

DAILY MEASURES OF SPOUSAL SUPPORT IN WOMEN WITH BREAST CANCER

Nicole D. Pukay-Martin

A thesis submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Arts in the Department of Psychology (Clinical Psychology).

Chapel Hill
2007

Approved by:

Advisor: Donald Baucom, Ph.D.

Reader: Daniel Bauer, Ph.D.

Reader: Laura Porter, Ph.D.

© 2007
Nicole D. Pukay-Martin
ALL RIGHTS RESERVED

ABSTRACT

NICOLE D. PUKAY-MARTIN: Daily Measures of Spousal Support in Women with Breast Cancer

(Under the direction of Donald Baucom, Ph.D.)

The effects of partner support on women with breast cancer were investigated utilizing a daily diary methodology. Fifty-four women who had recently been diagnosed with early-stage breast cancer completed daily diary measures of partner support amount and satisfaction, mood, cancer symptoms, and role functioning each day for 30 days. Results indicate that the relationship between support amount and satisfaction and the various outcomes differs depending on the level of support, suggesting different underlying mechanisms for average, same-day, and previous-day support. Women's average amount and satisfaction with support may help protect the women from the negative impact of breast cancer, while a woman's daily fluctuations in support seem to be related to her experience on that specific day. For previous-day support, amount appears to operate in the expected direction, while the effect of satisfaction is unclear. Thus, amount and satisfaction are both important when investigating effects of partner support.

TABLE OF CONTENTS

LIST OF TABLES.....	vi
LIST OF FIGURES.....	vii
DAILY MEASURES OF SPOUSAL SUPPORT IN WOMEN WITH BREAST CANCER.....	1
<i>Social Support and Psychosocial Effects of Breast Cancer</i>	3
<i>Types of Social Support</i>	3
<i>Outcomes Examined</i>	6
<i>Providers of Support</i>	11
<i>Conceptualization and Clarification of the Social Support Construct</i>	14
<i>Daily Diary Assessment of Social Support</i>	15
<i>The Current Investigation</i>	19
Method.....	22
<i>Participants</i>	22
<i>Procedure</i>	25
<i>Materials</i>	27
Results.....	30
<i>Evaluation of Error Structure</i>	31
<i>Evaluation of Assumptions of HLM</i>	32
<i>Control Variables</i>	33
<i>Creating Predictor Variables</i>	34

<i>Creating Models to Evaluate Hypotheses 1-3</i>	35
<i>Relationships between Average Support Amount and Outcomes</i>	38
<i>Relationships between Average Support Satisfaction and Outcomes</i>	39
<i>Interaction between Average Support Amount and Satisfaction in Predicting Outcomes</i>	39
<i>Relationships between Support Amount and Same-Day Outcomes</i>	41
<i>Relationships between Support Satisfaction and Same-Day Outcomes</i>	42
<i>Interaction between Support Amount and Satisfaction in Predicting Same-Day Outcomes</i>	43
<i>Relationships between Support Amount and Next-Day Outcomes</i>	46
<i>Relationships between Support Satisfaction and Next-Day Outcomes</i>	47
<i>Interaction between Support Amount and Satisfaction in Predicting Next-Day Outcomes</i>	48
<i>Summary of Results for Hypotheses 1-3</i>	49
Discussion.....	50
APPENDIX.....	80
REFERENCES.....	82

LIST OF TABLES

Table	Page
1. Means and Standard Deviations of Initial Support Variables and Women's Outcome Variables.....	65
2. Means and Standard Deviations of Support Variables Computed for Analyses.....	66
3. Results from the Analyses Modeling Positive Mood as a Function of Partner Support Variables.....	67
4. Results from the Analyses Modeling Negative Mood as a Function of Partner Support Variables.....	68
5. Results from the Analyses Modeling Pain as a Function of Partner Support Variables.....	69
6. Results from the Analyses Modeling Fatigue as a Function of Partner Support Variables.....	70
7. Results from the Analyses Modeling Role Functioning as a Function of Partner Support Variables.....	71

