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Cancer Survivor Lifestyle Changes in Relationship to Depressive Symptoms, Hope,
Social Support, and Quality of Life

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2011

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Abstract

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By Shanice Ivy Coleman

Given the high prevalence of patients surviving cancer diagnosis and treatment, research is needed to understand the association between psychosocial factors and healthy behaviors, such as fruit and vegetable (FV) intake and physical activity (PA) among cancer survivors. In this secondary analysis of data from a study focusing on smoking among survivors of smoking-related cancers, we examined depressive symptoms, hope, social support, and quality of life in relation to FV intake and PA among cancer survivors. Participants with a history of smoking and a smoking-related cancer diagnosis (lung, oral, pharynx, larynx, esophagus, bladder, stomach, cervix, kidney, pancreas, acute myeloid leukemia) within the past four years were identified in the electronic medical record for the parent study focusing on smoking-related factors. We recruited 613 individuals to complete a mail-based survey and received 139 completed surveys (22.7% response rate). We assessed sociodemographics, type of cancer and treatment(s), psychosocial factors (depressive symptoms, hope, social support, quality of life), and selected health behaviors, specifically level of FV intake and PA. Overall, 90 (72%) cancer survivors reported consuming 5 or more FV per day, and 98 (77.8%) reported walking for exercise at least 4 times per week (n=128). After controlling for age, gender, and marital status, significant factors associated with consuming 5 or more FV per day included higher social support from a significant other (OR=1.20, CI (1.06, 1.35), p=.004) and being female (OR=3.13, CI (1.19, 8.33), p=.02). In reference to physical activity, the only significant factor associated with greater likelihood of walking for exercise was higher social support from friends (OR=1.19, CI (1.05, 1.33), p=.003). Understanding the psychosocial factors related to health promoting behaviors among cancer survivors is critical in developing interventions targeting healthy post-cancer lifestyles.

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Table of Contents

Chapter 1: Introduction	1
Chapter 2: Literature Review	4
Chapter 3: Methods	7
Chapter 4: Results	12
Chapter 5: Discussion	13

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Introduction

Approximately 64.8% of individuals diagnosed as of 2007 with cancer can expect to survive at least 5 years, joining the 11.7 million cancer survivors in the U.S. (Centers for Disease, 2007). With increased survival rates and more people living longer after their cancer diagnosis, there is expected to be an increase in the number of people living with a history of cancer (Centers for Disease, 2007). The American Cancer Society estimates that 13.7 million people live with a history of cancer as of January 2012 with hopes this will increase to approximately 18 million by January 2022 (American Cancer Society's, 2012).

From the moment of diagnosis through the rest of one's life, individuals are identified as 'cancer survivors' (Centers for Disease, 2012). Life after cancer diagnosis and treatment can impact physical, psychosocial, and financial well-being (Centers for Disease, 2007). Even if the initial course of therapy is successful and the cancer will most likely not return, survivors must learn to cope with the long-term effects of treatment, which include psychological anxieties (American Cancer Society's, 2012). Preparing for the long-term survivorship can be stressful and hopeful, all while trying to regain regularity (American Cancer Society's, 2012). Cancer treatment can have the long-term effects of chronic pain, decreased bone density, infertility, decreased lung functioning, fatigue, and sexual problems (American Cancer Society's, 2012). These effects could impact cancer survivors' quality of life and survivorship. Unfortunately, complications affecting these dimensions can arise due to cancer and its therapy. Second malignancies are the most serious complication among this high-risk group, accounting for 16% of all cancer incidences (Valdivieso, Kujawa, Jones, & Baker, 2012).

Providing cancer survivors with information on how to regain and improve their health through healthy behaviors has been shown to be important due to their increased risk of reoccurrence and development of new cancer (American Cancer Society's, 2012). Many behavioral changes have been researched as ways to affect the health, quality of life, and survival rate of cancer survivors. Specifically, physical activity and a healthy diet are some of the main behavioral lifestyle changes that have been previously researched, showing the potential impact they can have on the life after cancer diagnosis and treatment (Wei, Wolin, & Colditz, 2010; Winzer, Whiteman, Reeves, & Paratz, 2011). Encouraging cancer patients to be more physically active and consume more fruits and vegetables could be a way to impact cancer survivors' survivorship. While needing to take into account the psychological aspect behind engaging in these activities, hopefulness could potentially contribute to the engagement in these healthy behaviors.

