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Psychological Distress in Different Social Network Members of Breast and Prostate Cancer Survivors

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Abstract

The purposes of this investigation were to compare psychological distress among cancer survivors' social network members with different relationships with the survivors and to compare their reported levels of distress with population norms. Participants in this investigation included spouses/significant others (*n* =153), siblings (*n* =11), adult children (*n* =25), parents (*n* =10), cousins (*n* =6), and friends/others (*n* =10) of English or Spanish speaking women with breast cancer and English speaking men with prostate cancer. Network members reported on their symptoms of depression, positive and negative affect, anxiety, and relationship satisfaction. The psychological distress among all relationship types was similar. Spouses, and to a lesser extent, adult children were the only groups whose levels of psychological distress were above population norms. Relationship satisfaction was negatively associated with social network members' psychological distress, and female network members had higher levels of depression than male network members due, in part, to higher perceived stress among female network members. These findings highlight the need to consider the potentially deleterious impact of cancer not just on survivors' spouses, but on other social network members as well and to make services available to network members who may play an important role in the survivor's care and adjustment.

Keywords

psychological distress; social network members; depression; anxiety; relationship satisfaction

Breast and prostate cancer are extremely prevalent diseases. Approximately 217,730 new cases of prostate cancer and 207,090 new cases of breast cancer were diagnosed in the US in 2009 (American Cancer Society, 2010). With advances in early detection and treatment methods, increasing numbers of people are living with these diseases and their sequelae. However, the consequences of these diseases, like those of all forms of cancer, reach beyond cancer survivors to family, friends, and especially spouses (Kim & Given, 2008; Northouse et al., 2007).

Data in the Surveillance Epidemiology and End Results (SEER) database compiled by the National Cancer Institute, indicate a lifetime risk of developing cancer at 40% (Horner et al., 2009). This suggests that the majority of the population will, at some point in their lives, have an immediate social network member with cancer. The family and friends of people with cancer experience high levels of stress associated with uncertainty and fear. Stress may

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also be related to the assistance and support they provide to the person with cancer (Ben-Zur, Gilbar, & Lev, 2001). Accordingly, social network members of cancer survivors will sometimes experience psychological distress that is on par with, or in excess of, the distress experienced by the survivors themselves (Couper et al., 2006; Manne et al., 2007; Rabin et al., 2009).

The two primary aims of this investigation, therefore, were to determine (a) whether psychological distress varied among different types of social network members of cancer survivors and (b) whether that distress was significantly different from levels that are evident in the general population. Secondary aims were to test whether sex, specifically being female, was a potential risk factor for elevated distress, and whether relationship satisfaction was a potential psychosocial resource that could minimize distress among cancer survivors' social network members.

Depression, anxiety, and related forms of negative affect are among the more common features of distress experienced by cancer survivors' social network members (Edwards & Clarke, 2004; Rivera, 2009). About 40% of cancer survivors' spouses score above the cutoff for clinically significant depression on the Beck Depression Inventory-II (Braun, Mikulincer, Rydall, Walsh, & Rodin, 2007). Similarly, a greater percentage of spouses in the Braun et al. (2007) investigation had clinically significant levels of depression compared to the survivors themselves (39% vs. 23%). Findings from a recent study of over 11,000 spouses and intimate partners of cancer survivors showed that the relative risk of psychiatric diagnosis doubled following the diagnosis of their partner's cancer (Sjovall et al., 2009).

Members of cancer survivors' social networks who provide informal care are particularly prone to emotional burden and psychological distress (e.g., Gaugler et al., 2005; Kim & Given, 2008). Psychological distress or mood disturbance is experienced by 32–50% of caregivers (Butler, Turner, Kaye, Ruffin, & Downey, 2005). When cancer survivors meet the criteria for a psychiatric disorder, their caregivers are 7.9 times more likely to meet the criteria as well (Bambauer et al., 2006). Even though spouses and immediate family members often serve in the caregiving role, sometimes other social network members assume the caregiving role (Sherwood et al., 2004).

Some of the secondary stressors and distress associated with caregiving appear to be affected by social relationship issues, such as whether the caregiver is the spouse of the care recipient or lives with the care recipient, and whether the caregiver has lost intimate exchange with the care recipient (Gaugler et al., 2008, 2009). These findings suggest that the nature of the relationship between the caregiver and care recipient may potentially influence the caregiver's distress. Understanding and mitigating distress in cancer survivors' network members is particularly important and has implications for network members' abilities to provide effective and reliable support and assistance to the cancer survivor during treatment.

There are several theoretical perspectives from relationship science that explain why social network members of cancer survivors would experience substantial psychological distress and why that distress could differ as a function of different relationship types. At a macroscopic level, family systems theory explains that people in a social system are interdependent and perpetually influencing each other (Broderick, 1993). That which affects one member of the system will invariably have some effect on other members of the system.

At a mid-level of analysis, interdependence theory (Rusbult & Van Lange, 2003) explains how people have varying levels of dependence and mutuality of dependence in different relationships, based on the structure of the relationships and the needs and goals of the members in the relationships. In close relationships, people often have a high level of dependence and rely on their network members, such that their own outcomes are heavily

influenced by network members' actions. In these dependent relationships, especially those with mutuality of dependence, as one person in the relationship becomes negatively affected and more incapacitated by illness, this could also influence the other person's relational outcomes. However, in more casual relationships with lower levels of dependence, the actions of one person would be less consequential to the outcomes experienced by the other person.