LIST OF FIGURES

Figure	Page
1. The interaction between average amount of support and average satisfaction with support on positive mood.....	72
2. The interaction between average amount of support and average satisfaction with support on pain.....	73
3. The interaction between support amount and support satisfaction on same-day positive mood.....	74
4. The interaction between support amount and support satisfaction on same-day negative mood.....	75
5. The interaction between support amount and support satisfaction on same-day pain.....	76
6. The interaction between support amount and support satisfaction on same-day fatigue.....	77
7. The interaction between support amount and support satisfaction on same-day role functioning.....	78
8. The interaction between support amount and support satisfaction on previous-day negative mood.....	79

DAILY MEASURES OF SPOUSAL SUPPORT IN WOMEN WITH BREAST CANCER

An estimated 212,920 women were diagnosed with breast cancer in 2006 (American Cancer Society, 2006). Approximately one in seven women will develop breast cancer at some point in their lives. In fact, breast cancer is the most prevalent cancer in women and ranks as the second-leading cause of cancer-related deaths. Due to advances in technology, however, the 5-year survival rate for breast cancer has surpassed 85%. Nevertheless, women diagnosed with breast cancer continue to face many challenges and stressors. From the time of diagnosis, women are overloaded with information and must quickly reach important decisions regarding treatment (Ganz, 2000). Even after these decisions are made, women must endure the physical and emotional effects of the treatments they receive. Because of the multiple stressors these women face, much research has focused on the psychosocial effects of breast cancer.

The most common psychological effects of breast cancer diagnosis and treatment are depression, anxiety, self-image concerns, and fear of recurrence (Bloom, 2002; Burgess et al., 2005; Irvine, Brown, Crooks, Roberts, & Browne, 1991). These women have trouble concentrating on the tasks of daily living and have difficulty sleeping due to intrusive, cancer-related thoughts (Backus, 2002). Other effects include a reduction in energy level, decreases in physical, social, and role functioning, and distress caused by cancer-related symptoms (Aranda et al., 2005; Bloom, 2002; Luoma & Hakamies-Blomqvist, 2004). A year from diagnosis, many of these negative effects improve; however, survivors continue to report decreased levels of energy and physical functioning and negative body image. In

addition, many physical and psychosocial problems related to breast cancer continue to affect women well after treatment completion (Ganz et al., 1996). Further, psychosocial effects may depend on the type of treatment women receive (Glanz & Lerman, 1992). A typical treatment plan for a woman with breast cancer consists of breast surgery, which may be followed by radiation and/or chemotherapy. Women who have undergone breast surgery suffer most often from decreased body image and inhibited sexual functioning. These negative psychosocial consequences may then be combined with negative effects from radiation, such as fatigue, breast soreness, anxiety, depression, and disruption in daily activities. Alternatively, surgery may be followed by chemotherapy, the side effects of which include fatigue, nervousness, and acute depression and anxiety. Even two years after treatment, women continue to report some psychosocial difficulties related to chemotherapy treatment (Meyerowitz, Watkins, & Sparks, 1983). Clearly, the experience of breast cancer involves many negative psychosocial and physical consequences, which may negatively impact the women's career, personal life, family, and marriage (Backus, 2002).

Because of these negative outcomes in combination with increased survival rates, research has turned to investigating factors that may help protect patients from the negative psychosocial effects of cancer. One of these potential safeguards is social support, which has been shown to protect people from various stressful life events, including health-related stressors (Cohen & Wills, 1985). In general terms, social support can be defined as functions that are carried out by significant others (e.g., family, friends, health care professionals) for an individual who is under stress (Nelles, McCaffrey, Blanchard, & Fuckdeschel, 1991). Numerous measures of social support have been found to be related to physical and psychosocial adjustment in various health contexts, such as stroke, hypertension, and heart

disease (see Dunkel-Schetter, 1984).