The current study examines depressive symptoms, hope, social support, and quality of life in relation to fruit and vegetable (FV) intake and physical activity (PA) among cancer survivors. The Theory of Planned Behavior is the theoretical framework for this study (Ajzen, 1991). The Theory of Planned Behavior suggests that the primary predictor of behavior is behavioral intention, and behavioral intention can be predicted with high accuracy from attitudes towards the behavior, subjective norms, and perceived behavioral control. Thus, these variables also predict behavior through behavioral intention. According to this theory, a person's intention to perform a behavior is influenced by 1) the attitudes towards that particular behavior, 2) belief about the subjective norms of significant others around them, and 3) the perceived behavioral control around the performance of the particular behavior (Ajzen, 1991). The Theory of Planned Behavior has been applied in a number of studies of FV intake and PA. A review was conducted

of 23 studies that were able to predict FV intake and show how this theory is a useful model in predicting intentions and behaviors towards FV intake (Guillaumie, Godin, & Vézina-Im, 2010). For FV intake, attitudes and perceived behavioral control have been shown to be the strongest predictors of healthy eating (Povey, Conner, Sparks, James, & Shepherd, 2000; Sjoberg, Kim, & Reicks, 2004). One of the theoretical bases for PA interventions has been the application of the Theory of Planned Behavior to the motivation for exercise as a health predictor in the general population (Ajzen, 1991) as well as in cancer populations (Andrykowski, Beacham, Schmidt, & Harper, 2006). In a meta-analysis of PA, intention was proposed as the most significant predictor among all of the constructs (Husebø, Dyrstad, Søreide, & Bru, 2013).

The Theory of Planned Behavior suggests that depressive symptoms, hope, social support, and quality of life may influence FV intake and PA among cancer survivors. Depressive symptoms has been linked with self-efficacy attitudes, normative beliefs, and behavioral capability (Courneya, Blanchard, & Laing, 2001). Likewise, quality of life has been linked with self-efficacy (Cunningham, Lockwood, & Cunningham, 1991; de Castro, Ponciano, Meneghetti, Kreling, & Chem, 2012). Social support has been linked to all three of the constructs: attitude, subjective norms, and perceived behavioral control (Courneya et al., 2001; Rhodes, Jones, & Courneya, 2002). Although Snyder's version of hope hasn't been linked to the constructs of this theory, it can be assumed that hope could appropriately fit under attitudes towards the behavior and perceived behavioral control due to its psychological and emotional ties to behavioral intention and the behavior. In light of these findings, a cancer survivor's level of depressive symptoms, hope, and social support may impact their attitudes and normative beliefs about the impact of lifestyle changes on their treatment outcomes and overall subsequent health outcomes. These factors, as well as the survivor's quality of life, may also impact the survivor's behavioral

capability for making a lifestyle change. As a result, depressive symptoms, hope, social support, and quality of life may impact survivors' intention to make a lifestyle change and their actual behavior of doing so.

Based on the aforementioned literature and this theoretical framework, we will examine the role of depressive symptoms, hope, social support, and quality of life on FV intake and PA among cancer survivors. We hypothesized that lower depressive symptoms, higher levels of hope, greater social support, and greater quality of life would relate to higher levels of FV intake and greater PA.

Literature Review

Many behaviors may be directly related to cancer and its treatment, but lifestyle behaviors may play a role in the outcomes as well (Blanchard, Courneya, Stein, & American Cancer Society's, 2008). After cancer treatment is complete, preventive interventions may help reduce the risk of cancer reoccurrence, prevent new cancers, increase survival, and strengthen quality of life (Centers for Disease, 2012). Some of these preventive interventions include lifestyle changes to help improve cancer survivors' health after diagnosis and treatment. Lifestyle changes, such as maintaining a healthy diet with appropriate levels of fruit and vegetable (FV) intake, physical activity (PA), weight management, and smoking cessation, have been shown to have an impact on cancer survivors and their life after cancer (Demark-Wahnefried, 2000).

Modifiable lifestyle factors such as good nutritional intake and appropriate PA are may reduce the risk of cancer and cancer recurrence (National Cancer Institute, 2012). The World Health Organization (WHO) states that low FV intake is one the top ten risk factors for global

mortality (World Health Organization, 2012). WHO recommends consuming 400g of FV daily in order to reduce the risk of certain cancers and diseases (World Health Organization, 2005). The health benefits from PA range from reducing the risk of diseases, cancers, and other health ailments to controlling a person's weight (National Cancer Institute, 2009). The National Cancer Institute has collected strong evidence that links PA with the reduction of some cancers (National Cancer Institute, 2009). It is recommended that adults should be physically active for 150 minutes a week to improve health and reduce risk of certain health ailments and diseases (World Health Organization, 2005, 2012). In fact, research on breast cancer patients concluded that diet changes could affect life expectancy after diagnosis (Cohen, Rose, & Wynder, 1993). In another study of cancer survivors, nutrition and physical fitness have been shown to influence cancer progression and survival after diagnosis and treatment (Kramish Campbell, 2009).

Several psychosocial factors, including depressive symptoms, hope, social support, and quality of life, have been found to be associated with FV intake engagement and PA. Modifiable risk factors have been related to depressive symptoms in many studies. A diet rich in FV has been associated with a lower risk of depressive symptoms in previous research (Samieri et al., 2008). This association has also been documented in older adults, indicating an relationship between having depressive symptoms and lower FV intake (Payne, Steck, George, & Steffens, 2012). In the general population, research has shown an inverse association between regular physical activity and prevalence of depressive symptoms (Goodwin, 2003). Eating well, being physically activity, and avoiding obesity have been found important in research on aging populations with and without a cancer diagnosis (Kramish Campbell, 2009). Thus, this inverse relationship between a healthy lifestyle (specifically diet and physical activity) and depressive

symptoms has been developing a large empirical basis of support in the general population and in cancer survivors.