Finally, at a more microscopic level, theories of emotional contagion postulate that people will “catch” the intense emotional states of those with whom they interact through largely unconscious interpersonal processes based on perception and imitation of subtle nonverbal behaviors (Hatfield, Cacioppo, & Rapson, 1992, 1994). Although these three theoretical perspectives are cast at differing levels of analysis, all predict that, in the context of close relationships, something that prompts distress in one member of a social network is likely to generate distress in the other. Interdependence theory further predicts variability in this effect as a function of how dependent social network members are on each other.

Breast and prostate cancer each have disease and treatment-related side effects that can have consequential implications for intimate dyads (e.g., sexual dysfunction, altered body image, fatigue). This has led to a focus on the functioning, adjustment, and distress of cancer survivors and their intimate partners, primarily spouses (e.g., Brusilovskiy, Mitstifer, & Salzer, 2009). However, there is accumulating evidence that distress in the social networks of cancer survivors extends beyond spouses and intimate partners, to include survivors' children (Schmitt et al., 2008; Thastum et al., 2009) as well as other family members and friends (Sandgren, Mullens, Erickson, Romanek, & McCaul, 2004).

The strong focus in the literature on distress in spouses or intimate partners of cancer survivors allows for only a partial understanding of the interpersonal dynamics associated with cancer diagnosis and treatment. With increases in the divorce rate and postponement of first marriages, the average American spends the majority of his or her adult life unmarried (Kreider & Fields, 2002). Consequently, there are many cancer survivors who do not have a spouse. Even among those with a spouse, some believe that social network members other than their spouse play a key role in their support, coping, and recovery from cancer (Mallinger, Griggs, & Shields, 2006). For these reasons, it is important to expand the examination of distress in cancer survivors' social networks beyond spouses or intimate partners and explicitly examine whether and to what extent other family members and friends experience comparable levels of psychological distress.

Among a host of variables that predict distress in social network members, relationship satisfaction is an important interpersonal factor that has a demonstrated association with a positive psychological state (Bergelt, Koch, & Petersen, 2008; Hodgkinson et al., 2007). Ordinarily, the more satisfied cancer survivors and their social network members are with their relationships, the less psychological distress they experience (Galbraith, Arechinga, Ramirez, & Pedro, 2005). The mechanism behind this association could be that highly satisfied relationships are likely to be coupled with effective communication, coping, and relationship maintenance, all of which are associated with better psychological functioning and interpersonal adjustment among cancer survivors and their partners (Badr & Taylor, 2008, 2009).

In the stress process model (Pearlin, Mullan, Semple, & Skaff, 1990), which has been applied to family caregiving, relationship closeness is conceptualized as a psychosocial resource that can minimize negative outcomes for the caregiver (Gaugler et al., 2009). Interpersonal relationship satisfaction is a stronger predictor of lower psychological distress

in spouses of men with prostate cancer than the severity of the men's medical condition (Eton, Lepore, & Helgeson, 2005).

Another predictor of distress in social network members is sex (e.g., Kim & Given, 2008). Generally, women experience greater psychological distress when faced with cancer, regardless of whether they are the survivor or the intimate partner (Hagedoorn, Sanderman, Bolks, Tuinstra, & Coyne, 2008). Bergelt et al. (2008) noted that female partners of cancer survivors had lower scores on mental and physical dimensions of quality of life than male partners. In Pearlin et al.'s (1990) stress process model, sex of the caregiver is conceptualized as an element in the context of care, where being female is commonly associated with more negative psychological outcomes (Gaugler et al., 2009).

One of the ambiguities inherent in research showing that women experience more distress than men in response to cancer, especially in terms of depression, is that women in the general population also report more depression than men (e.g., Romans, Tyas, Cohen, & Silverstone, 2007). Therefore, what is needed is a further exploration of whether there are mechanisms specific to cancer caregiving that could explain why female social network members of cancer survivors experience more depression than male network members. Based on concepts from Pearlin et al.'s (1990) stress process model, Gaugler et al. (2005) argued that women who are providing informal care for cancer survivors carry heavier emotional burdens than men because of (a) socially normative expectations that assign greater responsibility for care to women, (b) women's greater sensitivity to the emotional burdens of care, and (c) the abundance of competing responsibilities experienced by women. All of these factors point to greater stress on women in a caregiving role as compared to men in a caregiving role.

In contrast to female social network members, the psychological distress of male network members may not be any different than that of men in the general population (Hinnen et al., 2008). Hinnen et al. (2008) argued that when studying distress in cancer survivors and their network members, it is vital to compare distress levels to those without cancer. Hinnen et al. found that the psychological distress experienced by male intimate partners of cancer survivors was not distinguishable from the distress in men from a control group whose intimate partners did not have cancer.