Social Support and Psychosocial Effects of Breast Cancer

The relationship between social support and decreased negative outcomes can be understood within the context of breast cancer by conceptualizing breast cancer as a stressful life event. Many researchers have investigated whether social support is related to better psychosocial outcomes in patients with breast cancer (e.g., Funch & Mettlin, 1982; Helgeson & Cohen, 1996; Koopman, Hermanson, Diamond, Angell, & Spiegel, 1998; Lichtman, Taylor, & Wood, 1988; Primomo, Yates, & Woods, 1990), and, overall, these studies provide evidence that social support does reduce negative psychosocial outcomes related to breast cancer. In most cases, broad, nonspecific measures of social support are related to psychosocial outcomes in women with breast cancer. Women's reports of the degree of general social support they received are positively associated with their level of adjustment (Lichtman et al., 1988). Furthermore, women who perceive greater levels of social support experience higher levels of positive affect and lower levels of negative affect (Funch & Mettlin, 1982). Women who report receiving more support from family, friends, and significant others experience greater psychosocial adaptation (Kulik & Kronfeld, 2005) and less psychological distress (Gilbar, 2005). Even for women with metastatic (i.e., advanced-stage) breast cancer, greater levels of social support are associated with better mood (Koopman et al., 1998). Thus, studies utilizing general measures of social support have provided some evidence that social support may help shield women from the psychological effects of breast cancer.

Types of Social Support

Additional research suggests that there are different types of social support that can

be of assistance to an individual in distress (Helgeson & Cohen, 1996). More specifically, theorists posit three main types of social support: emotional, instrumental, and informational (House, 1981; Thoits, 1985). First, emotional support consists of verbal and nonverbal communication of caring and concern. This type of support can help to restore self-esteem by communicating that a person is loved and valued. In addition, emotional support may permit recipients to express feelings, which may lead to a reduction in distress. Further, this type of support can lead to increased emphasis on interpersonal relationships, which may offer some meaning for stressful experiences. Second, instrumental support involves providing tangible aid or services, such as help with chores or transportation. This type of support may restore recipients' sense of control by giving them resources that they can use to exert control over their stressful experiences. Third, informational support involves providing advice or information. This information may increase people's sense of control by providing them with ways to actively cope and manage their stressful experience. Each of these three types of social support can protect people from the effects of stressful life events (Cohen & Wills, 1985).

Based on this division of social support, Helgeson and Cohen (1996) reviewed a number of studies that distinguished between emotional, instrumental, and informational support received by cancer patients. In general, it appears that emotional support shows the strongest link to adjustment. Instrumental support has rarely been assessed, and so its relation to adjustment is questionable at best. Further, informational support is considered helpful when the source of support is a health care professional; however, the exact relationship between informational support and adjustment is unknown.

The relationship between these three subtypes of social support and outcomes has

been investigated within the context of breast cancer. Of the three types of support, emotional support and its relationship to psychosocial outcomes in women with breast cancer has been examined most often. Numerous measures of emotional support are related to outcomes in breast cancer. For example, women who talk more with others about their experience of breast cancer achieve greater well-being (Cordova, Cunningham, Carlson, & Andrykowski, 2001). Similarly, women who report having greater numbers of significant others with whom they can discuss cancer-related concerns have less fear of cancer recurrence (Northouse, 1981). Failure to disclose concerns is associated with low emotional well-being among these women (Figueiredo, Fries, & Ingram, 2004). Additionally, affect, affirmation, and reciprocity, all forms of emotional support, are associated with lower levels of depression, higher marital quality, and better family functioning (Primomo et al., 1990). Emotional support has even been found to be related to survival rates of women with breast cancer (Reynolds et al., 2000).

