Effects of Caregiving Status and Changes in Depressive Symptoms on Development of Physical Morbidity Among Long-Term Cancer Caregivers

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**Objective:** Cancer caregiving burden is known to vary across the survivorship trajectory and has been linked with caregivers’ subsequent health impairment. Little is known, however, regarding how risk factors during long-term survivorship relate to vulnerability to caregivers’ health during that period. This study examined effects of caregiving status and depressive symptoms on development of physical morbidity by 5 years postdiagnosis. **Method:** Family caregivers (N = 491; M_age = 55.78) completed surveys at 2 (Time 1 [T1]) and 5 years (T2) after their care recipients’ cancer diagnosis. Demographic and caregiving context variables known to affect caregivers’ health were assessed at T1. Self-reported depressive symptoms and a list of physical morbid conditions were assessed at T1 and T2. Caregiving status (former, current, or bereaved) was assessed at T2. **Results:** Hierarchical negative binomial regression revealed that current caregivers at T2 (p = .02), but not those bereaved by T2 (p = .32), developed more physical morbid conditions between T1 and T2 compared with former caregivers, controlling for other variables. Independently, caregivers reporting either newly emerging or chronically elevated depressive symptoms at T2 (p < .03), but not those whose symptoms remitted at T2 (p = .61), showed greater development of physical morbidity than did those reporting minimal depressive symptoms at both T1 and T2. **Conclusions:** Results highlight the roles of long-term caregiving demands and depressive symptoms in cancer caregivers’ premature physical health decline. Clinical attention through the long-term survivorship trajectory should be emphasized for caregivers of patients with recurrent or prolonged illness and to address caregivers’ elevated depressive symptoms.

**Keywords:** family caregiver, depression, prospective studies, self-report, survivorship

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An estimated 2.8 million Americans provide unpaid care for an adult with cancer (National Alliance for Caregiving, 2016), with the number of informal cancer caregivers likely to increase markedly over the coming decades due to the aging of the U.S. population (Edwards et al., 2014; Rahib et al., 2014; B. D. Smith, Smith, Hurria, Hortobagyi, & Buchholz, 2009). Family members provide essential emotional and instrumental support to their relatives with cancer, yet these caregivers are vulnerable to physical health decline compared to demographically similar noncaregivers (Corà, Partinico, Munafò, & Palomba, 2012; Ji, Zöller, Sundquist, & Sundquist, 2012; Rohleder, Marin, Ma, & Miller, 2009). Few studies (Kim, Carver, Shaffer, Gansler, & Cannady, 2015; Kurtz, Given, Given, & Kurtz, 1994), however, have examined how psychosocial risk factors longitudinally relate to caregivers’ physical health changes across the cancer-caregiving trajectory. This study provides a novel examination of two potential influences on cancer caregivers’ longitudinal patterns of physical health vulnerability: caregiving status and depressive symptoms.

Before turning to those variables, we summarize widely known factors that contribute to poor health among caregivers in general, regardless of the care recipients’ condition necessitating assistance. Stress-coping frameworks as applied to the caregiving context posit that caregiving stress results from appraisals of caregiving demands that tax or exceed available resources, with many factors affecting each step of the stress process (Pearlin, Mullan,
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Semple, & Skaff, 1990; Swore-Fletcher, Miaskowski, Given, & Schumacher, 2012; Weitzner, Haley, & Chen, 2000). Prolonged stress then increases vulnerability for morbidity and mortality through chronically activating physiological stress responses (Kiecolt-Glaser et al., 2003; Segerstrom & Miller, 2004) and changes to healthy lifestyle behaviors (Bonnet et al., 2005). Demographic characteristics and factors related to the caregiving role, factors henceforth collectively called known vulnerability factors, have been well characterized in the extant literature as being related to caregivers’ vulnerability to physical morbidity (for reviews see Pinquart & Sörensen, 2005, 2007; Swore-Fletcher et al., 2012; Vitaliano, Zhang, & Scanlan, 2003).