Hope is another construct that may be related to engaging in healthy behaviors among cancer survivors. According to Snyder and his colleagues (1994), hope is the perception of having both the pathways for one's goals and the motivation and self-efficacy (agency) to use those routes. The anchor in hope theory is the notion of goals, which are significant short- or long-term targets of mental action sequences (Snyder, 1996). In order to create and obtain goals a person goes through a thought process to identify how they can attain the goals. Snyder identifies two types of thoughts associated with goals attainment: pathway thoughts and agency thoughts. Pathways thoughts reflect the person's perceived ability to generate multiple plausible routes to goals and to choose new routes when an obstacle blocks previous goals. Agency thoughts reflect the belief that one can initiate and sustain movement along pathways to goals and the ability to maintain motivation. Together, the pathways and agency thoughts iterate and drive engagement and disengagement throughout goal pursuit (Snyder, 2000). Thus, hope is the perception that one can engage both of these types of thought. Hope has been shown to be related to health behaviors such as FV intake and PA. In the general population, hope has been shown to be a determinant of engaging in healthier behaviors while reducing unhealthy behaviors among different populations. Berg and colleagues (2011) have found that higher levels of hope were associated with more PA and dietary fat limitations.

Social support can play a major part in a person's ability and desire to eat healthily and engage in physical activity. Research has shown that newly coupled people tend to consume more FV (Burke et al., 1999). Social support systems were also found to be significantly correlated with participants' intention to eat FV (Brug, Lechner, & De Vries, 1995). In a

previous study, conclusions arose finding that for many participants to successfully engage in health change interventions, family support was quite important (Rakowski, 1988). Family's and friends' support have been found to be consistently and positively related to increased physical activity in adults (Treiber et al., 1991). Friend support seems to play a role in influencing physical activity participation (Rogers, Markwell, Verhulst, McAuley, & Courneya, 2009). Social networks among older adults have been shown to influence a physically active lifestyle (Leroux, Moore, Richard, & Gauvin, 2012).

Cancer diagnosis and treatment have been linked to negative side effects that can affect the survivor's quality of life. How lifestyle changes like FV intake and PA affect a survivor's quality of life have also been researched. In a previous study, cancer survivors' quality of life has been shown to be positively impacted when engaging in FV intake and PA (Hong et al., 2007). In past breast cancer studies, exercise interventions were shown to possibly be associated with improvements in overall quality of life and exercise capacity (Demark-Wahnefried, 2000). Given the health benefits of FV intake and PA previously shown, it is reasonable to believe that these are important factors for the cancer survivors (World Health Organization, 2005).

In order to address the gap in the literature this study aims to examine the levels of hope with other psychosocial factors such as depressive symptoms, social support, and quality of life upon FV intake and PA, while controlling for type of cancer diagnosis, treatment, and participants' socio-demographic characteristics.

Methods

The current study is a secondary analysis of data from a study focusing on smoking among survivors of smoking-related cancers.

Participants

Participants for this study were identified using electronic medical records (EMR) from a National Cancer Institute (NCI) designated cancer center in a large southeastern city. Individuals with any indication of a history of smoking and with a smoking-related cancer diagnosis (i.e., lung, oral cavity, pharynx, larynx, esophagus, bladder, stomach, cervix, kidney, pancreas, and acute myeloid leukemia) within the past four years were recruited to complete a mail-based survey.

Measures

Sociodemographic characteristics. The characteristics we assessed included age, gender, ethnicity, education level, household income, employment status, marital status, and insurance coverage. Ethnicity was categorized as non-Hispanic white, non-Hispanic black, or other due to the small numbers of participants who reported other race/ethnicities.

Cancer diagnosis and treatment. We assessed type of cancer, stage of cancer at diagnosis, time of diagnosis of current cancer, current treatment status (waiting to begin treatment; currently in treatment; finished treatment), and prior cancer diagnoses. We also asked, “Did/does your treatment protocol include chemotherapy? surgery? radiation?” with response options of “No; Yes, I completed it; or Yes, I am currently going through it.”

Depressive symptoms. Depressive symptoms were assessed using the Centers for Epidemiological Studies Depression Scale – 10 item (CES-D), which is a 10-item depression screening tool but not a diagnostic tool (Radloff, 1977). It assesses distress associated with depressive symptoms in the past week. Response options range from 0 = “Rarely or none of the time” to 3 = “All of the time.” Higher total scores reflect greater distress. A score of 10 or higher has been used to indicate significant distress or a positive screen for depression. Cross-validation

of the Rasch-derived CES-D short form supported its utility and structural validity across samples. Tests of structural validity using latent variable modeling methodology indicated that a hierarchical, single-factor model of depressive symptoms had the best fit for the original full form and the Rasch-derived short form of the CES-D (Radloff, 1977). Cronbach's alpha of this scale in the current study is 0.82.

