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Identifying Risk and Protective Factors Related to Depressive Symptoms among Northern Plains American Indian Women Cancer Survivors

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Abstract

Cancer is the leading cause of death among American Indian and Alaska Native (AIAN) women, and depressive symptoms have been linked to higher mortality, but research on depressive symptoms among AIAN cancer patients has been scant. The purpose of this exploratory study was, using the Framework of Historical Oppression, Resilience, and Transcendence (FHORT), to examine risk and protective factors related to depressive symptoms in American Indian (AI) women cancer survivors. We examined the relationships of adverse childhood experiences (ACE), perceived health status, resilience, and social support with depressive symptoms in Northern Plains AI women cancer survivors. We used a cross-sectional design with purposive sampling of 73

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female cancer survivors (aged 18 years or older) between June 2014 and February 2015. Hierarchical multiple regression was used to test three sets of variables in relation to depressive symptoms: (1) sociodemographics, (2) risk factors (ACE and perceived health), and (3) protective factors (psychological resilience and social support). Approximately 47% of participants had probable depressive symptoms. Depressive symptoms were inversely associated with perceived health, psychological resilience, and social support. These results support bolstering existing social support among AI cancer patients and survivors as well as prevention and intervention efforts that strengthen resilience.

Keywords

Cancer survivors; depressive symptoms; risk factors; protective factors; American Indian women

Cancer is the leading cause of death among American Indian and Alaska Native (AIAN[1]) women and the second leading cause of death among their male counterparts (Espey et al. 2014). Although advances in cancer treatment are growing, cancer death rates have continuously increased in recent years for AIANs, whereas these rates have declined for whites (Espey et al. 2014, S303-S311). In other words, the progress in reducing cancer deaths for whites has not been shared by AIANs (Espey et al. 2014. Regardless of ethnicity, depressive symptoms have been consistently associated with increased mortality among cancer patients (Walker et al. 2014), therefore, research on the risk and protective factors related to depressive symptoms among cancer patients is needed.

Although no studies on the prevalence of depressive symptoms among AIAN cancer survivors were found, a systematic review of studies, limited to those that used diagnostic interviews, indicated that the prevalence of depressive symptoms among cancer patients differed across U.S. regions and health care settings, ranging from 5 to 16% among outpatients, 4 to 15% among inpatients, 4 to 11% in mixed outpatient and inpatient settings, and 7 to 49% in palliative care (Walker et al. 2013). Traeger et al. (2014) found in a sample of over 5,000 adults diagnosed with lung cancer across four geographic regions that the proportion of black men exhibiting depressive symptoms was 24.7%, compared to 20.6% for white women, 15.8% for black women, and 15% for white men. Depressive symptoms can also differ by cancer type (Massie 2004). The prevalence of depressive symptoms rates also vary across different racial and ethnic groups (Aguado Loi et al. 2013; Moreno-John et al. 2004), making research collecting data on prevalence for specific AIAN tribes important.

In conjunction with the higher prevalence of depressive symptoms for cancer patients, these symptoms have also been associated with lower adherence to treatments, poorer quality of life, higher healthcare costs, and increased mortality among cancer patients (Walker et al. 2013). Although cancer is the leading cause of death for female AIANs, and depressive symptoms have been linked with higher mortality (Espey et al. 2014), research on depressive symptoms among AIAN cancer patients has been scant. Therefore, uncovering the risk and protective factors for depressive symptoms among such patients is particularly important.

[1]We use the terminology *AIAN* for the background of extant research, which is inclusive of Alaska Natives; however, the sample for this research only included American Indians (*AI*), so we limited the scope to AIs when speaking of the data specific to this study.