Compared to the research demonstrating the effectiveness of emotional support in reducing the negative psychosocial outcomes of breast cancer, there is little research focusing on the role of instrumental support or informational support in reducing negative outcomes for these women. Qualitative research indicates that women who receive greater amounts of tangible aid are able to utilize this support to function more adaptively in their daily roles (Hirschman & Bourjolly, 2005); however, these findings were garnered from a small pilot sample of breast cancer patients ($N = 33$), and so, are not conclusive by themselves. A longitudinal study of Hispanic women (Alferi, Carver, Anotoni, Weiss, & Durán, 2001) suggests that instrumental support from spouses presurgery predicts less distress postsurgery. In another study, the amount of instrumental support women received weakened the negative

relationship between cancer-related symptoms and depression more than the amount of emotional support available to those women (Woods & Earp, 1978). This suggests that receiving a greater amount of instrumental help from others attenuated the relationship between symptoms and distress more than having people listen to cancer-related concerns did. Furthermore, when women concurrently experienced a large number of family stressors related to her illness (e.g., family role adjustments and decision making relative to the mother's illness) and high levels of tangible aid from their partner, they experienced higher marital quality. However, there was no other relationship between tangible aid and outcome variables in this study (Primomo et al., 1990). Thus, there is initial research suggesting that instrumental support, especially from spouses, may be able to attenuate the impact of breast cancer.

Even more scant than the research examining instrumental support are investigations of the effects of informational support. No known studies exist that specifically examine whether informational support is related to psychosocial outcomes in breast cancer. As a result, little is known about the relationship between informational support and psychosocial outcomes in women with breast cancer. However, what *is* clear from the studies above is that social support is a multidimensional construct that encompasses different types of support. Measures that sample across these different support domains should be chosen when investigating social support and its relationship to outcomes in breast cancer.

Outcomes Examined

As mentioned earlier, women with breast cancer experience a wide range of negative psychosocial and physical effects due to breast cancer. Consequently, investigators must choose which of numerous potential outcomes to measure when examining the relationship

between these effects and social support. These outcomes can be divided into two categories: psychosocial adjustment and health outcomes. Within psychosocial adjustment, the most frequently measured outcome is psychological functioning. Researchers define psychological functioning in a variety of ways, including (the absence of) psychological distress, negative mood, anxiety, depression, and (the presence of) positive mood and concentration. Utilizing these various measures of psychological distress, researchers have generally found that social support is related to higher levels of psychological functioning (e.g., Alferi et al., 2001; Cordova et al., 2001; Funch & Mettlin, 1982; Neuling & Winefield, 1988; Northouse, 1988; Porter, et al., 2006; Primomo et al., 1990; Roberts, Cox, Shannon, & Wells, 1994; Trunzo & Pinto, 2003; Zemore & Shepel, 1989). For example, Primomo et al. (1990) found that greater emotional support is related to less depression. Similarly, women who report higher levels of social support experience better mood and less psychological distress (Northouse, 1988). Thus, adjustment, in terms of psychological functioning, has usually displayed a positive relationship with social support.

Another measure of adjustment that may show a relationship to social support is social functioning; however, results are conflicting. These contradictory findings may be the result of differing operational definitions of both social support and social functioning. For example, Zemore and Shepel (1989) investigated the relationship between social support and social functioning, defining social support as the ability to talk about feelings and problems with a friend, relative, or spouse. Social functioning was measured using a 42-item scale that delineates social adjustment as adjustment in six areas of functioning: at work, social and leisure activities, relationship with extended family, marital role, parental role, and membership in the family. Utilizing these definitions, the authors found that women who

received more emotional support experienced greater social adjustment. On the other hand, Neuling and Winefield (1988) reported that social activity levels were only minimally related to social support. In this study, social support was a summation of emotional, instrumental, and informational support for each of three providers: family, friends, and surgeons. Social activity was measured using seven items that have been found to indicate subjective health status in previous studies. The only significant relationship between support and social activity was that, in the third month after surgery, women who received greater support from their families participated in more social activities. Conversely, Bloom and Spiegel (1984) found that emotional support from the family was not related to social functioning. In this study, family emotional support was measured using a true-false inventory of family atmosphere, and social functioning was assessed through 20 items evaluating functioning in different areas of life, such as work, finances, family, friends, and intimate relationships. These studies illustrate both the conflicting results regarding the relationship between social support and social functioning, as well as the broad range of definitions for both social support and social functioning. Due to these inconsistent findings and the scarcity of studies investigating this relationship, more research is needed to clarify the relationship between social support and social functioning.