Hope. Hope was assessed using the 6-item State Hope Scale, which assesses the extent to which an individual endorses hope-related items on a scale of 1 = "Definitely false" to 8 = "Definitely true" (Snyder et al., 1996). This scale has three agency items and three pathways items assessing how respondents describe themselves "right now" (versus "in general"). Numerous studies support the scale's (1) internal reliability (alphas of 0.90–0.95 for the overall scale and ≥ 0.90 for the subscales); (2) factor structure; and (3) concurrent, discriminant, and convergent validity (Feldman & Snyder, 2000; Snyder et al., 1996). In terms of test-retest reliability, the longer periods between retests have lower reliability (i.e., 0.93 over a two-day interval and 0.48 over a thirty-day interval), as should hold true for assessments of state psychosocial measures. Cronbach's alpha of this scale in the current study is 0.89.

Perceived social support. Perceived social support from family, friends, and significant others was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988), which is a 12-item measure comprising three subscales: support from friends, support from family, and support from significant others. There are four items per subscale, each with response options ranging from 1 = "very strongly disagree" to 7 = "very strongly agree." Higher scores on each of the subscales indicate higher levels of perceived support, and a sum of the 3 scales yields a summary score. The construct and concurrent validity of the MSPSS has been supported with correlations with relevant measures of anxiety,

depressive symptoms, and previously validated social support scales (Zimet et al., 1988).

Previous studies suggest a low impact of social desirability bias influencing subject response (Zimet et al., 1988). The MSPSS has also demonstrated strong internal consistency (Cronbach's alpha = 0.85 to 0.91) and stability ($r = 0.72$ to 0.85) over a three-month period for all three subscales (Zimet et al., 1988). Cronbach's alpha for friends, family, and significant others subscales in the current study are 0.81, 0.85, and 0.84, respectively.

Quality of life. Quality of life was assessed using the Functional Assessment of Cancer Therapy – General (Cella et al., 1993), which is a 28-item scale assessing reactions to different items in terms of how they apply to the individual on a scale of 0 = “not at all” to 4 = “very much.” It yields a total score and subscale scores for physical, functional, social, and emotional well-being. Coefficients of reliability and validity have been shown to be uniformly high. The scale's ability to discriminate patients on the basis of stage of disease, performance status rating, and hospitalization status supports its sensitivity. It has also demonstrated sensitivity to change over time. Finally, the validity of measuring separate areas, or dimensions, of quality of life was supported by the differential responsiveness of subscales when applied to groups known to differ along the dimensions of physical, functional, social, and emotional well-being. Cronbach's alpha for physical, functional, social, and emotional subscales in the current study are 0.83, 0.79, 0.77, and 0.78, respectively.

Fruit and vegetable (FV) intake and physical Activity (PA). To assess FV intake, we asked, “Over the past 7 days, how many servings of fruit did you eat per day?” and “Over the past 7 days, how many servings of vegetables did you eat per day?” To assess physical activity, we asked, “In the last 2 weeks, how many days have you walked to get exercise?” This assessment of physical activity is limited to walking, but given our population (cancer survivors

at an average age of 57.72 years [SD=11.01]), we assumed that the most frequent type of exercise would be walking (Watson & Mock, 2004). We developed a ‘per week’ measurement of physical activity. Based on the recommendations for appropriate FV intake (FAO/WHO, 2005) and PA (U.S. Department of Health and Human Services, 2008) and the distributions of the data, we dichotomized the FV variable as < 5 servings of FV per day vs. \geq 5 servings of FV per day, and we dichotomized the PA variable as < 4 days of PA per week vs. \geq 4 days of PA per week.

Procedure

We mailed surveys to 798 potential participants, and research staff made follow-up phone calls to encourage participation one week later. We received notifications that 72 of these individuals were deceased, and 65 had incomplete or incorrect addresses. Upon making phone calls to encourage participation, an additional 48 were unreachable. This resulted in a final potential sample of 613. A total of 139 individuals completed and returned the survey for a response rate of 22.7% (n=139/613). Our sample was proportionately representative of the cancer types selected for inclusion in this study: lung cancer: n=39 (32.2%), head/neck cancer: n=17 (14%), and other smoking related cancer: n=65 (53.7%). Analyses for this study focus on the 128 participants who completed measures of interest in the current study. This study was approved by the Emory University Institutional Review Board.

Analysis

Participant characteristics were summarized using descriptive statistics. Bivariate analyses were conducted comparing 1) FV variable as < 5 servings of FV per day vs. \geq 5 servings of FV per day and 2) PA variable as < 4 days of PA per week vs. \geq 4 days of PA per week using chi-squared tests for categorical variables and independent samples t-tests for continuous

variables. We also assessed collinearity among the potential correlates of interest, specifically depressive symptoms, hope, social support, and quality of life measures using bivariate correlation. We then developed a binary logistic regression model for each of our outcomes of interest, forcing entry of age, gender, and marital status, and using backwards stepwise entry of other factors associated with our correlates of interest per the bivariate analyses at $p < .10$. Only factors associated at $p < .05$ were allowed to remain in the model. SPSS 18.0 was used for all data analyses. Statistical significance was set at $\alpha = .05$ for all tests.