Resilience Among American Indians

This research used the holistic Framework of Historical Oppression, Resilience, and Transcendence (FHORT), which is an ecological model developed in collaboration with AIANs through empirical research identifying risk and protective factors (Author(s), 2017b). The concept of Historical Oppression (HO) expands upon the prominent concept of historical trauma (Brave Heart and DeBruyn 1998,; Brave Heart 1999b; Brave Heart 1999a) yet includes both historical and contemporary forms of oppression. HO includes chronic, severe, and intergenerational forms oppression, which, over time may be imposed and internalized into the daily lives of many AIs (Burnette 2015b Burnette 2015a). HO is distinct in that it is localized to distinct contexts and is inclusive of the contemporary factors that continue to perpetuate oppression (e.g., discrimination, poverty, and oppression (Burnette 2015b)).

Although AIAN populations have demonstrated remarkable resilience, despite experiencing centuries of HO, most research with AIANs continues to focus on risk factors for social and health disparities (Burnette 2015a), which can inadvertently stigmatize already oppressed groups. Indeed, research with AIAN populations tends focus solely on problems and risk factors, and researchers have begun to emphasize the need for a greater focus on resilience, which may positively impact AIAN populations long-term (McMahon, Kenyon, and Carter 2012). AIAN tribes vary in terms of history, cultures, languages and social norms, and despite some overlap across risk and protective factors of AIAN and non-AIAN populations, many of the risk and protective factors for behavioral health outcomes, such as depression, substance dependence, suicide, and post-traumatic stress disorder (PTSD) vary by tribe (Burnette 2015a).

Resilience acknowledges the continuous efforts made by AIAN peoples to respond and transcend HO. *Resilience*, which has often been described as the positive adaptation to adversity, is particularly important (Greene 2009. Adversity may include challenging life experiences, such as experiencing cancer, discrimination, or trauma. *Risk factors* are those, such as depressive symptoms, which increase the probability of negative outcomes (Greene 2009). *Protective factors*, in contrast, buffer against risk factors and negative outcomes and have been associated with positive life outcomes (Greene 2009); these protective factors may include social support and positive outlooks. According to FHORT, the balance of risk and protective factors across multiple ecological levels (i.e., individual, family/relational, community/cultural, societal) is associated with whether a person experiences wellness (balance across physical, mental, emotional and spiritual health after experiencing adversity (Cross 1998; West et al. 2012; Wright et al. 2011; Burnette and Figley 2016).

Protective Factors Related to Depressive Symptoms

Social support, including from friends and family, buffers or protects against the development of depressive symptoms in women with cancer. In a study with 199 women at heightened risk for breast cancer, social support and optimism was associated with lower rates of depressive symptoms (Garner et al. 2015). A study with cancer patients in Korea found that low perceived social support was significantly associated with higher levels of

depressive symptoms and symptom scales, as well as lower functional scores and quality of life (Eom et al. 2013). Thus, across diverse populations, social support appears to be a robust protective factor against depressive symptoms.

Psychological resilience has also been shown to be an important protective factor against depressive symptoms for cancer patients. A multi-site study of 425 prostate cancer patients examined the relation of resilience to depressive symptoms using the Conner-Davidson Resilience Scale (CD-RISC), which measures psychological resilience (Sharpley, Bitsika, Wootten et al. 2014a). Sharpley et al. (2014) found that some aspects of psychological resilience, namely staying focused under pressure, knowing where to turn for help in a crisis, and maintaining a humorous perspective, buffered against depressive symptoms among cancer patients, whereas the other aspects of resilience did not. Moreover, a study with 133 breast cancer patients receiving postoperative chemotherapy found that psychological resilience, as measured by the CD-RISC scale, was associated with lower levels of depressive symptoms (Kun et al. 2013). Despite the protective effects of resilience for cancer patients, no research of which we are aware has been published that is specific to AIANs in examining psychological resilience for cancer patients.

Risk Factors Related to AIAN Depressive Symptoms

Among risk factors, adverse childhood experiences (ACE) tend to be negatively associated with depressive symptoms among AIANs. For example, a study of 233 older AIs in the Midwest found that certain dimensions of ACE, namely childhood neglect and household dysfunction, were positively associated with depressive symptoms (Roh et al. 2014). Another study with AIANs from the Southwest and Northern Plains indicated that childhood physical abuse was associated with depressive disorders (Libby et al. 2005). Thus, existing research indicates preliminary support for ACE as a risk factor for depressive symptoms among AIAN adults, but it has not been examined among AIAN cancer survivors.

