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# The Relationship Between Age, Anxiety, and Depression in Older Adults With Cancer

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## Introduction

By the year 2030 older adults will account for 20% of the U.S. population[1], almost doubled from 2005[2]. Cancer is a disease of aging; over half of all cancer diagnoses and almost three quarters of cancer deaths occur in patients older than 65[3]. The development and progression of comorbid conditions and the accelerating loss of spouses, friends and loved ones may make older adults with cancer more vulnerable to anxiety and depression[4]. The rate of anxiety in older oncology patients has been cited to be as high as 23%[5], while depression in older oncology patients ranges from 17–26%[6].

Despite the various challenges faced by geriatric oncology patients, recent studies have suggested that age may actually serve as a protective factor against cancer-related psychological distress[7]. Distress is an umbrella term encompassing factors such as quality of life, anxiety, and depression. When teasing apart distress, age may not buffer against all facets of distress. For example, in a study of older men (age 50 and older) with prostate cancer, while increased age was associated with reduced anxiety ($p < 0.01$), increased age was also associated with *greater* depressive symptoms ($p < .01$)[8]. The percentage of men scoring above the cut-off for depression consistently increased with age.

Despite the burgeoning geriatric oncology population and the importance of understanding how age may be related to constructs such as anxiety and depression, there has been limited further exploration of changes in anxiety and depression related to age *within* an older population of patients. Depression and anxiety are associated with poorer treatment outcomes[9], reduced ability to make treatment decisions, decreased adherence to lengthy treatment and longer hospital stays[10–14], and suicide[1,15]. Given the serious consequences of unrecognized and untreated depression and anxiety, it is important for clinicians to know if older adults are more vulnerable, and which variables might serve as signals to screen for depression and anxiety among this population. The current study seeks to explore the relationship between age, anxiety and depression within an older oncology population. Based on the literature, we hypothesized that anxiety would decrease with age while depression would increase with age.

# Methods

## Participants & Procedures

This study was a secondary analysis of a dataset using baseline (pre-chemotherapy) data. The main study was a prospective longitudinal study with 500 older adults (age ≥65) aimed at identifying risks of chemotherapy toxicity and developing a risk stratification schema for chemotherapy toxicity[16]. Patients were recruited from the outpatient oncology practices between November 2006 and November 2009. Eligible patients had a diagnosis of cancer, were scheduled to receive a new chemotherapy regimen, were fluent in English, and had the ability to provide informed consent. Patients were excluded if they met criteria for any untreated major mental illness that would interfere with their ability to participate or provide informed consent (e.g., psychosis, mental retardation, dementia). The study was approved by the IRB at each participating institution and participating patients completed the informed consent process.

## Measures

*Demographics* were assessed using a demographic questionnaire. It also included information such as age, sex, ethnicity, race, education, cancer type and stage, marital status, household composition and employment status.

The *Hospital Anxiety and Depression Scale (HADS)* was used to assess anxiety and depression. It is a 14 item self-rated scale with depression and anxiety subscales consisting of seven items each. It has been well tested in cancer populations including elderly patients with cancer[17]. Ibbotson and colleagues (1994) found that a HADS total cut-off score of 15 or greater resulted in 80% sensitivity, 76% specificity, and a positive predictive value of 41%[18]. A cut-off score of 8 was used for the two subscale scores, consistent with research that found a cut-off of 8 to be optimal for cancer patients[17,19–24]. Strong test-retest reliability has been established in a large sample of elderly patients[25]. Both subscales were found to be internally consistent, with values of Cronbach's coefficient (alpha) being 0.80 and 0.76, respectively[26].

The *Medical Outcomes Study (MOS) Social Support Survey*[27–29] was used to assess social support. The MOS is a 20-item measure of perceived availability of social support, with four subscales: Emotional/Informational, Tangible, Affectionate, and Positive Social Interactions. In the current study, we merged two scales into one: the Tangible (access to material aid or behavioral assistance) and Emotional/Information (the expression of positive affect and empathetic understanding; the offering of advice, information, guidance, or feedback). All but one item (out of 12 items) is rated on a 5-point scale (from "none of the time" to "all of the time"). Internal consistency of the subscales and total score is > 0.90. Convergent validity was demonstrated by significant correlations of the social support total score with measures of mental health ($r = 0.45$; $P < 0.01$)[27–29].