Results

Table 1 presents participant characteristics. The mean age of the participants was 57.72 (11.01), with 53.5% (125) being male. More than half (56.3%) of the participants stated that they were married and/or living with a partner. The vast majority (90.5%) of the participants reported having some type of insurance. In the bivariate assessment of collinearity between variables, strong correlations were found between family social support and social and family well-being ($r = .74$, $p < .001$) and social support from significant others and family social support ($r = .75$, $p < .001$).

< INSERT TABLE 1 ABOUT HERE >

Fruit and Vegetable Intake

In the bivariate analysis (Table 2), hope was found to be significantly higher for those who ate five or more FV a day compared to those who ate fewer ($p = .023$). Those who ate five or more FV a day were found to have higher social support among their families ($p = .002$), friends ($p = .023$), and significant others ($p = .003$). In relationship to quality of life, social and family well-being ($p = .008$) was higher for those who ate five or more FV a day compared to those who

ate fewer FV. In our multivariate model controlling for age, gender, and marital status, significant factors associated with consuming 5 or more FV per day included higher social support from a significant other (OR=1.20, CI (1.06, 1.35), $p=.004$) and being female (OR=3.13, CI (1.19, 8.33), $p=.02$; Nagelkerke R-squared = .216).

< INSERT TABLE 2 ABOUT HERE >

Physical Activity

In the bivariate analysis, hope was found to be significantly higher for those who exercised 4 times or more per week compared to less ($p=0.001$). Those who exercised 4 times or more per week versus less were found to have higher social support among their families ($p=.002$), friends ($p=.001$), and significant others ($p=.005$). In relationship to quality of life, all of the components were found to be significant for those who exercised four or more times: physical well-being ($p=.011$), social and family well-being ($p=.002$), emotional well-being ($p=.004$), and functional well-being ($p=.004$). The binary logistic regression model indicated that, after controlling for age, gender, and marital status, the only significant factor associated with greater likelihood of walking for exercise included higher social support from friends (OR=1.19, CI (1.05, 1.33), $p=.003$; Nagelkerke R-squared = .177).

< INSERT TABLE 3 ABOUT HERE >

Discussion

Findings

The current research examined sociodemographic and psychosocial variables in relationship to FV intake and PA among cancer survivors. This study is one of the few studies examining psychosocial factors related to FV intake and PA among cancer survivors. Most

notably, our results indicated that, although many psychosocial factors were associated with FV intake and PA, social support was the most important.

The sociodemographic variables collected in this study showed that the majority of the participants were male and more than half of participants were married and/or living with a partner. Cancer survivors' partners could have more impact on FV intake and PA, due to living arrangements and personal relationships.

Fruit and vegetable (FV) intake

Consuming 5 or more FV per day was associated with higher social support from a significant other and being female, as indicated in our multivariate analysis. Significant others may be more likely to be involved in care taking and preparing the participants' meals, encouraging higher FV consumption. Similar to previous studies, social support systems were significantly correlated with participants' intention to eat FV (Brug et al., 1995). Also, previous studies have shown similar findings, that women were more likely to eat more FV than men (M. K. Serdula et al., 1995; Mary K. Serdula et al., 2004). Men have been found to have poorer knowledge about current dietary recommendations, whereas women are more likely to follow recommended guidelines (Baker & Wardle, 2003; Emanuel, McCully, Gallagher, & Updegraff, 2012). Compared to women, fewer men were even aware of the relationship between diet and disease (Baker & Wardle, 2003). The labeling, with healthy foods being more bright and colorful like the FV it contains, also may not be appealing to men (Baker & Wardle, 2003). Men's low FV intake was also explained by weaker beliefs in the importance of FV intake for their health, as well as lesser confidence in their ability to eat FV at work, when tired, while watching television, and when other junk foods are available to them (Emanuel et al., 2012). One study

explicitly examining constructs from the Theory of Planned Behavior showed that women reported greater perceived behavioral control and more favorable attitudes towards FV intake than men (Emanuel et al., 2012).

Several results of our bivariate analyses were similar to what has been found in prior research. Hope was found to be significantly higher for those who ate 5 or more FV a day, compared to those who ate fewer. This is similar to the findings of Berg and colleagues (2011) that higher levels of hope were associated with exercising among college students (C. J. Berg, Ritschel, L. A., Swan, D. W., An, L. C. and Ahluwalia, J. S., 2011). With FV intake and a healthy diet, cancer survivors may want to be involved in bettering their life post-cancer. The desire to want to improve life post-cancer could possibly come from having hope in living longer, being healthier or possibly being more proactive in their cancer prognosis.

Likewise, social support was greater for those who ate 5 or more FV a day when compared to those who ate fewer (Brug et al., 1995; Burke et al., 1999). This is consistent with the findings of Burke et al. (1999) that newly coupled people tend to consume more FV (Burke et al., 1999). It is also consistent with the findings of Brug et al. (1995) that social support systems were significantly correlated with participants' intention to eat FV (Brug et al., 1995).

We found no association between depressive symptoms and FV intake. Although not specifically to FV intake, depressive symptoms has been linked to decreased appetite (Akechi et al., 2003) Conversely, women who maintained healthy eating behaviors over a long period of time had lower odds of recurrent depressive symptoms in a previous study (Akbaraly, Sabia, Shipley, Batty, & Kivimaki, 2013). Although the present study was unable to find a protective

relationship between depressive symptoms and FV intake, consumption of healthy foods like FV should be encouraged for the well-being of cancer survivors.