The perception of poor health has been identified as a factor related to depressive symptoms among older AIs (Roh et al. 2014; Honkalampi et al. 2005). Additionally, comorbidity between depressive symptoms and other health conditions among AIANs is prominent (Goins and Pilkerton 2010). In summary, social support and psychological resilience are key protective factors for depressive symptoms among cancer patients, whereas perceived poor health and ACE are risk factors. Yet, research specific to AIAN populations is lacking, and the diversity across more than five million people (United States Census 2010) belonging to 573 federally recognized tribes (Bureau of Indian Affairs 2018) and approximately 400 non-federally recognized tribes (U.S. Government Accountability Office 2012) make examining distinct tribal contexts important. Moreover, cancer mortality and depressive symptoms rates can vary by gender (Espey et al. 2014, S303-S311), which warrants the investigation of women's experiences separately. Therefore, the purpose of this exploratory study was to examine risk and protective factors related to depressive symptoms among female AI cancer survivors. Thus, our hypotheses as they related to female AI cancer survivors were as follows:

Risk Factors:

1. Higher levels of ACE would be associated with higher levels of depressive symptoms;
2. Lower levels of perceived health would be associated with higher levels of depressive symptoms;

Protective Factors:

3. Higher levels of social support would be associated with lower levels of depressive symptoms; and
4. Higher levels of psychological resilience would be associated with lower levels of depressive symptoms.

Methods

Participants and Data Collection

A cross-sectional survey research design was used for this study. This study employed a community-based participatory research (CBPR) approach and formed a community advisory board (CAB), which consisted of AI community leaders, health care professionals who work in the American Indian community, and social workers from social service agencies. The CAB's mutually agreed upon primary responsibilities were to: (1) identify project-related community needs and concerns; (2) provide guidance on participant recruitment and dissemination; and (3) promote community support and involvement in this research. A purposive sampling technique was employed based on recommendations from our CAB. Participants were recruited from two non-profit hospitals in South Dakota, which included the Avera Medical Group Gynecologic Oncology in Sioux Falls and John T. Vucurevich Cancer Care Institute, Rapid City Regional Hospital in Rapid City.

Eligibility criteria for participation included: (1) a personal history of any type of cancer within the previous 10 years; (2) an AI woman with a tribal enrollment identification card; (3) completion of cancer treatment without signs or symptoms of recurrence at the time of interview; (4) aged 18 years or older; and (5) resident in South Dakota. Participant recruitment involved three steps. First, a list of cancer survivors was developed through the two partner hospitals. Then, the staff in the two participating hospitals mailed a flyer to these cancer survivors. Second, individuals who were on the above list or who responded to the advertisement were phoned by interviewers for initial screening. A total of 100 flyers were sent to AI women cancer survivors. A total of 76 women responded, but more than 10 years had elapsed since cancer diagnosis for three respondents who were thus excluded, resulting in the final sample of 73. After determining eligibility, an interview was scheduled at the interviewee's preferred location (i.e., participants' residence, a private conference room, a lead author's office, community church, and office).

Upon appropriate Institutional Review Board approval (e.g., two hospitals, university, and funding agency) a survey was conducted in participants/ preferred locations between June 2014 and February 2015. We fully explained the purpose of our study, eligibility criteria,

risks/benefits, confidentiality, and contact information of the research team. Participants were also informed that their participation would be entirely voluntary and that they could withdraw at any time should they become uncomfortable with the study. Prior to the survey, all participants provided written, signed informed consent. All 73 participants completed a self-administered survey. The questionnaire took about 30 minutes to complete, and participants were paid $20 cash for their participation.