In sum, social support predicts adjustment in women with breast cancer. Specifically, many studies suggest that social support is related to better psychological functioning (e.g., less distress, better mood, less anxiety and depression, greater concentration). Social support may also be related to better social adjustment; however, more research is needed to clarify this relationship. Thus, social support may facilitate women's adaptation to life with breast cancer in a number of important domains.

Breast cancer not only affects women psychologically; it also has a major impact on women's physical lives. Given the enormous effect of breast cancer on health, many researchers have investigated the relationship between social support and health outcomes. The most commonly investigated health outcome is a general measure of physical adjustment or physical functioning. Findings regarding the relationship between social support and physical adjustment are mixed. For example, women who report more support from their spouses and other adults report fewer physical adjustment problems than women with less support (Hoskins et al., 1996). Neuling and Winefield (1988) found that, even though one month post-surgery, women who received greater amounts of support from friends and surgeons had *more* physical difficulties; at three months post-surgery, women who were more satisfied with support from friends experienced less physical difficulties. On the other hand, many studies have found no relationship between social support and physical recovery (Bolger, Foster, Vinokur, & Ng, 1996; Funch & Mettlin, 1982). In addition, greater personal resources and positive characteristics (i.e., self-esteem, body image, personal control, and illness uncertainty) are related to better physical functioning over time, while social support is not (Helgeson, Snyder, & Seltman 2004). The authors suggest that personal resources may have a stronger effect than social support on physical functioning because women with better personal resources can find and utilize social support more effectively.

Another health outcome that has been investigated with respect to social support is pain level; however, no relationship has been found between social support and pain (Koopman et al., 1998). This conclusion, though, may be unwarranted, as only one breast-cancer study has investigated this relationship.

Perhaps the most vital health outcome, survival, has been shown to relate to social

support. Social support, in terms of marital status, the extent to which women could call on three or more friends for help, contact with friends, total number of supportive people, employment status, and social network size, is strongly associated with survival (Waxler-Morrison, Hislop, Mears, & Kan, 1991; Weihs et al., 2005). In addition, women reporting low levels of emotional expression and support had two to four times greater breast cancer mortality than women with high levels of emotional expression (Reynolds et al., 2000). Thus, breast-cancer survival may be related to social support; however, more findings regarding this relationship are needed before a strong conclusion can be made, and the mechanism underlying such a relationship is unknown.

Finally, some studies demonstrate a more complicated relationship between social support, mood, and physical symptoms. In women with low or average levels of support, more cancer-related symptoms are related to greater mood disturbance; however, this relationship disappears for women with high levels of support (Lee, Chung, Park, & Chun, 2004). Thus, social support negates the relationship between cancer-related symptoms and mood. In a similar vein, other investigators have found that for women with one physical complication, greater social support was related to less depression; however, for women with more physical symptoms, social support had no effect on depression (Woods & Earp, 1978). The investigators suggest that social support has a buffering effect on depression until a threshold of disability is reached.

In sum, social support may be related to various health outcomes, including physical adjustment, functioning, and recovery; pain; and survival, as well as many psychological outcomes. However, more research is needed before any strong conclusions can be reached as to the exact effects of social support on these outcomes and the mechanisms underlying

these effects.