In the current study, quality of life subscales assessing social and family well-being and the functional well-being were found to be significantly higher for those who ate more FV than those who ate fewer. Social and family well-being was also highly correlated with the social support scale. In a study of diet among cancer patients, the treatment group's quality of life improved over that of the control group due to differences in diet (Morey Mc & et al., 2009). The quality of life of cancer survivors seems to be important for overall health as well, as for engaging in healthy behaviors like FV consumption. Healthy interactions among others may influence FV consumption.

Physical Activity (PA)

As for PA, higher social support from friends was associated with walking for exercise, as indicated by our multivariate analysis. In another research study, combining a walking partner and a supportive environment could effectively facilitate older adult's physical activity (Carlson et al., 2012; Eyler et al., 1999). Similar to our results, previous research showed that friend support seems to play a role in influencing physical activity participation (Rogers et al., 2009). Encouragement, love, and support could be reasons having large social networks that include friends and family allows cancer survivors to be more engaged in PA.

The bivariate analyses found that hope related to an increased amount of PA among cancer survivors. In relation to PA, similar results were found with another study stating that higher levels of hope with exercising among college students (C. J. Berg, Ritschel, L. A., Swan,

D. W., An, L. C. and Ahluwalia, J. S., 2011). By having goals, the motivation and self-efficacy, components of hope, engaging in PA is likely to be attributable to cancer survivor's decision to walk for exercise.

In the current study, there were no significant findings for depressive symptoms and PA, although previously exercise has been shown to an effective treatment for depressive symptoms (Ernst E, 1998). In cancer patients who had completed treatment, PA was associated with significant reduction in depressive symptoms (Fong et al., 2012). Although this study found no association between depressive symptoms and PA, walking for exercise should be recommended for cancer survivors due to the health benefits of being physically active.

In the bivariate analyses, quality of life was found to be significantly higher for those who exercised more frequently. This is consistent with prior research. In a past study of breast cancer patients going through radiation therapy and chemotherapy, a home-based walking program was found to improve quality of life (Mock et al., 2001). In a home-based exercise and diet study, the quality of life of cancer patient in the treatment group improved over that of the control group (Morey Mc & et al., 2009). Quality of life improvements were also found during treatment of breast cancer, prostate cancer and hematologic malignancies when patient engaged in physical activity (Speed Andrews & Courneya, 2009). With all components of quality of life significant, there are many possible reasons as why PA could affect quality of life. Self-esteem, physical health, attitudes could all impact quality of life when engaging in PA.

Conclusions

After controlling for age, gender, and marital status, significant factors associated with consuming 5 or more FV per day included higher social support from a significant other and being female. In reference to physical activity, the only significant factor associated with greater likelihood of walking for exercise was higher social support from friends. This shows the importance of social support systems, quality of life and hope could have an impact on cancer survivor's FV intake and PA. Since these psychosocial variables show a relationship with FV intake and PA interventions could be created to improve their health, quality of life, and survival rate in hopes to strengthen survivors' mental and physical well-being, and with members of their social support systems.

Limitations

One of the main limitations of this study is the response rate. Fewer than one-fourth of individuals recruited responded, leaving room for a great deal of response bias.

There are also limitations of this study associated with the measures. First of all, there may be other factors that are related to FV intake and PA that were not assessed in this study. For example, one's ability to engage in PA and consume a healthier diet consisting of FV would be of interest to evaluate since medication, surgery, and appetite may have an impact on one's ability. Also, it would be interesting to see the impact the support of healthcare providers play in cancer survivor's hope and quality of life. Providing doctors and nurses with more techniques on handling a cancer diagnosis, its treatment and survivorship could improve the quality of care and the provider-patient relationships. Furthermore, recall bias could have affected the self-reporting of FV intake and PA, especially when asking about daily intake or endurance over a long period of time. With regard to physical activity, we asked specifically about walking for exercise

because this form of PA is by far the most common physical activity for this population.

However, this specificity limits our findings to only one type of PA.

Another limitation of this study was due to the variety of definitions and scales for hope. In this study the State Hope Scale was used instead of the Trait Hope Scale due to its brevity even though they are highly correlated (Cheavens, Gum, & Snyder, 2000). Snyder (1994) defines hope differently than some other authors, but our conceptualization of hope is restricted to that measured by Snyder's scale. In the research community there is the Herth Hope Scale, Becks Hopelessness Scale, and the Hope Index Scale (Beck & Steer, 1988; Herth, 1991; Obayuwana et al., 1982). These three alternative hope scales assess different aspects at which still relate to hope like an attitude-behavioral relationship or religious assets. With hope being occasionally subjective and empirical containing a variety of possibilities as its definition and meaning, it would be difficult to compare results from this study to others. This limited our access to comparable past literature.