There is some evidence in the literature that women experience more stress than men when providing care to a family member with cancer (Colgrove, Kim, & Thompson, 2007; Kim, Baker, & Spillers, 2007; Kim, Loscalzo, Wellish, & Spiller, 2006). This may be because female caregivers are more likely to feel trapped by caregiving responsibilities than male caregivers (Gaugler et al., 2005). Collectively, these findings suggest that female caregivers experience more stress than male caregivers, and that their stress is associated with greater psychological distress. Stated differently, stress appears to be a mediator that could explain the relationship between sex of the social network member and psychological distress.

In the present study, we sought to first test for different levels of psychological distress in social network members of varying relationships with cancer survivors. We conceptualized psychological distress as a constellation of affective states including symptoms of depression, negative affect, anxiety, and low positive affect. Different relationships types (e.g., spouse, adult child, sibling, friend) have vastly different levels of investment, commitment, expectation for future interaction, and obligation. Any of these variables could significantly influence the extent to which social network members experience high levels of psychological distress in response to the cancer diagnosis and treatment of their friend, family member, or spouse. Because spouses have been the dominant focus of research on distress among cancer survivors' social network members, we treated spouses/significant

others as a point of comparison with five other groups of social network members—siblings, adult children, parents, cousins, and friends/others.

Next, in accord with Hinnen et al.'s (2008) suggestion, we sought to determine if any of the network members of different relational types had levels of psychological distress that were significantly elevated compared to population norms. Whereas the first set of analyses tested for relative differences among types of social network members, this second set of analyses tested for differences from a reference point of distress in the general population.

Third, as a secondary aim, we examined the association between relationship satisfaction and social network members' distress. Although marital satisfaction is a powerful predictor of lower stress among cancer survivors' partners (Segrin, Badger, Sieger, Meek, & Lopez, 2006), little attention has been devoted to relational satisfaction in other interpersonal contexts. Just as married couples can vary extensively in their satisfaction with the relationship, so too can parent-child, sibling, and friend dyads as well as dyads that involve extended family members.

Finally, also as a secondary aim, we tested for sex differences in levels of psychological distress among the various social network members of cancer survivors. Once established, stress was tested as a potential mechanism to explain this sex difference in a subset of social network members.

Methods

Participants

The analyses presented here are based on data collected from three different samples of breast or prostate cancer survivors' social network members (N = 215). The first sample consisted of 96 network members of English-speaking women with breast cancer. The second consisted of 49 network members of Spanish-speaking women with breast cancer. The third sample included 70 network members of English-speaking men with prostate cancer. All survivors were asked to nominate a member of their social network who played an important role in their recovery to participate with them in the investigation. Table 1 provides further information on these social network members.

This investigation is a secondary analysis of data from the first sample, English speaking women with breast cancer, and the primary analysis of data from the second and third samples. Because these data were derived from three separate investigations, there were slight variances in their protocols (e.g., inclusion criteria, measures) that are highlighted when relevant to the present analyses. The cancer survivors were recruited to participate in a clinical trial testing the effectiveness of interventions—educational, interpersonal counseling, or exercise—developed to enhance and maintain quality of life for people recently or currently in treatment for cancer and their social network members. All arms of the intervention involved multiple waves of data collection. For this report, we used only those data that were collected at the baseline assessment before any intervention. Further details of these interventions can be found elsewhere (Badger, Segrin, Dorros, Meek, & Lopez, 2007; Badger, Segrin, Meek, Lopez, & Bonham, 2005). Only procedures and measures relevant to the current analyses are described here.

Cancer survivors were recruited predominantly from regional cancer centers and oncologists' offices through announcements from staff and distribution of study brochures that had the research staff's contact information. A smaller portion of participants were recruited from announcements and brochures distributed at regional Veteran's Administration centers and cancer support groups, as well as from research study websites

through which interested individuals could volunteer to enroll. Enrollment was open to any person diagnosed with breast or prostate cancer, who was currently undergoing treatment or who had completed treatment within the past 6 months. Among the breast cancer survivors, 33% had stage I, 53% had stage II, and 14% had stage III disease. For the prostate cancer survivors, 36% had stage I, 19% had stage II, 19% had stage III, and 26% had stage IV disease. The mean Gleason score was 6.33 (*SD* = 1.63) for the prostate cancer survivors.

Procedure

Cancer survivors nominated a social network member to participate along with them in the investigation. Once enrolled in the investigation, all social network members completed a baseline assessment during which measures were administered over the telephone by a trained data collector. Ten data collectors were involved in the three investigations; they all had the same training. Each data collector reviewed each measure with the investigators and then administered the measure to practice subjects who were not in the actual investigations. The interactions between the data collectors and the practice subjects were audio recorded and reviewed by the principal investigators who then gave feedback and suggestions for improvement to the data collectors. Thereafter, actual data collection sessions were randomly selected for recording and spot checking by the principal investigators to ensure the continued integrity of the data collection procedures.

The measures described in the following section all involved closed–ended response options. For this reason, there was a great deal of consistency in the data collection procedure. The project manager who recruited the participants determined their preferred language; this information was forwarded to the appropriate data collector, who spoke either English or Spanish, whichever was the participant's preferred language. Data collectors always knew in advance which language the participant preferred. The full battery of measures took approximately 45 minutes to complete. The data presented in this manuscript represent only about 15–20 minutes of the entire baseline data collection session. Participants received a $20 gift card to one of several national retail stores after each assessment in compensation for their time.

