999 4 Between $20,000 and $29,999 5 Between $30,000 and $49,999 6 $50,000 or more 7 Don't Know/Not Sure 9 Refused

Appendix I Ethnicity (from Socio-Demographics Questionnaire)

DD12. Please record **<u>your</u>** birthplace. (**PRINT "UNKNOWN" WHEN NOT KNOWN)**

State _____

Country _____

a. Which of the following best describes **<u>your</u>** racial or ethnic background? **CIRCLE ONLY ONE**

1 White, not of Hispanic origin
2 Hispanic
3 Black, not of Hispanic origin
4 Asian or Pacific Islander
5 American Indian or Alaska Native
6 Other (specify): _____
7 Don't Know/Not sure