Vulnerability Factors of Caregiving for Cancer

Caregiving differs from caregiving for other chronic illnesses in that the patients’ cancer may follow variable disease trajectories, with caregivers moving in and out of caregiving as needed. For example, by 5 years after the initial cancer diagnosis, approximately 70% of caregivers from a national survey had ceased caregiving because the patient was in remission; 15% had ceased caregiving due to bereavement; and 15% were actively providing care to the cancer patient due to long-term side effects, recurrence, or palliative care (Kim, Spillers, & Hall, 2012). In contrast, caregivers of other chronic illnesses, such as dementia, tend to remain consistently in the caregiving role as their care recipients’ health progressively declines (Clipp & George, 1993; Kim & Schulz, 2008). By 5 years after an Alzheimer’s diagnosis, 40% of caregivers were bereaved (Ganguli, Dodge, Shen, Pandav, & DeKosky, 2005) and 32% of caregivers were continuing to provide care to the patient (Alzheimer’s Association, 2014; National Alliance for Caregiving, 2009).

The distinct trajectories of cancer caregiving are associated with unique burdens and stressors (Kim & Given, 2008; Swore-Fletcher et al., 2012) and have been found to be differentially associated with caregiver physical health outcomes. Consider bereavement: In one study, cancer caregivers who were bereaved by 5 years postdiagnosis were more likely to develop arthritis and heart disease by that time than were caregivers whose care recipient was alive and in remission (Kim et al., 2015). In another study, bereaved cancer caregivers used more health care services during the year before and after the loss than did noncaregivers (Guldin, Jensen, Zachariae, & Vedsted, 2013). Continuing or repeated engagement in cancer care is also a challenge: Caregivers to patients with recurrent and advanced cancer, compared to those whose patients’ cancer remitted, have reported greater distress (Vivar, Whyte, & McQueen, 2010), burden (Grunfeld et al., 2004), and unhealthy lifestyles (Bowman, Rose, & Deimling, 2005).

Depressive Symptoms as a Vulnerability Factor

Another potential vulnerability factor for caregivers’ development of physical morbidity is elevated depressive symptoms, which have been associated with disease onset and prognosis in other populations (Pinquart & Duberstein, 2010; Rosengren et al., 2004; Whooley et al., 2008). Indeed, patterns of change in depressive symptoms over time have been shown to more accurately predict the development of physical morbidity compared to any solitary assessment of depressive symptoms. In the general population, persons with chronically elevated depressive symptoms had an 88% increased risk of cancer incidence (Penninx, Guralnik, Havlik, et al., 1998) and a 2.83-fold greater risk of decline in general physical functioning (Penninx, Deeg, Van Eijk, Beekman, & Guralnik, 2000) compared to those who never reported elevated depressive symptoms. Those reporting a new onset of depressive symptoms, compared to those without elevated symptoms, had a 2.07-fold increased risk for acute cardiovascular events (Penninx, Guralnik, Mendes de Leon, et al., 1998) and a 13% increased risk for mortality (Anstey & Luszcz, 2002). It is important to note that persons reporting high depressive symptoms that remitted had rates of morbidity and mortality comparable to those who never reported elevated depressive symptoms (Anstey & Luszcz, 2002; Penninx et al., 2000).

Cancer caregivers have reported varied but substantial (12% to 67%) levels of clinically significant depressive symptoms around the time of diagnosis and treatment (Kessler et al., 2014; Rhe et al., 2008; Swore Fletcher et al., 2008), with 4% to 40% continuing to report elevated symptoms years after the patients’ initial cancer diagnosis (Lambert, Jones, Girgis, & Lecathelinais, 2012; Mitchell, Ferguson, Gill, Paul, & Symonds, 2013; Falos et al., 2011). It is yet unknown to what extent cancer caregivers’ changes in depressive symptoms over time are independently associated with physical health decline beyond what may be accounted for by their long-term cancer-caregiving experiences and other known vulnerability factors.

This study examined associations of (a) caregiving status during long-term cancer survivorship and (b) chronicity and change in depressive symptoms with development of physical morbidity among cancer caregivers between 2 and 5 years after the relative’s cancer diagnosis, beyond the effects of other known vulnerability factors. Two primary hypotheses were tested:

Hypothesis 1: Bereaved and current caregivers at 5 years postdiagnosis will develop more physical morbidities by that time than will former caregivers whose patients were in remission.

Hypothesis 2: Caregivers reporting chronic and newly emerging depressive symptoms at 5 years postdiagnosis, but not those whose depressive symptoms had remitted at 5 years, will develop more physical morbidities than will caregivers who never reported significant depressive symptoms at the 2- or 5-year mark.