Measures

The majority of the social network members of Spanish-speaking women with breast cancer completed previously translated Spanish-language versions of the measures. All other social network members completed the measures in English. Table 2 includes the means, standard deviations, and Cronbach's alpha for each measure for each sample.

Depression—Symptoms of depression were measured using the 20-item Center for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977). Scores on this instrument have a possible range of 0–60. Respondents reported on their symptoms of depression over the course of the past week. Sample items include “I felt depressed” and “My sleep was restless.” The CES-D has been used in numerous studies with general and cancer populations with evidence of satisfactory reliability (e.g., $\alpha > .80$) and validity estimates (e.g., concurrent validity with correlations of $r > .70$; e.g., Badger et al., 2007).

Negative and positive affect—Affective state was assessed with the 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Scores have a possible range from 10 to 50 on each scale with higher scores reflecting greater negative or positive affect. Sample positive affect items include “interested” and “inspired;” sample negative affect items include “distressed” and “irritable.” The PANAS has been used extensively with general populations as well as cancer populations with satisfactory

reliability and demonstrated convergent and construct validity (e.g., Manne & Schnoll, 2001; Melvin & Molloy, 2000).

Anxiety—The State version of the State-Trait Anxiety inventory was administered to social network members to assess their current levels of anxiety (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The State version of this instrument was used because it varies based upon the individual's present state of anxiety, and the study protocol required repeated assessments. The State version of the instrument asks respondents to focus on how they feel "right now, that is at this present moment." The STAI is a 20-item instrument with a possible scale range of 20–80 that includes items such as "I feel anxious" and "I am worried." The STAI has an extensive record of psychometric quality (e.g., Oei, Evans, & Crook, 1990) and has been used with cancer survivors and their family members (e.g., Lienard et al., 2008). Because of the slightly different measurement protocols for the different samples, the STAI was only administered to network members of Spanish-speaking women with breast cancer and English-speaking men with prostate cancer.

Stress—Social network members' current level of stress was assessed with the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983). The PSS is a 10-item instrument that measures subjective appraisals of stress (e.g., "In the last month, how often have you found that you could not cope with all the things that you had to do?" and "In the last month, how often have you felt that you were unable to control the important things in your life?"). The PSS has a scale range of 0–40, with higher scores reflecting greater subjective stress. The PSS was only administered to network members of Spanish-speaking women with breast cancer and English-speaking men with prostate cancer because of different measurement protocols.

Relationship satisfaction—The Relationship Assessment Scale (RAS; Hendrick, 1988; Hendrick, Dicke, & Hendrick, 1998) was completed by all social network members as an index of their current relational quality with the cancer survivor. The RAS is a 7-item instrument with items that tap global satisfaction with the relationship (e.g., "In general, how satisfied are you with your relationship?" and "How good is your relationship compared to most?"). The RAS has a scale range of 7–35, with higher scores indicating greater satisfaction. Most importantly, the RAS does not confound the appraisal of global relational satisfaction with specific behavioral phenomena that indicate satisfaction or dissatisfaction. Also, the RAS is appropriate for assessing satisfaction with any close relationship, not just marriage (Hendrick et al., 1998).

Analysis strategy—Potential differences in psychological distress among social network members in different types of relationships with cancer survivors were evaluated in three steps. A series of one-way ANOVAs were conducted to compare the different social network groups on each of the psychological distress variables. Two different sets of planned comparisons tested spouses/significant with (a) each of the five other social network member groups and (b) the other social network groups combined. Differences between various social network groups and population norms were tested with one-sample *t*-tests. Sex differences in social network members' psychological distress were tested with independent samples *t*-tests comparing male and female partners. Finally, we used a regression-based bootstrapping technique to estimate the indirect effect of social network member sex on psychological distress through perceived stress.

Results

Psychological Distress by Relationship Type

The first set of analyses focused on differences in psychological distress among the various types of social network members. For these analyses, four one-way ANOVAs were conducted with depression, positive affect, negative affect, and anxiety each treated as dependent variables; the relationship variable with six levels (spouse/significant other, sibling, child, parent, cousin, and friend) was the independent variable. Results of these analyses are in Table 3. Significant differences in symptoms of depression were found as a function of relationship type. ANOVA results for the remaining dependent variables (i.e., positive affect, negative affect, and anxiety) yielded no significant differences among any of the relational types—all social network members had comparable levels of psychological distress.

Two sets of planned comparisons were under-taken to explore potential differences in psychological distress in different types of social network members. The first comparison involved spouses/significant others and each of the five remaining social network member groups. These planned comparisons were conducted with the Bonferroni *t*-tests, setting alpha equal to .01, to reflect the traditional alpha of .05 divided by five pairwise comparisons for each psychological distress variable. Spouses/significant others had significantly higher levels of depression than siblings, $t(14.54) = 3.05$, $p < .01$. All other pairwise comparisons between spouses/significant others and each remaining social network member group were not statistically significant. For the three remaining measures of psychological distress (i.e., positive affect, negative affect, anxiety), none of the pairwise comparisons between spouses/significant others and any of the other social network member groups were statistically significant.