Measures

Dependent variable.—The Center for Epidemiologic Studies Depressive symptoms Scale Short Form (CES-D-SF) (Radloff 1977, 385–401) was used to identify depressive symptoms. The instrument contains eight negatively stated items and two positively stated items (reverse coded). The items assess how often symptoms, such as loneliness, feelings of fearfulness, and restless sleep, were experienced during the past week. Participants' responses were coded on a 4-point Likert scale. Although a clinical diagnosis of depressive symptoms cannot be made based on scores using this instrument, a score of 10 (Miller, Anton, and Townson 2008) or higher on the CES-D-SF is typically suggested as a cutoff for probable depressive symptoms. Internal consistency was 0.79 in the current study.

Adverse Childhood Experiences (ACE).—ACE were defined in this study as any exposure to traumatic situations, chronic stressors, or specific traumatic events before the age of 18 years. Childhood adversity was measured using the ACE questionnaire (Centers for Disease Control and Prevention 2014; Dube et al. 2003; Felitti et al.1998). This questionnaire assesses 11 types of childhood adversity among seven categories of childhood exposures to abuse and household dysfunction: psychological abuse, physical abuse, sexual abuse, substance abuse, mental illness, mother treated violently, and criminal behavior in household. The responses for the 11 items were summed to produce a total score (range = 0 – 11) with higher scores indicating greater exposure to childhood maltreatment. Cronbach's alpha coefficient was 0.75 in the present study.

Perceived health.—This factor was measured with a single item, "how would you rate your overall physical health at the present time?" Participants were asked to rate their health on a 4-point Likert scale ranging from (1) *poor* to (4) *excellent.*

Social support.—Social support was measured using the Medical Outcomes Study Social Support scale (MOS-SSS) (Sherbourne and Stewart 1991), which measures strength of perceived social support available. Sherbourne and Stewart (1991) discussed five dimensions of social support: positive social interactions, emotional support, informational support, tangible support, and affectionate support. The social support scale consists of ten items and asks and how often each of the kinds of support is available if needed. Three items assessed instrumental support and seven items measured emotional support from the MOS-SSS. Participants were asked to rate their responses on a five-point Likert scale ranging from (1) *seldom* to (5) *always*. Scores on the social support measure can range from 10 to 50, with higher scores indicating greater support. Internal consistency was 0.78 in the current study.

Psychological resilience.—To assess psychological resilience, the 10-item abbreviated version of the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) was used. The original scale was developed as a self-reported measure of successful stress-coping ability (Connor and Davidson 2003) and was based on a conceptual model of psychological resilience as the successful adaptation to disruptive events (Richardson 2002). The ten items were scored on a five-point response scale (0 = *not true at all* to 4 = *true most of the time*). To score this measure, items were summed to create a count scale with a range from 0 to 40. Internal consistency was 0.90 in the current study. When examining their psychometric properties of the CD-RISC full and abbreviated versions for use with older AIs, Goins, Gregg, and Fiske (2013) found these scales to perform similarly for older AIs as other populations, and results indicated stronger support for use of the abbreviated form with this population.

In addition, this study included three socio-demographic factors as control variables: age, time since cancer diagnosis, and cancer type (Burgess, Caroline, et al., 2015; Linden, Wolfgang, et al., 2012: Author(s) 2016b). Age (*in years*) and time since cancer diagnosis (*in years*) were continuous variables. Cancer type was a dichotomous variable (*breast cancer was coded as* 1*, other (cervical cancer, colon cancer, lung cancer, non-Hodgkin lymphoma, sarcoma, etc. coded as* 0).