Medical comorbidity was assessed using the Physical Health subscale of the *Older Adults Resources Scale (OARS)*[27,29]. The OARS Physical Health Section is a comorbidity scale that contains a list of current illnesses and conditions an individual might have and the degree to which they impair daily activities. Questions are rated on a 3-point scale ("not at

all" to "a great deal") and a list of current medications is recorded. Test-retest reliability for the Physical Health subscale over five weeks was 0.66. Regarding validity, the subscale correlated significantly with health professional ratings (Kendall tau coefficients = 0.75)[27,29].

### Statistical Analyses

Descriptive statistics are reported for demographic information. Pearson Correlation coefficients were calculated for the relationship between age and anxiety, and age and depression. Anxiety and depression were entered as dichotomous variables (i.e. ≥8 on either subscale was considered depressed or anxious). Multiple linear regressions were used to control for potential covariates. We selected potential covariates a priori by reviewing the literature in cancer, and where possible, specifically in geriatric oncology; in doing so, we identified variables that have a potential relationship with anxiety and depression. These variables were: gender[6], social support (MOS)[9], number of comorbidities (OARS)[30], socioeconomic status[9] and stage of disease [9]. Education served as a proxy for socioeconomic status. As such, along with age, we included the covariates listed in two multiple regression analyses, one predicting anxiety and the other predicting depression. To test the interaction between gender and age, we calculated a "gender x age" variable (the interaction between gender and age), and entered this into the multiple regression equations stated above. Prior to calculating the interaction variable we centered these variables; centering is a procedure used to reduce the chance of multicollinearity in multiple regression equations where mediating variables are entered into the equation. Significance was determined as $p < 0.05$.

## Results

### Participant Characteristics

Table 1 presents the participants' demographic information. The mean age was 73.1 (SD = 6.18, range: 65–91). The sample was 56.2% female. The majority of patients were White (85.2%), over half (61.2%) were married and over three quarters (78.7%) lived with a spouse or partner or child. Thirty-five percent had some high school or a high school diploma, 40.5% had some college/college diploma and 20.8% had some graduate school or an advanced degree.

Sites of cancer were as follows: lung 28.6%, gastrointestinal 27.0%, gynecological 17.4%, breast 11.4%, genitourinary 10.0% and other 5.6%. Of interest to this study, most patients had stage IV cancer (61.4%), while 4.6% of patients had stage I, 11.8% had stage II and 21.8% had stage III. Over a quarter of patients (29%) had received a prior chemotherapy regimen. Many had multiple medical comorbidities: 68.4% had two or more medical comorbidities and 44.2% had three or more.

### Depression and Anxiety

The average HADS anxiety score was 4.7 (SD = 3.60, range 0–18). The percentage of patients scoring above the cut-off for anxiety was 20.9%. The average HADS depression

score was 3.6 (SD = 3.17, range 0–17). The percentage of patients scoring above the cut-off for depression was 12.6%.

### Univariate Analysis: Anxiety

Age was not correlated with anxiety ($r = -0.04$, $p = 0.42$). Anxiety was associated with social support ($r = -0.22$, $p < 0.0001$) and number of comorbidities ($r = 0.30$, $p < 0.0001$). Anxiety was not associated with stage of disease (M = 4.4 vs. 4.8, $p = 0.23$) (early versus late stage, respectively), gender (M = 4.4 versus 4.9, $p = 0.11$) (men and women, respectively) or levels of education ($p = 0.77$). The mean anxiety scores by education group were: 1–8$^{th}$ grade: 4.9; some HS/HS diploma: 4.8; some college/college degree: 4.8; and graduate school/advanced degree: 4.3.