The second set of planned comparisons tested for differences between spouses/significant others and all other social network types as an aggregate. These tests revealed no significant differences between spouses and the combination of all other social network members for depression, positive affect, negative affect, or anxiety.

The prior analyses evaluated relative differences in psychological distress among the different relational types. Another useful way to examine the different groups was to compare their psychological distress against population norms. This asks whether any given group had elevated symptoms relative to those in the general population. These analyses were conducted with one-sample *t*-tests for each group, compared against a population norm for that dependent variable—depression, positive affect, negative affect, and anxiety. Results of these analyses can be found in Table 4.

Radloff (1977) published normative data for the CES-D from 4,996 adults in the general population. This value ($M = 8.65$) was compared to the mean CES-D score for each relational type in our sample. As the results in Table 4 document, the spouse/significant other, adult child, and cousin, social network members had significantly elevated symptoms of depression compared to those in the general population. The remaining types—siblings, friends, and parents—had levels of depression that were not significantly different from those in the general population.

Crawford and Henry (2004) presented norms for the PANAS based on data from a broad representation of 1,003 adults. These population norms were used as the point of comparison. For positive affect, all groups except cousins had means that were statistically significantly higher than the reference norm. For negative affect, the spouse/significant other group ($M = 19.08$) had scores that were significantly higher than the population norm, $t(152)$

= 4.88, $p < .001$. The scores for the remaining relational types were not significantly different from those in the general population.

Normative data from 1,766 adults aged 25–69 (Spielberger & Sarason, 1985) were used to test for elevated State anxiety in the relational types relative to the general population. Results revealed a nonsignificant trend suggestive of lower anxiety among siblings than those in the general population, $t(9) = -2.08$, $p = .07$. All remaining groups had anxiety scores that were indistinguishable from those in the general population.

Because some of the relationship types were represented by small sample sizes, all non-spouse/significant other groups were collapsed into one group and compared to population norms. These analyses showed that the non-spouse/significant other group collectively had symptoms of depression, $t(61) = 4.58$, $p < .001$, negative affect, $t(61) = 2.39$, $p < .05$, and positive affect, $t(61) = 5.65$, $p < .001$ that were significantly higher than population norms. However, there were no significant differences in anxiety between the non-spouse group and population norms, $t(39) = .15$, *ns*. This pattern of differences from population norms is identical to that of spouses/significant others.

Relationship Satisfaction and Psychological Distress

To test the prediction that relationship satisfaction would be a positive psychosocial resource that could minimize distress, social network members' reported satisfaction in their relationship with the cancer survivor was correlated with each indicator of psychological distress. The results showed that social network members' relationship satisfaction with the cancer survivor was significantly and negatively correlated with symptoms of depression, $r(214) = -.28$, $p < .001$ and negative affect, $r(214) = -.22$, $p < .01$, and significantly and positively associated with their level of positive affect, $r(214) = .24$, $p < .001$. Among the subsample of network members in relationships with Spanish-speaking women with breast cancer or English-men with prostate cancer, the correlation between relationship satisfaction and anxiety was not significant, $r(118) = -.15$, *ns*.

Sex Differences in Distress Among Social Network Members of Cancer Survivors

The literature offers some evidence suggesting that women are more distressed by the experience of cancer than men, regardless of whether they are the survivor or social network member (Hagedoorn et al., 2008). Sex differences were therefore examined for each of the four dependent measures of psychological distress. Results indicated that female social network members had more symptoms of depression than male network members, $t(212) = 2.37$, $p < .05$. However, there were no statistically significant male–female differences in positive affect, $t(212) = .28$, *ns*, negative affect, $t(212) = .69$, *ns*, or anxiety, $t(116) = .72$, *ns*.

The statistically significant sex difference for symptoms of depression among social network members of cancer survivors is consistent with prior research showing that women coping with cancer, in either the role of survivor or intimate partner, have higher depression than do men. It is also consistent with past research showing that women in the general population, regardless of exposure to cancer, report higher levels of depression than men. Accordingly, it is useful to determine if this sex difference might be attributable to reactions to the cancer experience or whether it represents an already well-established pattern of sex differences in depression in the general population.

Social network members of Spanish-speaking women with breast cancer and network members of English-speaking men with prostate cancer all completed a measure of stress. We tested whether female social network members of cancer survivors were more depressed because they were under greater stress, presumably as a result of the cancer of their friend or

family member. Such an analysis tests for an indirect effect of sex on depression through stress.

The significance and magnitude of indirect effects can be estimated with bootstrapping techniques (Preacher & Hayes, 2004). Fairchild, MacKinnon, Taborga, and Taylor (2009) provided algorithms for an R^2 effect size measure for indirect effects among observed variables. The results of this test, using a regression model with an SPSS macro published by Preacher and Hayes (2004), documented that female social network members reported higher stress than male network members (b=3.26, t=2.10, $p < .05$, where sex was dummy coded as 1=*male*, 2=*female*). Stress had a powerful positive association with depression, controlling for sex (b=.16, t=11.55, $p < .001$). Furthermore, there was a statistically significant indirect effect of social network member sex on depression, through increased stress (b =.52, 95% c.i. =.02–1.01, R^2=.03, $p < .05$). Controlling for stress, the effect of sex on depression dropped to virtually zero (b =.09, t=.38, Sobel z=2.05, $p < .05$). These results, based on a subsample of the social network members in this investigation, provide evidence that female network members of cancer survivors experienced higher levels of depression than male network members, in part, because female network members were under greater stress.