Implications for Research and Practice

Attention must be given in the clinical encounter to ensure that patients are hearing the message of the benefits of increased FV intake and PA. Furthermore, results of this study indicated that it will be important to engage cancer survivors' support systems in influencing these behaviors. Future research should be conducted on the best ways of providing cancer patients the opportunities to engage in healthy behaviors related to their mental, physical and social well-being. Interventions that involve the cancer patient and members of their social support systems to increase their FV intake and PA would be a way to ways to improve their health, quality of life, and survival rate. Interventions such as these could strengthen survivors'

mental and physical well-being, and also their relationships with members of their social support systems. This information can assist healthcare staff members with intervening to help their patients live a healthier post-cancer life. Strengthening patients' support systems, and increasing their hope and quality of life can promote FV intake and PA, and help improve the life of cancer survivors.

Table 1. Survey participant's characteristics

Variable	Total N=128 N (%) or M (SD)
<i>Sociodemographics</i>	
Age (SD)	57.72 (11.01)
Gender (%)	
Male	68 (53.5%)
Female	59 (46.5%)
Ethnicity (%)	
White	101 (80.2%)
Black	20 (15.9%)
Other	5 (4%)
Marital status (%)	
Married/living with partner	71 (56.3%)
Other	55 (43.7%)
Education (%)	
≤ High school	39 (31%)
> High school	87 (69%)
Employment status (%)	
Employed part- or full-time	40 (32%)
Other	85 (68%)
Income (%)	
≤ \$2,399/month	62 (50.8%)
> \$2,399/month	60 (49.2%)
Insurance (%)	
Uninsured	12 (9.5%)
Some type of insurance	114 (90.5%)
<i>Cancer-related factors</i>	
Type of cancer (%)	
Lung	39 (32.2%)
Head/neck	17 (14%)
Other smoking-related cancer	65 (53.7%)
Years since cancer diagnosis (SD)	
Radiation (%)	80 (62.5%)
No	48 (37.5%)
Yes	
Chemotherapy (%)	49 (38.6%)
No	78 (61.4%)
Yes	
Surgery (%)	44 (35.5%)
No	80 (64.5%)
Yes	

Psychosocial factors

Depressive symptoms (SD)	10.23 (5.60)
Hope (SD)	33.45 (10.69)
Social support (SD)	
Family	22.78 (5.63)
Friends	21.19 (6.33)
Significant other	22.89 (6.78)
FACT scales (SD)	
Physical well-being	19.38 (7.07)
Social and family well-being	19.75 (6.19)
Emotional well-being	17.41 (5.26)
Functional well-being	16.74 (7.13)
<i>Health-related behaviors</i>	
Number of fruits per day (SD)	1.78 (2.52)
Number of vegetables per day (SD)	2.42 (2.20)
Number of fruit/vegetable intake (%)	
≥5 per day	35 (28%)
<5 per day	90 (72%)
Days walked for exercise in last two weeks (SD)	4.34 (4.743)
Number of days exercising past two weeks (%)	
≥4 days in past week	28 (22.2%)
<4 days in the past week	98 (77.8%)

Table 2. Bivariate analyses comparing cancer survivors reporting consumption of at least 5 fruits and vegetables per day versus less

Variable	Total N=125 N (%) or M (SD)	FV<5 per day N= 90 N (%) or M (SD)	FV≥5 per day N= 35 N (%) or M (SD)	p
<i>Sociodemographics</i>				
Age (SD)	57.76 (11.10)	58.11 (11.12)	56.82 (11.17)	.567
Gender (%)				.348
Male	65 (52.4%)	49 (55.1%)	16 (45.7%)	
Female	59 (47.6%)	40 (44.9%)	19 (54.3%)	
Ethnicity (%)				.435
White	98 (79.7%)	72 (81.8%)	26 (74.3%)	
Black	20 (16.3%)	12 (13.6%)	8 (22.9%)	
Other	5 (4.1%)	4 (4.5%)	1 (2.9%)	
Marital status (%)				.258
Married/living with partner	71 (57.7%)	48 (54.5%)	23 (65.7%)	
Other	52 (42.3%)	40 (45.5%)	12 (34.3%)	
Education (%)				.213
≤ High school	39 (31.7%)	25 (28.4%)	14 (40%)	
> High school	84 (68.3%)	63 (71.6%)	21 (60%)	
Employment status (%)				.529
Employed part- or full-time	40 (32.8%)	30 (34.5%)	10 (28.6%)	
Other	82 (67.2%)	57 (65.5%)	25 (71.4%)	
Income (%)				.882
≤ \$2,399/month	59 (49.6%)	43 (50%)	16 (48.5%)	
> \$2,399/month	60 (50.4%)	43 (50%)	17 (51.5%)	
Insurance (%)				.462
Uninsured	11 (8.9%)	9 (10.1%)	2 (5.9%)	
Some type of insurance	112 (91.1%)	80 (89.9%)	32 (94.1%)	
<i>Cancer-related factors</i>				
Type of cancer (%)				.389
Lung	38 (32.2%)	30 (35.7%)	8 (23.5%)	
Head/neck	16 (13.6%)	10 (11.9%)	6 (17.6%)	
Other smoking-related cancer	64 (54.2%)	44 (52.4%)	20 (58.8%)	
Radiation (%)				.374
No	78 (62.4%)	54 (60%)	24 (68.6%)	
Yes	47 (37.6%)	36 (40%)	11 (31.4%)	
Chemotherapy (%)				.729
No	48 (38.7%)	34 (62.2%)	14 (41.2%)	
Yes	76 (61.3%)	56 (58.8%)	20 (58.8%)	
Surgery (%)				.332
No	43 (35.5%)	29 (33%)	14 (42.4%)	
Yes	78 (64.5%)	59 (67%)	19 (57.6%)	