Method

Participants and Procedure

The National Quality of Life Survey for Caregivers (Kim & Spillers, 2010) was designed to longitudinally assess the impact of cancer on the quality of life of family members and close friends who provide care for cancer survivors. Recruitment strategies for patients and caregivers have been previously published (see T. Smith et al., 2007 and Kim & Spillers, 2010, respectively) but are reviewed in brief here. Patients were identified through multiple state cancer registries as having been diagnosed with one of the 10 most common cancers, and they were asked to nominate family members or family-like persons who provided constant care to
them during their cancer experience. The overall recruitment rate for survivors was 34%, and 42% of responding participants nominated a caregiver. Eligible caregivers were (a) 18 years of age and older, (b) fluent in either English or Spanish, and (c) a resident of the United States. Although recruitment of cancer survivors was stratified by region and oversampled African Americans and Latinos, racial or ethnic minorities were significantly less represented in patients’ survey response and their family member nomination (Kim, Kashy, Kaw, Smith, & Spillers, 2009; Kim & Spillers, 2010; T. Smith et al., 2007).

A total of 896 caregivers completed the baseline survey that contained study variables at 2 years postdiagnosis (T1; data collected 2003–2004). Follow-up data collection (Kim et al., 2012) at 5 years postdiagnosis (T2; 2006–2007) comprised three surveys (a) Former Caregivers—Remission (caregivers whose survivor was in remission), (b) Current Caregivers (caregivers who were actively providing care to the survivor at the time of T2 survey completion), and (c) Former Caregivers—Bereaved (caregivers whose survivor had passed away by T2). A total of 491 caregivers returned a T2 survey with valid data for the study variables. Caregivers who returned surveys at both T1 and T2 did not differ from those who did not return a T2 survey (N = 405) on any study variable (ps > .17), with two exceptions. Completers were significantly older (M_Difference = 3.03 years; p < .001) and were more likely than noncompleters to live with the survivor (83% vs. 75%, respectively; p = .002). Analyses were conducted with completers.

This study was conducted in compliance with the regulations of the Emory University Institutional Review Board. A packet containing an introductory letter, survey, self-addressed stamped envelope, and a $10 gift card as an incentive was mailed to the sample of nominated family caregivers. Returning the completed survey evidenced informed consent to participate.

Measures

**Known vulnerability factors.** Factors that have been associated with development of physical morbidity among caregivers were measured at T1. Demographic vulnerability factors were age, gender, race or ethnicity, and education. Caregiving context vulnerability factors were whether the caregiver lived with the patient, months spent in caregiving role, patient’s cancer severity, and caregiver’s esteem. The patient’s cancer severity (adjusted survival rate) was calculated for each survivor (Kim, Baker, & Spillers, 2007; Kim et al., 2015). This measure was calculated as a function of cancer type (the 10 cancers studied) and stage (localized, regional, distant) and the time since diagnosis at T1 (this information was obtained information from the state cancer registry; Howlader et al., 2011). Scores range from 0 to 1, with higher scores reflecting greater severity of illness. For example, the cancer severity index is 0 for localized prostate cancer diagnosed 2 years ago, .40 for localized lung cancer diagnosed 2 years ago, and .94 for distant lung cancer diagnosed 2 years ago.

Caregivers’ self-esteem related to providing care to their family member was assessed using the seven-item Caregiver Esteem subscale of the Caregiving Reaction Assessment (Given et al., 1992), rated on a 5-point Likert format ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Higher mean scores indicate greater caregiver esteem. This scale has shown good reliability in cancer caregiver samples (α = .82; Kurtz, Kurtz, Given, & Given, 2004) and also in the current sample (α = .72). These vulnerability factors were included in analyses as covariates because they have been related to study outcomes (Kurtz et al., 2004; Pinquart & Sörensen, 2005, 2007).

**Caregiving status at 5 years postdiagnosis.** Caregivers who responded “no” to the question, “Is [survivor’s name] alive?” in the T2 Main Survey received a Bereaved Caregiver Survey. This subgroup of caregivers was called former caregivers—bereaved (FCB). The average time since their care recipients’ death was 2.7 years (SD = 1.1) at the time of T2 survey completion. Caregivers who responded “yes” to the question, “Are you currently providing help to [survivor’s name] for his/her cancer experience?” in the T2 Main Survey were called current caregivers (CC). The final sub-group of caregivers whose survivors were alive and currently did not need any cancer-related help were called former caregivers—remission (FCR).