Analytical Plan

Data were screened prior to conducting the main analyses as recommended (Tabachnick and Fidell 2007). No missing data were identified for study variables and depressive symptoms (CES-D-SF), the outcome variable, did not significantly deviate from normal, $D(73) = 0.102$, $p = 0.058$. Residual plots were inspected following this preliminary analysis to check normality, linearity, and homoscedasticity assumptions. Residual plots showed the data met assumptions. To test study hypotheses, we performed hierarchical multiple regression (Mertler and Vannatta 2010). For this regression model, the control and main independent variables were selected through relying upon the findings of previous studies, indicating the variables were significantly related to depressive symptoms. Initial associations among the continuous study variables and CES-D-SF were evaluated by conducting Pearson's correlations to understand their significance to depressive symptoms. Additionally, in the hierarchical regression analysis, a stepwise selection procedure was used to determine significant independent variables in the model and appropriate model fit (Bursac et al. 2008). Using the stepwise (forward and backward) procedure, variables with the highest *t*-statistics were selected in the model (Zhang, 2016). Variables associated with the outcome at $p < 0.05$ were retained in the stepwise regression. The regression analysis included three steps. In Step 1, age, time since cancer diagnosis, and cancer type were entered to control for their potential associations with depressive symptoms. ACE and perceived health (risk factors) were entered next in Step 2. Psychological resilience and social support (protective factors) were entered in Step 3.

We examined model fit using R^2, which denotes the proportion of variance of the dependent variable accounted for by the independent variables, and βs ($p < 0.05$) to identify the relationship of individual independent variables. Given the limited scope and the exploratory

nature of the study, and that the relationships examined in this study have received scarce attention in our population of interest, we did not test for interactions. In addition, due to our modest sample size, we accounted for a potential loss of power by implementing bootstrap resampling with mean replacement (Giger et al. 2015), a modern, robust statistical method used to maximize the accuracy and power of research (Adèr, Adèr, and Mellenbergh 2008; Erceg-Hurn and Mirosevich 2008). Additional resources would have enabled extension of our recruitment period and potentially increased our sample size, thus relying less on bootstrap procedures to increase the precision of our preliminary findings. Bootstrap procedures simulated 10,000 resamples with mean replacement. Robust parameter estimates are reported using bias corrected and accelerated (BCa) methods (DiCiccio and Efron 1996). With the original sample, hierarchical regression indicated the same significant variables (perceived health, resilience, and social support) related to depressive symptoms compared to results with the bootstrap resampling. SPSS for Windows version 22 software was used.

Results

The age of participants ranged from 32 to 77 years, with a mean of 56.5 years (Table 1). Almost all (97.3%) participants had at least a high school degree/GED. Approximately 43% of the participants reported a monthly household income of less than $1,499. Forty percent of the sample described their health as *poor or fair*. About a third of the sample had had breast (n=25, 34.3%); about a quarter had had cervical (n=20, 27.4%), and less than 10% had had colon (n=7, 9.6%) or lung cancer (n=4, 5.5%), and Non-Hodgkin Lymphoma (n=4, 5.5%), and others comprised less than 20% (n=13, 17.8%). The mean score for ACE was 2.5, which indicated participants reported approximately three ACE. The mean score for social support was 36.59, revealing respondents reported moderate social support. The psychological resilience mean score was 31.50, indicating that participants had moderate resilience. For depressive symptoms, the mean score was 9.31. Using CES-D-SF categories, approximately 46.6% of participants could be classified as having high levels of depressive symptoms (≥ 10).

Bivariate Correlations Among Variables

We observed significant correlations among variables that ranged from 0.21 to 0.52, indicating correlations approached medium-to-large magnitudes (Table 2). As evidenced by robust BCa confidence intervals (CIs), relationships between perceived health, psychological resilience, social support and depressive symptoms were large and stable (r = +0.50, $p \leq$ 0.01). Contextual health and risk factor associations were also observed. The correlation of psychological resilience with social support was moderate and statistically significant (r=0.36, $p \leq 0.01$). These protective factors were also strongly associated with perceived health and ACE. Correlations between cancer type, time since cancer diagnosis, and age approached medium effect sizes, and BCa 95% CIs were largely stable, except for three coefficients (Table 2). Resampling revealed the initial correlation between age and type of cancer was significant (p=0.02) but unstable as the 95% CI included 0. Associations among perceived health and psychological resilience (p=0.07), along with ACE and social support (p=0.06) approached significance with Pearson standard correlations and showed significance when bootstrapped.