Discussion

This investigation was designed to expand the inquiry into the psychological distress of cancer survivors' social network members to include a variety of relationships in addition to spouses. The results showed that other social network members (e.g., siblings, adult children, friends) had levels of psychological distress that were comparable to spouses/ significant others of cancer survivors. When compared to population norms, spouses/ significant others exhibited significantly elevated depression and negative affect. The adult children of cancer survivors also had elevated depression. None of the groups had anxiety that was higher than population norms.

This study also replicated previously published findings in showing that relationship satisfaction was associated with lower psychological distress (e.g., Gale et al., 2001). In addition, we found evidence that female social network members of cancer survivors had higher levels of depressive symptoms compared to male network members. Furthermore, this effect appears to be attributable to the higher stress experienced by female, relative to male, social network members. At the same time, there were no sex differences in network members' levels of negative affect, positive affect, or anxiety.

Prior research on social network members of cancer survivors has focused on the adjustment of spouses. In this investigation, we included a broader range of key social network members with the cancer survivors. This is important because some cancer survivors do not have a spouse or an intimate partner and may rely primarily on other family and friends during the cancer experience. Even those with spouses may rely on other social network members for the majority of their support. Given the changing structure of US families, it is important to move beyond focusing on intimate partners to include other social network members who are vital resources to the cancer survivor during recovery.

The findings of this study showed that depression scores among spouses/significant others were indistinguishable from those of adult children, parents, and siblings of cancer survivors. Although spouses of cancer survivors are at increased risk of depression (Braun et al., 2007), these findings highlight that this risk is shared by other family members as well.

What is perhaps even more remarkable is that among the remaining indicators of psychological adjustment (i.e., positive affect, negative affect, and anxiety), all groups were

comparable to the spouses/significant others. Spouses, siblings, adult children, parents, cousins, and friends of cancer survivors all experienced these states of distress to a similar degree. This finding adds to a growing body of evidence suggesting that spouses are not the only members of cancer survivors' networks who experience psychological distress (Sandgren et al., 2004) and who also may benefit from psychosocial intervention.

Hinnen et al. (2008) argued that it is important to compare the distress of cancer survivors and their social network members to people in the general population, as their distress is sometimes not appreciably higher than what is normative in the population. In our analysis, spouses/significant others had depression symptom scores that exceeded those of the general population, suggesting significant depression symptoms (Radloff, 1977). The adult children of cancer survivors had even higher depression scores than did the spouses/significant others or the general population; as a group adult children of cancer survivors were beyond the threshold for significant depression. However, most other groups (e.g., parents, friends, siblings) did not have depression scores that were different from those in the general population.

Tests that combined all the non-spouse network members and compared them to population norms indicated that collectively, social network members had elevated depression. These results may be understandable from the perspective of interdependence theory (Rusbult & Van Lange, 2003) in that spousal and parent-child relationships are commonly marked by high levels of interdependence. It is plausible that people in both types of relations are heavily invested in the relationship and get seriously involved in caregiving with the cancer survivor such that it also affects their own well-being.

Similar to depression, the results for negative affect showed that spouses/significant others were the only relational type with distress that was significantly above the population norm. This finding must be interpreted with caution as parents, adult children, siblings, and cousins also had mean levels of negative affect that were above population norms. However, because of the small sample size for each of these groups, statistical power was lower in these cases than in the comparison of spouses/significant others to the population norm. When all the non-spouse network members were combined into one group, these non-spouse network members also had significantly higher negative affect than what is evident in the general population.

The positive affect data showed that virtually all groups scored *above* population norms. Such findings vividly illustrate the independence of positive and negative affect (Gotlib & Meyer, 1986; Watson & Clark, 1997). For example, even though spouses had depression and negative affect scores that were significantly higher than population norms, they also had higher positive affect. Being in close relationship with a cancer survivor is accompanied by a myriad of emotions, not all of which are negative.

The findings from this investigation are consistent with others showing that relationship satisfaction is negatively associated with psychological distress among social network members of cancer survivors (Bergelt et al., 2008; Hodgkinson et al., 2007). This finding has a paradoxical quality. One might assume that those with the highest relationship satisfaction are perhaps most heavily invested in their relationship with the cancer survivor, and therefore they would be the most distressed by the experience. Alternatively, relationship satisfaction could be a proxy for effective communication, social support, and coping that could promote better psychological adjustment when providing care for a social network member with cancer (e.g., Kim & Given, 2008; Langer, Brown, & Syrjala, 2009). To the extent that this alternative explanation is the case, the salutary effects of being in a

satisfying relationship may actually trump the stress of having a social network member with cancer, at least in terms of psychological distress.