**Changes in depressive symptoms.** The level of depressive symptoms (DS) caregivers experienced during the past 4 weeks was measured at both T1 and T2 with the 20-item Center for Epidemiologic Studies—Depression Scale (CES–D; Radloff, 1977), using a 4-point Likert format ranging from 0 (Rarely or None of the Time) to 3 (Most or All of the Time). Higher summed scores (after reverse coding, as appropriate) indicate greater depressive symptoms. Criterion validity has been shown in populations of older adults (Beekman et al., 1997). This scale has shown good reliability in cancer caregiver samples (α = .87; Kurtz et al., 2004) and also in the current sample (α = .92 at T1 and T2). Caregivers were grouped according to clinically significant change patterns in their depressive symptoms between T1 and T2, following the two-step coding approach outlined by Kennedy, Kelman, and Thomas (1991) and Penninx et al. (2000). First, the typical CES–D cutoff score of 16 was used to indicate clinically meaningful levels of depressive symptoms at a given time (Beekman et al., 1997). Second, clinically relevant change in depressive symptoms was defined by an increase or decrease in CES–D from T1 to T2 by 5 or more points (i.e., .5 SD of the T1 CES–D; Kennedy et al., 1991; Penninx et al., 2000). Thus, to establish a change in symptom status from T1 to T2, two requirements had to be met: First, the person had to cross the cutoff line of 16 (in one direction or the other). Second, the change had to be by 5 points or greater. This conservative approach was designed to capture meaningful change in depressive symptoms rather than minor variations in symptoms. Following these guidelines, caregivers were categorized as low DS if they reported CES–D < 16 at T1 and either (a) CES–D < 16 at T2 or (b) CES–D > 16 at T2 but less than a 5-point increase between T1 and T2. Caregivers were categorized as remitting DS if they reported CES–D ≥ 16 at T1, CES–D < 16 at T2, and a 5-point or more decrease between T1 and T2. Caregivers were categorized as emerging DS if they reported CES–D < 16 at T1, CES–D > 16 at T2, and a 5-point or more increase between T1 and T2. Last, caregivers were categorized as chronic DS if they reported CES–D > 16 at T1 and either (a) CES–D > 16 at T2 or (b) CES–D < 16 at T2 with less than a 5-point decrease between T1 and T2.

**Development of physical morbidity.** Physical morbidity development was operationalized as the change in number of physical morbid conditions caregivers reported between T1 and T2 (i.e., new conditions) on the Morbidities Index for Informal Caregivers of Chronic Illness (Kim, Carver, Cannady, & Shaffer, 2004) and also in the current sample (α = .72). These vulnerability factors were included in analyses as covariates because they have been related to study outcomes (Kurtz et al., 2004; Pinquart & Sörensen, 2005, 2007).
Caregivers were asked at each assessment “Have you ever been under a physician’s care or taken prescription medication for any of the following medical conditions?” Thus, any condition indicated at T1 would also be applicable to indicate at T2, so all T1 conditions were consequently included in the total count of physical ailments ever treated at T2. The number of new physical morbid conditions that caregivers developed between T1 and T2 was calculated by subtracting the total number of conditions at T2 from that at T1. Psychological morbidity items (“depression” and “mental health problems”) were removed to capture physical morbid conditions exclusively. This measure has shown good construct and concurrent validity (Kim et al., 2013), and self-report has been shown effective in acquiring health outcome data (Okura, Urban, Mahoney, Jacobsen, & Rodeheffer, 2004).

Analysis Plan

Basic descriptive information for study variables (means, standard deviations, and frequencies) is presented in Table 1. Study hypotheses were tested using negative binomial regression models, because our outcome variable, number of new physical morbid conditions at T2, represents a count variable, which was overdispersed (i.e., conditional means < variances; Cameron & Trivedi, 2013). Data met assumptions for this analytic strategy (see the online supplemental materials for more detail). In the first block, the effects of known vulnerability factors (covariates) on development of physical morbidity were tested. Age and caregiver esteem were mean-centered prior to analyses. In the second block, caregiving status at T2 was added. To test Hypothesis 1, we used the former caregiver—remission (FCR) group as a reference group for the CC and FCB groups. In the final block, we added the four depressive symptom groups, testing Hypothesis 2 by using the low DS group (CES–D < 16 at T1 and T2) as the reference group. The statistical software SPSS Version 22 was used, and significance levels for all analyses were set at p < .05.