Risk and Protective Factors for Depressive Symptoms

Cohen's (1988) effect size convection was used in this study. The full hierarchical multiple regression model of factors related to depressive symptoms was significant, accounting for 53% of the variance in depressive symptoms, $F(5, 67) = 5.53$, $p < 0.001$ (Table 3). Two of the three steps of the analysis contributed additional, unique variance to the model. In Step 1, the contribution of age, cancer type and time since cancer diagnosis to our model was non-significant, F change (3, 69) = 1.53, $p = 0.213$, $R^2 = 0.06$, which is considered a relatively small effect size (ES). After the variability in depressive symptoms due to age, cancer type and time since cancer diagnosis was taken into account, ACE and health explained significant variance in Step 2, F change (5, 67) = 10.87, $p < 0.001$, $R^2 = 0.29$, which represents a large ES. In this Step 2, only perceived health was a significant associated with lower depressive symptoms ($B = -3.22$, $p \leq 0.001$). After the variability in depressive symptoms was controlled in our previous models, psychological resilience and social support together explained additional significant variance in Step 3 (F change (7, 65) = 16.06, $p < 0.001$, $R^2 = 0.53$), again representing a large ES. Together study variables accounted for 53% of the variance in depressive symptoms.

In Step 3, the results revealed that higher levels of perceived health ($B = -2.38$, $p \leq 0.001$), resilience ($B = -0.22$, $p \leq 0.01$), and social support ($B = -0.14$, $p \leq 0.01$) were significantly associated with lower levels of depressive symptoms. However, age, cancer type, time since cancer diagnosis, and ACE were not significantly related to depressive symptoms. We ran a post hoc model with only significant variables ($B < 0.05$) from our full model (Step 3) for comparison purposes. The three factor model, $F(3, 69) = 23.39$, $p < 0.001$, $R^2 = 0.50$, included perceived health ($B = -2.27$, $p \leq 0.001$), resilience ($B = -0.25$, $p \leq 0.001$), and social support ($B = -0.14$, $p \leq 0.001$). Our post hoc model removed four factors, age, cancer type, time with since cancer diagnosis, and ACE from our full model, yet accounted for 3% less of the variance.

Discussion

The purpose of this study was to examine depressive symptoms and relevant risk and protective factors among AI women cancer survivors in the Northern Plain region. Importantly, almost half of participants (46.6%) reported elevated depressive symptom levels, indicating these symptoms were prominent across AI women cancer survivors. As a first study examining risk and protective factors related to depressive symptoms among AI women cancer survivors, it is promising that three out of four hypotheses were supported, including poor perceived health as a risk factor and social support as well as psychological resilience as protective factors, accounting for 50% of the variance of depressive symptoms among this AI population.

The results did not support the first hypothesis, investigating whether ACE was positively associated with higher level of depressive symptoms. This runs contrary to other studies (Roh et al. 2014; Libby et al. 2005), which have found dimensions of ACE to be related to depressive symptoms in AIs. Future research can investigate this hypothesis with other AI samples and examine whether specific components of ACE may be risk factors for depressive symptoms.

The second hypothesis was supported, indicating lower levels of perceived health were significantly associated with higher levels of depressive symptoms. This finding is congruent with other research results identifying perceived poor health as a risk factor related to depressive symptoms (Honkalampi et al. 2005; Roh et al. 2014) and indicates that, like other chronic health conditions, cancer may increase the risk for depressive symptoms (Bell et al. 2005). In addition, both the third and fourth hypotheses were substantiated, indicating higher levels of psychological resilience and social support were associated with lower level of depressive symptoms. This is consistent with other research highlighting these protective factors related to depressive symptoms among cancer patients (Garner et al. 2015; Pinar et al. 2012,; Kun et al. 2013; Sharpley, Bitsika, Wootten et al. 2014b).