### Univariate Analysis: Depression

Age was not correlated with depression ($r = -0.01$, $p = 0.85$). Depression was associated with social support ($r = -0.28$, $p < 0.0001$), number of comorbidities ($r = 0.27$, $p < 0.0001$) and disease stage (M = 3.1 vs. 3.9, $p = 0.005$) (early versus late stage, respectively). Depression was not associated with gender (M = 3.5 versus 3.7, $p = 0.51$) (men and women, respectively) or level of education ($p = 0.60$). The mean depression scores by education group were: 1–8$^{th}$ grade: 2.8; some HS/HS diploma: 3.8; some college/college degree: 3.6; and graduate school/advanced degree: 3.4.

### Multivariable Analysis

Multivariable analyses (Table 3) predicting anxiety scores produced a significant regression equation ($F = 12.43$; $p < 0.0001$) and explained 15 % of the variance in anxiety scores. Importantly, age was a significant predictor of anxiety scores ($\beta = -0.07$, $p = 0.05$); increased age was associated with decreased anxiety. Social support ($\beta = -0.04$, $p < 0.001$) and number of comorbidities ($\beta = 0.66$, $p < 0.001$) were also significant predictors. The remaining variables were not significant predictors of anxiety: education ($\beta = 0.07$, $p = 0.82$), advanced stage ($\beta = 0.41$, $p = 0.197$), and sex ($\beta = -0.39$, $p = 0.21$). The interaction between gender and age was not significant ($\beta = 0.01$, $p = 0.82$).

Multivariable analyses predicting depression scores produced a significant regression equation ($F = 13.51$; $p < 0.0001$) and explained 17 % of the variance in depression scores. Age was not a significant predictor of depression scores ($\beta = -0.04$, $p = 0.13$). The significant predictors were: social support ($\beta = -0.04$, $p < 0.001$), number of comorbidities ($\beta = 0.50$, $p < 0.001$), and advanced stage ($\beta = 0.83$, $p = 0.003$). The remaining variables were not significant predictors of depression: education ($\beta = 0.04$, $p = 0.88$) and sex ($\beta = -0.06$, $p = 0.83$). The interaction between sex and age was not significant ($\beta < 0.0001$, $p = 0.99$).

## Discussion

### General Findings

The present study helps elucidate the associations among age, anxiety, and depression in a cohort of non-demented older adults with cancers of mixed sites of largely advanced stage

anticipating a new chemotherapy regimen. Almost a quarter (21%) scored above the cut-off for anxiety on the HADS, and 13% reaching the cut-off score for depression. After controlling for covariates, age was a significantly associated with anxiety: as age increased, anxiety decreased. In contrast to our hypotheses, age was not associated with depression in univariate or multivariable analyses. Reduced social support and increased number of comorbidities were associated with higher levels of anxiety and depression. Advanced disease stage was associated with higher levels of depression.

While anxiety decreased with age, it is important to note that the rate of anxiety in this population remains high (21%) and is a concern in older adults with cancer. There are several possible explanations as to why anxiety was found to decrease with age. As discussed, despite the various challenges faced by geriatric oncology patients (e.g., multiple medical comorbidities, loss of spouse, family members and friends), studies have suggested that age may serve as a protective factor against cancer-related general distress[7,31]. Blank and Bellizi posit three main theories to explain why older patients with cancer may cope better than younger patients. The first theory relates to the mastering of developmental tasks that occurs as people age. Older adults are more likely to take life on a "day-by-day" basis, focusing on the here and now. Older adults have also achieved increased "emotional regulation" [31] which results in more passive coping and may lead to a subdued response to having cancer. Second, according to Erikson's developmental theory, middle age is an active, outward focused time when people direct their energy towards leaving behind a legacy for future generations. In contrast, older age is a more internally focused, less overtly active time, focused on integrity and wisdom and making peace with one's life as lived[31]. This increased wisdom helps older adults put their situation into a broader context and adapt to or cope better with life's challenges. Third, older adults may cope better because they have different life trajectories and experiences than younger patients. This is what some refer to as 'psychological immunization'-older adults may view cancer from the perspective of having lived a longer life. Older adults have experienced more significant life events over a longer time, giving them the opportunity to develop more effective coping mechanisms and life lessons[31]. Additionally, young adults diagnosed at an early age face the competition between roles (e.g., work, caring for children, aging parents, etc.), which may increase the stress of cancer[31]. Although these studies focus mainly on general distress, they may also provide a theoretical framework which explains why older cancer patients may report lower anxiety than their younger counterparts, and why they may be better equipped to deal with anxiety associated with cancer.