<i>Psychosocial factors</i>				
Depressive symptoms (SD)	10.27 (5.83)	10.67 (5.81)	9.26 (5.90)	.333
Hope (SD)	33.40 (10.78)	32.03 (10.36)	36.97 (11.19)	.023
Social Support (SD)				
Family	22.75 (5.68)	21.78 (5.92)	25.30 (4.06)	.002
Friends	12.10 (6.38)	20.29 (6.49)	23.21 (5.66)	.023
Significant other	22.97 (6.69)	21.86 (7.32)	25.82 (3.38)	.003
FACT scales (SD)				
Physical well-being	19.51 (7.02)	19.52 (7.22)	19.47 (6.56)	.973
Social and family well-being	19.75 (6.17)	18.77 (5.95)	22.03 (6.17)	.008
Emotional well-being	17.50 (5.18)	17.14 (5.32)	18.41 (4.76)	.227
Functional well-being	16.74 (7.13)	15.94 (7.17)	18.69 (6.73)	.054
Number of days exercising past week (%)				
≥ 4 days	27 (21.6%)	20 (22.2%)	7 (20%)	.786
< 4 days	98 (78.4%)	70 (77.8%)	28 (80%)	

Table 3. Bivariate analyses comparing cancer survivors reporting exercising at least 4 times per week versus less

Variable	Total N=126 N (%) or M (SD)	PA<4 per week N= 98 N (%) or M (SD)	PA≥4 per week N= 28 N (%) or M (SD)	p
<i>Sociodemographics</i>				
Age (SD)	57.70 (11.07)	57.26 (10.43)	59.26 (13.22)	.409
Gender (%)				.341
Male	66 (52.8%)	49 (50.5%)	17 (60.7%)	
Female	59 (47.2%)	48 (49.5%)	11 (39.3%)	
Ethnicity (%)				.319
White	99 (79.8%)	75 (77.3%)	24 (88.9%)	
Black	20 (16.1%)	17 (17.5%)	3 (11.1%)	
Other	5 (4%)	5 (5.2%)	0 (0%)	
Marital status (%)				.498
Married/living with partner	71 (57.3%)	54 (55.7%)	17 (63%)	
Other	53 (42.7%)	43 (4.3%)	10 (37%)	
Education (%)				.243
≤ High school	39 (31.5%)	33 (34%)	6 (22.2%)	
> High school	85 (68.5%)	64 (66%)	21 (77.8%)	
Employment status (%)				.302
Employed part- or full-time	40 (32.5%)	29 (30.2%)	11 (40.7%)	
Other	83 (67.5%)	67 (69.8%)	16 (59.3%)	
Income (%)				.116
≤ \$2,399/month	60 (50%)	51 (53.7%)	9 (36%)	
> \$2,399/month	60 (50%)	44 (46.3%)	16 (64%)	
Insurance (%)				.262
Uninsured	11 (8.9%)	10 (10.4%)	1 (3.6%)	
Some type of insurance	113 (91.1%)	86 (89.6%)	27 (96.4%)	
<i>Cancer-related factors</i>				
Type of cancer (%)				.295
Lung	38 (31.9%)	31 (33.7%)	7 (25.9%)	
Head/neck	16 (13.4%)	10 (10.9%)	6 (22.2%)	
Other smoking-related cancer	65 (53.7%)	51 (55.4%)	14 (51.9%)	
<i>Psychosocial factors</i>				
Depressive symptoms (SD)	10.26 (5.83)	10.35 (6.21)	9.75 (3.17)	.746
Hope (SD)	33.39 (10.74)	31.72 (10.98)	39.37 (7.27)	.001
Social support (SD)				
Family	22.79 (5.67)	21.96 (6.00)	25.64 (2.97)	.002
Friends	21.14 (6.37)	20.18 (6.60)	24.56 (3.94)	.001
Significant other	23.01 (6.68)	22.10 (7.00)	26.11 (4.28)	.005
FACT scales (SD)				
Physical well-being	19.38 (7.12)	18.48 (7.25)	22.41 (5.81)	.011
Social and family well-being	19.78 (6.15)	18.85 (6.4%)	22.89 (3.91)	.002

Emotional well-being	17.41 (5.25)	16.69 (5.34)	19.93 (4.07)	.004
Functional well-being	16.74 (7.13)	15.76 (6.98)	20.29 (6.63)	.004
Number fruit/vegetable per day (%)				.786
≥ 5 per day	35 (28%)	28 (28.6%)	7 (25.9%)	
< 5 per day	90 (72%)	70 (77.8%)	20 (74.1%)	

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