Limitations

Several limitations of our study should be noted. First, the cross-sectional design limited our ability to identify temporal relations among variables and thus to make causal conclusions about the findings. Additionally, the sample was not representative of AI women cancer survivors throughout the United States. The use of a purposive sampling method to recruit AI adults in a South Dakota state also limits the generalizability of the findings to AIs in other settings or states. In addition, because data on tribal membership were not collected we could not examine tribal differences in any of the examined variables. Further, selection bias might have affected the findings in several ways. Participants who chose to participate in the study might have been more willing to discuss the cancer and depressive symptoms than those who did not choose to participate. Future studies with more representative samples of AI adults generally and also across different tribes and rural/urban contexts will provide a fuller picture of depressive symptoms among AI women cancer survivors.

Additionally, several limitations are based on measurement choices used in the study. First, all of the data are based on self-report, and participants could have provided answers they considered to be socially desirable. Second, some measures had not been used previously with AIs. Culturally grounded tools or wellness instruments might best be used with this population in future studies, such as the HO Scale, and the Indigenous Family Resilience Scale, which were developed through in-depth mixed-methods ethnographic research and long-term collaborations with tribes (Author(s), 2018). Finally, including multiple cancers and stages, along with the heterogeneity of the AI sample may limit inferences that may be made from this research. However, other research with AI women cancer survivors has indicated that common themes related to depressive symptoms are present across cancer types (Author(s), 2017). Given the scarcity of extant research on the topic (i.e., no known research on rates of depressive symptoms among AIAN cancer survivors), we believe this exploratory research provides some scaffolding for future research to build upon.

Implications

This research offsets a tendency to focus solely on risk factors among AI populations (Burnette and Figley 2016; Burnette 2015a) and identified multiple protective factors related to depressive symptoms among cancer survivors. These are particularly important, given that almost half of this sample reported symptoms consistent with elevated depressive symptoms.

The implications of the results support the bolstering of existing social support among AI cancer patients and survivors as well as prevention and intervention efforts that strengthen resilience. Individual or support groups could include activities that are aimed at such resilience. Moreover, improving physical health may enhance psychological wellbeing. This finding is consistent with other research supporting a wellness approach to health, given many AIANs value the interconnections between physical, mental, emotional and spiritual health (Burnette 2015a). Interventions and prevention efforts in line with this approach may include working with natural helping systems and traditional medicine to achieve wellness.

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Table 1

Demographic Characteristics of the Sample (N = 73)

Age in years, *Mean* (*SD*)	Range: 32 to 77	56.49	(8.4)
Educational attainment, *n* (%)	Lower than high school diploma/GED	2	(2.7)
	High school diploma/GED	21	(28.8)
	Greater than high school diploma/GED	50	(68.5)
Perceived health, *n* (%)	Poor or fair	29	(39.7)
	Good or excellent	44	(60.3)
Monthly household income, *n* (%)	Less than $1,499	31	(42.5)
	$1,500-$2,999	25	(34.2)
	More than $3,000	16	(21.9)
Type of cancer, *n* (%)	Breast	25	(34.2)
	Cervical	20	(27.4)
	Colon	7	(9.6)
	Lung	4	(5.5)
	Non-Hodgkin Lymphoma	4	(5.5)
	Others	13	(17.8)
Time with cancer, *Mean* (*SD*)	Ranged from 3 month to 10 years	3.80	(3.4)
Adverse Childhood Experience, *Mean* (*SD*)	Ranged from 0 to 9	2.50	(2.3)
Resilience, *Mean* (*SD*)	Ranged from 12 to 40	31.50	(6.7)
Social support, *Mean* (*SD*)	Ranged from 14 to 96	36.59	(13.5)
Depressive symptoms, *Mean* (*SD*), *n* (%)	Ranged from 0 to 24	9.31	(5.5)
	Normal	337	(50.7)
	Probable depressive symptoms	34	(46.6)

Note: Percentages may not equal 100% due to rounding, missing data, or “refused to answer.”