Another interesting finding related to why anxiety decreases with age are studies that examine the "U-shaped curve"—U-shaped age profiles, showing increased well-being in community dwelling young adults and older adults (with a dip in well-being during middle age). These studies suggest older community dwelling adults possess better emotion regulation than younger adults, are more successful in their problem-solving strategies, are wise/ possess wisdom and emotional intelligence, are more focused on positive aspects of life (glass half full), and have learned to adapt to their strengths and weaknesses. It is also possible that cheerful people live longer than those who are chronically unhappy, and that the U-shape somehow traces out in part a "selection effect." Finally, older adults may benefit from a shortened time perspective and focus on "what matters now"[32]. Taking into

account these studies regarding quality of life in older adults and lower rates of anxiety in older patients with cancer, it is possible that professionals may overlook mental health concerns and needs of older adults.

With respect to depression, the percent of patients who scored above the HADS depression scale cut-off was 12.6%. Rates of depression in older oncology patients range from 17–26%[1,6,33]. Nelson's study showed that increased age was associated with greater depressive symptoms in older patients with prostate cancer [34]. Contrary to our hypothesis, depression did not increase with age in our population even after controlling for covariates. It is likely that advanced disease (61.4% had stage IV cancer) and multiple medical comorbidities (44.2% had ≥3 conditions, 68.4% had ≥2 and only 31.6% had < 2) eclipsed age as a predictor of depression in the present data. Additionally, this sample did not include a broad age range (mean age was 73.1 (SD = 6.18, range: 65–91). Several studies note the importance of medical comorbidities and stage of illness in increasing severity of prevalence of depression[4,9,35].

It is possible the rate of depression in this sample was underestimated due to the inability of the current measures of depression to accurately assess depression in a geriatric cancer setting. Researchers examined the extent of validation evidence of eight commonly used depression measures in geriatric cancer populations (BDI-II, BSI-18, CES-D, GDS-15, HADS, PHQ-9, POMS–SF, and SDS). Symptom profile analysis showed these measures do not identify many symptoms indicating depression in geriatric patients with cancer; thus the adequacy of these scales in this population is questionable[36]. There are data to support this theory. Researchers assessed common screening tools for geriatric depression (GDS-SF, the HADS, and the CES-D compared to the SCID) with cancer patients ≥ 70 years[37]. They found cut-off scores for these measures produced inadequate sensitivity (0.50 to 0.67), indicating cut-off scores will miss as many as 33% to 50% of geriatric cancer patients who are depressed[37]. Taken together, these data suggest these measures may adequately identify depression in a geriatric cancer population.

Our results showed depression was significantly predicted by inadequate social support. There are psychosocial treatments available geared towards reducing loneliness and isolation. Few psychotherapy or psychoeducational approaches have been specifically tested in elderly cancer patients[38]. A randomized clinical trial of 192 older adults with advanced stage cancer receiving chemotherapy found that patients receiving monthly telephone calls, in which items on the HADS scale were asked to monitor depression and anxiety (for a duration of six months), experienced reduction of anxiety and depression[39]. They stated they were comforted by the fact that "somebody cared" between oncology visits[39]. One patient reported, "I feel less alone." At six months, patients receiving monthly telephone calls reported significantly less anxiety (HADS; $p < .0001$) and depression (HADS; $p = .0004$), compared with patients in the educational materials group. Referring older adults to interventions geared towards reducing loneliness and isolation can decrease depression.

The results of the present study should be interpreted in light of its methodological limitations. First, the demographics of the population limit the generalizability of this study. The majority of patients were White (85.2%), and most (61.4%) had stage IV cancer;

therefore the results may not generalize to patients with early stage disease and patients from other racial or ethnic groups. Second, the current study was a secondary analysis of a data set using cross-sectional data; thus, even though there was a significant relationship found between age and anxiety, longitudinal research is necessary to further test these relationships.