Finally, findings from this study provide further evidence that symptoms of depression are higher in female social network members of cancer survivors than in male network members (see also Bergelt et al., 2008 and Hagedoorn et al., 2008). At the same time, these findings indicate that there may be limitations on this sex difference in other forms of psychological distress. It appears that the elevated psychological distress of female versus male social network members of cancer survivors is restricted to symptoms of depression. There was no evidence in these data that female network members experienced any higher levels of negative affect or anxiety than male network members. This finding has considerable importance for understanding and interpreting risk factors for psychiatric morbidity among social network members of cancer survivors. Although female network members in this investigation had higher levels of depression than did male social network members, women in the general population also have higher levels of depression than men. It is therefore possible that the higher depression in female social network members of cancer survivors is not specifically attributable to the cancer experience.

In this investigation, we assessed perceived stress in a subset of the social network members. When we tested for an indirect effect of sex on depression, we found evidence consistent with the idea that female network members of cancer survivors experience higher levels of depression possibly because they also experience higher levels of stress than do males. The indirect effect of social network member sex on depression, though stress was statistically significant. When controlling for stress, the effect of network member sex on depression became virtually zero. The higher stress of female network members may be because women often assume a heavier caregiving burden than men (e.g., Gaugler et al., 2005; Kim et al., 2007). In a cross-sectional context it cannot be stated with certainty that being female predisposes one to greater stress and therefore higher depression, but these results are suggestive of just such a relationship, which would be worth testing in a longitudinal context in future research.

The findings on relationship satisfaction and sex differences are consistent with elements of the stress process model (Pearlin et al., 1990) as applied to informal caregiving with cancer survivors (e.g., Gaugler et al., 2009). In this model, caregiver sex is a key variable in the context of care, and relationship closeness is a psychosocial resource. This model holds that being female is associated with more distressing outcomes for the caregiver, but that relationship closeness is associated with less distressing outcomes. This is the pattern of findings documented in this investigation.

There are several limitations of this investigation that must be considered. First, this cross-sectional analysis precludes evaluating causal effects of the survivor's cancer on the social network member's distress. Second, sample sizes of some of the social network member groups (e.g., cousins, friends, siblings) were small, thereby minimizing the power when testing for differences between these and the spouse/significant other groups. Third, due to the voluntary nature of the recruitment, it is possible that selection bias resulted in an underrepresentation of those network members who are truly the most distressed. Given that virtually all of the network members had positive affect scores that were significantly above population norms, this limitation must be given serious consideration. Fourth, there was considerable heterogeneity in the time since diagnosis and treatment status of the cancer survivors whose social network members participated in this investigation. Presumably, the needs of the survivor and consequent burden and demands on social network members are more intense earlier in the survivorship trajectory than they are after treatment has been completed. Finally, because survivors were asked to nominate a social network member to

participate with them in the investigation, it is likely that they selected someone close to them. Accordingly, these social network members could have higher levels of distress and concern than more peripheral network members.

In conclusion, these findings show that intimate partners are not the only members of the cancer survivor's social network who experience psychological distress. Siblings, adult children, friends, and parents had levels of depression, negative affect, and anxiety that were indistinguishable from spouses/significant others. However, it was the spouses/significant others, and to a lesser extent adult children, who had levels of depression and negative affect that were clearly in excess of those in the general population. Among the different social network member groups, good relationship satisfaction was consistently associated with lower levels of psychological distress. Finally, being a female social network member of a cancer survivor appeared to be a risk factor for depression, but not other forms of distress. This may be due to female network members perceiving more stress in their lives than male network members. These findings document the need to develop effective psychosocial interventions that include key members within the social network of various relational types as well as cancer survivor.

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Table 1
Demographic Characteristics of Social Network Members by Sample

	Social Network Members of English-Speaking Women With Breast Cancer (*n* = 96)	Social Network Members of Spanish-Speaking Women With Breast Cancer (*n* = 49)	Social Network Members of Men With Prostate Cancer (*n*=70)
Relationship			
Spouse/significant other	73 (76%)	21 (43%)	58 (83%)
Sibling	2 (2%)	6 (12%)	3 (4%)
Adult child	17 (18%)	6 (12%)	2 (3%)
Friend	3 (3%)	5 (10%)	2 (3%)
Parent	0 (0%)	6 (12%)	4 (6%)
Cousin	1 (1%)	2 (4%)	0 (0%)
Other	0 (0%)	3 (6%)	1 (1%)
Sex			
Male	71 (74%)	23 (47%)	4 (6%)
Female	25 (26%)	26 (53%)	66 (94%)
Age			
M	51.68	42.75	61.13
SD	14.83	13.77	10.94
Race/ethnicity			
Amer. Indian/AK Native	0 (0%)	0 (0%)	1 (1%)
Asian/Pacific Islander	0 (0%)	1 (2%)	2 (3%)
Black	2 (2%)	0 (0%)	6 (9%)
Latina/o	11 (11%)	45 (92%)	3 (4%)
White	83 (86%)	3 (6%)	57 (81%)
Other/unknown	0 (0%)	0 (0%)	1 (1%)
Marital status			
Married	71 (74%)	32 (65%)	58 (83%)
Unmarried	25 (26%)	17 (35%)	12 (17%)
Ever divorced	31 (32%)	9 (18%)	30 (43%)
Ever widowed	5 (5%)	2 (4%)	3 (4%)
Education			
Elementary	0 (0%)	3 (6%)	0 (0%)
Middle school	1 (1%)	11 (22%)	1 (1%)
High school	14 (15%)	18 (37%)	12 (17%)
Vocational/some college	29 (30%)	6 (12%)	20 (29%)
College	29 (30%)	9 (18%)	22 (31%)
Post-grad/professional	23 (24%)	2 (4%)	15 (21%)
Employment			
Unemployed	9 (9%)	8 (16%)	3 (4%)
Part time	5 (5%)	8 (16%)	8 (11%)
Full time	54 (56%)	25 (51%)	24 (34%)
Retired	26 (27%)	2 (4%)	32 (46%)