Results

Characteristics of the Sample and Study Variables

As shown in Table 1, participating caregivers were overall middle aged, primarily female and non-Hispanic White, and relatively well educated. Most caregivers lived with the patient and had been providing care to the patient for an average of approximately 1.5 years by T1. Caregivers’ average depressive symptoms at both T1 and T2 were comparable to those of the U.S. general population (Radloff, 1977) and other studies of cancer caregivers (Kim, Duberstein, Sörensen, & Larson, 2005; Kurtz et al., 2004). Caregivers reported receiving medical care for an average of four physical morbid conditions within their lifetimes at T1, developing an additional two new conditions on average by T2. The three most commonly reported conditions at both T1 and T2 were hypertension (33.6% and 55.4%, respectively), high cholesterol (31.8% and 54.0%), and chronic back pain (29.3% and 42.8%). Comparable prevalence rates of these conditions are reported among older, noncaregiving adults (National Center for Health Statistics, 2011).

Table 1
Sample Characteristics of Family Caregivers at Two and Five Years After the Patients’ Cancer Diagnosis (N = 491)

<table>
<thead>
<tr>
<th>Time and variable</th>
<th>M (SD)</th>
<th>Scale range</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2 years postdiagnosis (T1)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>55.78 (12.63)</td>
<td>18.32–89.98*</td>
<td></td>
</tr>
<tr>
<td>Gender (female)</td>
<td>321 (65.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race–ethnicity (non-Hispanic White)</td>
<td>443 (90.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education (some college or more)</td>
<td>367 (74.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with patient</td>
<td>403 (82.08)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months providing care</td>
<td>18.78 (14.24)</td>
<td>.5–120*</td>
<td></td>
</tr>
<tr>
<td>Patient cancer severity</td>
<td>.17 (.25)</td>
<td>0–1</td>
<td></td>
</tr>
<tr>
<td>Caregiver esteem</td>
<td>4.39 (.49)</td>
<td>1–5</td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>10.43 (9.53)</td>
<td>0–60</td>
<td></td>
</tr>
<tr>
<td>Total no. morbid conditions</td>
<td>3.79 (4.98)</td>
<td>0–38*</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>95 (19.35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–2</td>
<td>151 (30.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3–5</td>
<td>150 (30.54)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–10</td>
<td>62 (12.63)</td>
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<td></td>
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<tr>
<td>&gt;11</td>
<td>33 (6.72)</td>
<td></td>
<td></td>
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<tr>
<td><strong>5 years postdiagnosis (T2)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current caregivers</td>
<td>65 (13.24)</td>
<td></td>
<td></td>
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<tr>
<td>Former caregivers—bereaved</td>
<td>75 (15.27)</td>
<td></td>
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<tr>
<td>Former caregivers—remission</td>
<td>351 (71.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>10.89 (10.13)</td>
<td>0–60</td>
<td></td>
</tr>
<tr>
<td>Total no. new morbid conditions by T2</td>
<td>1.78 (1.87)</td>
<td>0–9*</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>148 (30.14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–2</td>
<td>207 (42.16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3–5</td>
<td>113 (23.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–9</td>
<td>23 (4.68)</td>
<td></td>
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</table>

* Actual range.
As shown in Table 2, the majority of caregivers did not report a clinically significant level of depressive symptoms at either time point (68.9% at T1; 67.4% at T2). A chi-square test of independence was used to compare percentages of caregivers among the four depressive symptom category to those from a survey of community-dwelling older adults (Kennedy et al., 1991). Overall, observed depressive symptom category frequencies varied significantly between caregivers and older adults, $x^2(3, N = 2,027) = 52.60, p < .001$. Follow-up pairwise comparisons were conducted to evaluate the differences among proportions, using Holm’s sequential Bonferroni method to control Type I error at the .05 level across comparisons. The probability of being categorized low DS was about 1.19 times less likely for our caregivers versus older adults (.65 vs. .78, respectively; $p = .001$), whereas the probability of being categorized chronic DS was about 2.67 times greater for caregivers versus older adults (.16 vs. .06, respectively; $p < .001$). There were no differences in the likelihood of being categorized as remitted DS (.08 vs. .07) or emerging DS (.10 vs. .09) between caregivers and older adults ($p > .41$).