Table 2

Intercorrelations and Bias Corrected and Accelerated 95% Confidence Intervals (BCa 95% CI) Between Depressive symptoms and Independent Variables

Variables	1.	2.	3.	4.	5.	6.	7.
1. CES-D	−−						
2. Age	−0.24 [−0.23, 0.28]	−−					
3. Cancer Dx	0.17 [−007, 0.38]	0.28 * [−0.00, .054]	−−				
4. Per year since Cancer Dx	−0.14 [−.036, .011]	0.25 * **[0.03, 0.45]**	0.26 * **[0.02, 0.49]**	−−			
5. Perceived health	−0.50 ** **[−0.67, −0.29]**	−0.17 [−0.41, 0.11]	−0.13 [−0.36, 0.10]	−0.01 [−0.23, 0.19]	−−		
6. ACE	0.05 [−0.21, 0.29]	−0.05 [−0.24, 0.16]	0.11 [−0.09, 0.33]	0.08 [−0.15, 0.32]	−0.11 [−0.35, 0.13]	−−	
7. Resilience	−0.52 ** **[−0.65, −0.38]**	−0.01 [−0.26, .023]	−0.22 [−0.45, 0.02]	0.01 [−0.23, 0.26]	0.26 * **[0.03, 0.47]**	0.01 [−0.21, 0.22]	−−
8. Social Support	−0.52 ** **[−0.64, −0.41]**	−0.13 [−0.36, 0.08]	−0.08 0.28, 0.13]	0.13 [−0.13, 0.36]	0.21 **[0.00, 0.40]**	−0.22 **[−0.40, −0.01]**	0.36 ** **[0.13, 0.56]**

Note: Significant robust correlation coefficient confidence intervals are emboldened. Pearson correlations and bias-correlated and accelerated 95% CIs were calculated. Bootstrap procedures used 10,000 resamples with replacement to calculate CIs. CES-D = Center for Epidemiologic Studies Depressive symptoms. Cancer Dx = Type of cancer. ACE = Adverse Childhood Experiences.

* $p \leq 0.05$

** $p \leq 0.01$.

Table 3

Hierarchical Regression Analysis Summary for Variables Predicting Depressive Symptoms (N =73)

Step & variables	*B*	*SE B*	BCa 95%	β
Step 1:				
Age, per year	0.01	0.07	[−0.13, 0.14]	0.01
Cancer Dx	0.01	0.40	[−0.15, 1.30]	0.21
Per year since Cancer Dx	−0.31	0.20	[−0.68, 0.07]	−0.20
F test	1.53			
R^2	0.06			
Adjusted R^2	0.02			
Step 2:				
Age	−0.03	0.06	[−0.14, 0.09]	−0.06
Cancer type	0.43	0.33	[−0.19, 1.06]	0.17
Per year since Cancer Dx	−0.27	0.18	[−0.61, 0.08]	−0.17
ACE	−0.00	0.26	[−0.58, 0.45]	−0.02
Perceived health	−3.22	0.69	[−4.58, −1.72]	−0.49***
F test	5.53***			
R^2	0.29			
Adjusted R^2	0.24			
Step 3:				
Age	−0.04	0.05	[−0.14, 0.07]	−0.09
Cancer type	0.23	0.29	[−0.30, 0.73]	0.09
Per year since Cancer Dx	−0.14	0.14	[−0.38, 0.12]	−0.09
ACE	−0.18	0.23	[−0.64, 0.28]	−0.08
Perceived health	−2.38	0.65	[−3.66, −1.09]	−0.36***
Resilience	−0.22		[−0.38, −0.08]	−0.27**
Social Support	−0.14		[−0.25, −0.07]	−0.36**
F test	10.31***			
R^2	0.53			
Adjusted R^2	0.47			

Note:

* $p \leq 0.05$.

** $p \leq 0.01$.

*** $p \leq 0.001$.

BCa 95% CIs = Bias Corrected and Accelerated 95% Confidence Intervals. Cancer Dx = Cancer type. ACE = Adverse Childhood Experiences. Bootstrap procedures used 10,000 resamples with replacement to calculate CIs.