	Social Network Members of English-Speaking Women With Breast Cancer (*n* = 96)	Social Network Members of Spanish-Speaking Women With Breast Cancer (*n* = 49)	Social Network Members of Men With Prostate Cancer (*n*=70)
Disabled	0 (0%)	1 (2%)	2 (3%)
Other	0 (0%)	5 (10%)	1 (1%)

Table 2

Means, Standard Deviations, and Alpha Reliabilities for Major Study Variables

	Social Network Members of English-Speaking Women With Breast Cancer			Social Network Members of Spanish-Speaking Women With Breast Cancer			Social Network Members of English-Speaking Men With Prostate Cancer		
Measure	***M***	***SD***	***α***	***M***	***SD***	***α***	***M***	***SD***	***α***
Depression (CES-D)	10.73	9.51	.90	12.35	10.58	.91	12.54	9.91	.89
Negative affect (PANAS)	20.03	7.89	.90	18.10	7.55	.87	17.51	6.69	.86
Positive affect (PANAS)	36.00	6.16	.84	36.59	8.44	.88	35.99	7.46	.87
Anxiety (STAI)				34.18	12.12	.94	32.40	10.59	.94
Stress (PSS)				14.29	8.43	.91	13.87	6.56	.89
Relationship satisfaction (RAS)	31.20	4.16	.83	31.73	3.97	.76	30.55	5.05	.88

CES-D, Center for Epidemiological Studies-Depression Scale; PANAS, Positive and Negative Affect Scales; STAI, State/Trait Anxiety Inventory; PSS, Perceived Stress Scale; RAS, Relationship Assessment Scale; Anxiety and stress data were not available for partners of English-Speaking women with breast cancer.

Table 3

Social Network Member Differences in Depression, Positive, and Negative Affect, and Anxiety

	Psychological Distress Dependent Variable								
	Depression			Positive Affect		Negative Affect		Anxiety[α]	
Relationship With Survivor	***N***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Spouse/significant other	153	15.86	12.14	36.05	7.20	19.08	7.81	32.78	11.27
Sibling	11	9.40	5.93	36.60	4.01	15.10	3.04	28.80	7.42
Adult child	25	19.56	15.62	35.76	6.59	18.12	5.80	34.88	11.41
Friend	10	9.29	7.65	41.29	5.47	15.57	6.24	34.57	10.64
Parent	10	15.50	13.37	39.00	6.96	17.60	8.47	34.30	12.93
Cousin	6	27.50	14.86	30.83	11.46	23.83	7.99	53.50	12.02
			$F(5,210) = 2.42^{*}$		$F(5,210) = 1.75$		$F(5,210) = 1.43$		$F(5,115) = 1.74$

[α]Because anxiety data were only available from 2 of the 3 samples, the *n*s were reduced in this analysis to spouse/significant other = 79, sibling = 10, child =8, friend = 7, parent = 10, and cousin =2.

$^{*}p < .05$.

Table 4

One Sample t-test Comparing Social Network Member Type Distress With Population Norms

	Psychological Distress Dependent Variable							
	Depression		Positive Affect		Negative Affect		Anxiety	
Partner Relationship With Survivor	*M*	*t*	*M*	*t*	*M*	*t*	*M*	*t*
Population	8.65		31.31		16.00		33.55	
Spouse	15.86	$t(152) = 7.34^{***}$	36.05	$t(152) = 8.14^{***}$	19.08	$t(152) = 4.88^{***}$	32.78	$t(78) = -.60$
Sibling	9.40	$t(9) = .40$	36.60	$t(9) = 4.18^{**}$	15.10	$t(9) = -.94$	28.00	$t(9) = -2.08^{\alpha}$
Child	19.56	$t(24) = 3.49^{**}$	35.76	$t(24) = 3.38^{**}$	18.12	$t(24) = 1.83^{\alpha}$	34.88	$t(7) = .33$
Friend	9.29	$t(6) = .22$	41.29	$t(6) = 4.83^{**}$	15.57	$t(6) = -.18$	34.57	$t(6) = .25$
Parent	15.50	$t(9) = 1.62$	39.00	$t(9) = 3.49^{**}$	17.60	$t(9) = .60$	34.30	$t(9) = .18$
Cousin	27.50	$t(6) = 3.10^{*}$	30.83	$t(5) = -.10$	18.12	$t(5) = 2.40^{\alpha}$		

Because only one cousin had data for anxiety that group was dropped from that analysis.

$^{\alpha}p = .06-.08$. Population norms were taken from the following sources, depression: Radloff (1977), positive affect: Crawford and Henry (2004), negative affect: Crawford and Henry (2004), and anxiety: Spielberger and Sarason (1985).

$^{*}p < .05$.

$^{**}p < .01$.

$^{***}p < .001$.