**Effects of Known Vulnerability Factors on Development of Physical Morbidity**

Table 3 shows results from the hierarchical negative binomial regression analyses predicting the number of new physical morbid conditions reported among caregivers between 2 and 5 years after the relative’s initial cancer diagnosis. Among the known vulnerability factors tested in Block 1, older age, having a high school education or less, and having provided help for longer duration were related to a higher number of additional morbid conditions.

**Effects of Caregiving Status at 5 Years Postdiagnosis on Development of Physical Morbidity**

Results for the negative binomial model testing the effects of caregiving status at T2 in addition to known vulnerability factors (Block 1) are shown in Block 2 of Table 3. Caregivers actively caring for the survivor at the 5-year mark (CC) reported more new physical morbid conditions between T1 and T2 than did those who became former caregivers due to their care recipients’ remission (FCR), providing partial support for Hypothesis 1. However, caregivers who were bereaved by the 5-year mark (FCB) did not differ from FCR. Holding all covariates constant, CC, FCB, and FCR were predicted to develop 2.44, 2.06, and 1.76 new physical morbid conditions between 2 and 5 years postdiagnosis, respectively.

**Effects of Changes in Depressive Symptoms on Development of Physical Morbidity**

Last, results for the negative binomial model including the effect of chronicity and change in depressive symptoms in addition to known vulnerability factors and caregiving status at T2 (Blocks 1 and 2) are shown in Block 3 of Table 3. Caregivers categorized as either emerging DS or chronic DS reported more newly developed physical morbid conditions between T1 and T2 than did low DS caregivers. However, remitting DS caregivers did not significantly differ from low DS caregivers. This pattern provides full support for Hypothesis 2. Holding all other predictors constant, emerging DS and chronic DS caregivers were predicted to develop 2.63 and 2.42 new morbidities between 2 and 5 years postdiagnosis, respectively. On the other hand, remitting DS and low DS caregivers were predicted to develop 1.97 and 1.78 new conditions, respectively. Figure 1 and Table 4 in the online supplemental materials display data as a function of both caregiving status and changes in depressive symptoms.

**Discussion**

This study provides evidence that development of physical morbidity among cancer caregivers is associated with their long-term caregiving status and, beyond that effect, either chronic or emerging depressive symptoms 5 years after the initial cancer diagnosis. Findings were independent of several other known demographic and caregiving-context vulnerability factors. Regarding the latter, the finding that time spent in the caregiving role was associated with cancer caregivers’ development of physical morbidity is consistent with results of prior studies (Pinquart & Sörensen, 2007) and shows that cancer caregiving of even a relatively short duration (up to 2 years in our sample) is sufficient to affect caregivers’ physical health years later.

Key findings from this study make novel contributions to the understanding of cancer caregivers’ risk for long-term physical health decline. First, caregivers who were actively providing cancer care during the long-term survivorship phase (but not bereaved caregivers) showed greater physical health decline compared to...
those whose patient’s cancer remitted, beyond effects of several other known demographic and caregiving context vulnerability factors. This suggests that burdens from providing cancer care further into the disease trajectory than is typical continue to negatively affect caregivers’ long-term physical health, over and above effects from earlier caregiving experiences during the acute phase of illness. Consistent with a “wear and tear” model (Nijboer et al., 1998), unexpectedly returning to caregiving due to cancer recurrence or providing care for longer than expected may deplete caregivers’ coping resources (Grunfeld et al., 2004; Northouse et al., 2010), resulting in increased risk for physical morbidity.

Independent of contributions from caregiving status at 5 years and other known vulnerability factors, caregivers’ chronic and emerging depressive symptoms significantly predicted their physical health decline. This finding extends existing knowledge about depressive symptoms and physical health from older community samples (Anstey & Luszcz, 2002; Penninx et al., 2000; Penninx, Guralnik, Havlik, et al., 1998; Penninx, Guralnik, Mendes de Leon, et al., 1998) to a cancer-caregiving sample. Elevated depressive symptoms is a well-established risk factor for disease onset and progression in the general population (Pinquart & Duberstein, 2010; Rosengren et al., 2004; Whooley et al., 2008). Several pathways linking depressive symptoms to poor physical health have been documented, such as immune (Howren, Lamkin, & Suls, 2009) and endocrine (Gillespie & Nemeroff, 2005) dysfunction and unhealthy lifestyle behaviors (Groesz et al., 2012; Van Gool et al., 2003).