### Conclusions

The present study examined the associations among age, anxiety, and depression in a cohort of non-demented older adults with cancers of mixed sites of largely advanced stage anticipating a new chemotherapy regimen. The rate of anxiety in this sample was 21% and the rate of depression was 13%. Age was a significant predictor of anxiety; as age increased, anxiety decreased. In contrast to our hypotheses, age was not a significant predictor of depression. Gender did not moderate the relationship between age, anxiety and depression. Reduced social support and increased number of comorbidities were associated with higher levels of anxiety and depression. Advanced disease stage was associated with higher levels of depression. The clinical implication is significant: depression and anxiety are not routinely measured in clinical practice and these variables might serve as signals to screen for depression and anxiety among older cancer patients. These data partially support the current literature, which suggests age serves as a protective factor for anxiety, but also highlights that this protective component may not apply to depression.

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**Table 1**

Patient Demographics *N = 500*

| ***Demographics*** | **N** | **%** |
|---|---|---|
| **Age** (*M, SD*) | 73.1 (6.18) | |
| Range | 65–91 | |
| **Gender** | | |
| Female | 281 | 56.2% |
| **Ethnicity** | | |
| Non-Hispanic | 465 | 92.9% |
| **Race** | | |
| White/Caucasian (non-Hispanic) | 426 | 85.2% |
| Black/African American | 42 | 8.4% |
| Asian | 26 | 5.2% |
| Other | 6 | 1.2% |
| **Marital Status** | | |
| Married | 306 | 61.2% |
| **Education** | | |
| Some college/College diploma | 202 | 40.5% |
| Some Graduate School/Advanced degree | 104 | 20.8% |
| **Job Status** | | |
| Employed | 83 | 16.6% |
| Retired, homemaker, unemployed | 395 | 79.2% |

**Table 2**

Cancer Type & Stage, Medical Comorbidities *N=500*

| **Cancer Type** | **N** | **%** |
|---|---|---|
| Breast | 57 | 11.4% |
| GI | 135 | 27.0% |
| GU | 50 | 10.0% |
| Gyn | 87 | 17.4% |
| Lung | 143 | 28.6% |
| Other | 28 | 5.6% |
| **Stage** | | |
| I | 23 | 4.6% |
| II | 59 | 11.8% |
| III | 109 | 21.8% |
| IV | 307 | 61.4% |
| **Total Comorbidities** | | |
| < 2 | 158 | 31.6% |
| ≥2 | 342 | 68.4% |
| < 3 | 279 | 55.8% |
| ≥3 | 221 | 44.2% |
| Mean (Std. Deviation) | 2.5 (1.66) | |

**Table 3**

Multivariate Regression Analyses

| Dependent Variable | Independent Variable | β | Standard Error | *P-value* | *F-value* | R Square |
|---|---|---|---|---|---|---|
| | Social Support | −0.04 | 0.01 | < **0.0001** | | |
| | # of Comorbidities | 0.66 | 0.09 | < **0.0001** | | |
| | Education (at least some college) | 0.07 | 0.31 | 0.8248 | | |
| HADS ANXIETY | Advanced Stage | 0.41 | 0.32 | 0.1971 | 12.43 (< 0.0001) | .150 |
| | Age | −0.07 | 0.03 | **0.0511** | | |
| | Sex (male) | −0.39 | 0.31 | 0.2106 | | |
| | Interaction (sex*age) | 0.01 | 0.05 | 0.8225 | | |
| HADS DEPRESSION | Social Support | −0.04 | 0.01 | < **0.0001** | | |
| | # of Comorbidities | 0.50 | 0.08 | < **0.0001** | | |
| | Education (at least some college) | 0.04 | 0.27 | 0.8823 | | |
| | Advanced Stage | 0.83 | 0.28 | **0.0028** | 13.51 (<0.0001) | .170 |
| | Age | −0.04 | 0.03 | 0.1258 | | |
| | Sex (male) | −0.06 | 0.27 | 0.8274 | | |
| | Interaction (sex*age) | 0.00 | 0.04 | 0.9916 | | |

HADS = Hospital Anxiety and Depression Scale