Considering that chronic depressive symptoms are strongly associated with physical morbidity, it is alarming that our cancer caregivers as a group were almost three times more likely to have chronically elevated depressive symptoms compared with older noncaregiving adults (Kennedy et al., 1991). This discrepancy in chronic depressive symptoms is not explained by differences in caregivers’ symptom remission rates; rather, a greater proportion of caregivers than noncaregivers were depressed at the initial assessment. Thus, a greater percentage of the caregivers were at risk for their depressive symptoms to persist. Our findings are consistent with those of prior studies that showed caregivers report more depressive symptoms than do noncaregivers (Pinquart & Sörensen, 2003) and that elevated depressive symptoms observed among cancer caregivers around the time of diagnosis and treatment persist rather than remit over many years (Kim, Shaffer, Carver, & Cannady, 2014; Lambert et al., 2012).

In light of these findings, development of interventions targeting caregivers with newly emerging or chronically elevated depressive symptoms that effectively diminish those symptoms is critical, because existing interventions for cancer caregivers have not, on the whole, been effective in reducing their depressive symptoms (Northouse, Katapodi, Song, Zhang, & Mood, 2010). Of importance, this study also provides corroborating evidence among cancer caregivers that there is no increased risk for physical health decline among those whose depressive symptoms remitted at the 5-year mark, even though they had elevated depressive symptoms at the 2-year mark (Anstey & Luszcz, 2002; Penninx et al., 2000). Studying caregivers’ resource factors that may promote their mental health recovery, such as social support and active coping (Lambert et al., 2012), may help guide designing such interventions to improve caregivers’ mental and physical quality of life.
Limitations and Future Directions

This study is not without limitations. First, variables are self-reported and therefore may be affected by social desirability and negative recall bias (Paulhus, 1991). Clinical interviews may be used in follow-up research as a more objective measure to identify caregivers meeting full diagnostic criteria for depressive disorders. Because this method can be costly in terms of time and resources, self-report measures may serve as screening tools to identify high-symptom caregivers for further diagnosis. Strategies such as linking clinical interview and survey data with medical records or health care insurance claims would also provide efficient means to evaluate relations between psychosocial factors and objective markers of physical health among caregivers.

Two additional factors limit generalizability of findings: First, although there were few baseline correlates of missingness at follow-up, it is impossible to rule out differential attrition related to variables assessed exclusively at follow-up, so we interpret findings with due caution. Second, the study sample was primarily non-Hispanic White and well educated. Therefore, generalization to caregivers from ethnic minorities and lower socioeconomic status is limited. Future studies must seek to examine the psychological and physical health consequences observed among caregivers of other ethnic, social, and economic groups, because these caregivers may be at even greater risk for adverse outcomes from the additive stress from caregiving. Moreover, future study may seek to examine long-term and recurring experience in the caregiving role as risk factors for poor physical health quality of life among caregivers of patients with other severe illnesses, in support of increasing access to supportive care for all families coping with serious illness.

Last, our measure for depressive symptoms captures physical symptoms that may share underlying etiology with the endorsed physical conditions, which may in part account for associations between depressive symptoms and physical morbidity development. Psychoneuroimmunological research has suggested a link between the psychological and physiological stresses of caregiving through elevated inflammation (Kiecolt-Glaser et al., 2003; Rohleder et al., 2009). Future research examining biobehavioral factors, such as genome expression (Miller et al., 2008), proinflammatory cytokines (Rohleder et al., 2009), and telomerase activity (Damjanovic et al., 2007), will improve the understanding of how psychosocial risk factors such depressive symptoms translate into greater risk for physical morbidity among cancer caregivers.

Conclusions

Despite limitations, this study provides strong and novel evidence regarding important vulnerability factors relevant to cancer caregivers’ development of physical morbidity. Caregivers who were providing assistance at 5 years postdiagnosis, as well as caregivers who reported newly emerging or chronically elevated depressive symptoms, showed the greatest likelihood for development of physical morbidity. Findings suggest that attention to these subgroups of caregivers is critical for not only addressing their psychological well-being but also limiting their development of physical morbidity. Providing effective, targeted, and timely psychosocial care for cancer caregivers years after the relative’s initial cancer diagnosis may help to prevent premature health decline among this important yet vulnerable population.

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