Providers of Support

Besides the outcomes chosen for investigation, a further important consideration in breast cancer research is the support provider. Research has suggested that examining social support from specific providers may be important in elucidating the relationship between social support and psychosocial outcomes in women with breast cancer. Studies examining support from specific providers suggest that social support from family members is extremely important. Family members provide more affective support (i.e., the expression of positive affect by the provider) than friends or others do, and women confide most often in their partners about their illness (Primomo et al., 1990). In addition, emotional support from the spouse and family is associated with less depression and greater marital quality. Emotional and instrumental support from spouses is also negatively correlated with distress (Alferi et al., 2001). At three months post-surgery, anxiety and depression are related to satisfaction with support from family members (Neuling & Winefield, 1988). Furthermore, women who experience more expressiveness and less conflict in their family (Spiegel, Bloom, & Gottheil, 1983) and greater family cohesion (Friedman et al., 1988) experience better adjustment to breast cancer. Moreover, when women concurrently experienced a large number of family stressors related to their illness and high levels of tangible aid from their partners, they experienced higher marital quality (Primomo et al., 1990). Thus, emotional and instrumental support from the family, particularly from the spouse, is associated with reduced negative psychosocial effects of breast cancer.

Besides support from the family, support from friends has also been shown to be beneficial in a few studies. For example, emotional support from friends relates to better

family functioning (Primomo et al., 1990) and less distress postsurgery (Alferi et al., 2001). Women who have more social contact have a better coping response to breast cancer, and so, indirectly have higher self-concept, feel more powerful, and experience less distress (Bloom, 1982). In addition, the extent of contact with friends and size of social network are positively related to survival (Waxler-Morrison et al., 1991). Thus, there are limited research findings suggesting that social support from friends reduces the negative impact of breast cancer.

Even more limited than research investigating support provided by friends are studies examining support given by health care professionals. The few studies that exist suggest that greater professional support is related to better psychological adjustment (Funch & Mettlin, 1982). Further, at one month and three months post-surgery, anxiety and depression are related to satisfaction with support from the surgeon (Neuling & Winefield, 1988). Thus, there is limited evidence that support from health care providers may affect psychological outcomes in breast cancer.

In summary, social support from family, friends, and health care professionals may lead to more positive, less negative experiences for women with breast cancer. The positive effects of support from the family have the most empirical support to date, while research suggestive of the effectiveness of support from friends and health care professionals is more limited and inconclusive at this point. As noted previously, research examining the effects of informational support given by different providers on outcomes in breast cancer is scant. However, families and friends do not frequently provide this type of support (Neuling & Winefield, 1988), and patients find informational support from family and friends to be unhelpful (Dunkel-Schetter, 1984). Thus, it is probably less useful to include informational support in assessments of social support when focusing on family and friend support

providers than when including health care professionals as potential support providers.

One specific provider that seems to be vitally important in outcomes with breast cancer is the spouse. For example, 90.7% of married women designate their husbands as their most supportive family member (Neuling & Winefield, 1988), and the majority of women with breast cancer select their spouse as their main confidant (Sandgren, Mullens, Erickson, Romanek, & McCaul, 2004). In addition, because of its effects on sexuality, breast cancer is a special disease that might affect the couple as a unit, more than most types of cancer do. Empirically, inadequate support from a partner is linked to problems with adjustment. For example, women with husbands who offer support and understanding report better adjustment; alternatively, husbands' inability to offer support during the breast cancer experience results in women experiencing higher levels of distress (Peters-Golden, 1982). Furthermore, having a good helping relationship with another person does not compensate for a problematic partner relationship (Pistrang & Barker, 1995). This suggests that the partner relationship has an effect that other relationships cannot counterbalance or equal.

Multiple studies have investigated the relationship between spousal support and outcomes in women with breast cancer. These studies suggest that women's satisfaction with a spouse's response to her emotional and interactional needs predicts her emotional adjustment to breast cancer (Hoskins et al., 1996). Similarly, satisfaction with the partner helping relationship is associated with greater psychological well-being (Pistrang & Barker, 1995). Women involved with a partner who listens to their worries and concerns and who helps around the house experience less depression than women who do not have such a partner (Maly, Umezawa, Leake, & Silliman, 2005). In addition, women with breast cancer who perceive more positive emotional involvement from their partner experience greater

well-being over time (Wimberly, Carver, Laurenceau, Harris, & Antoni, 2005). These studies demonstrate that support from a spouse is effective in combating negative outcomes in breast cancer. Due to the emotional intimacy and physical proximity of spouses in a marital relationship, spousal social support may be particularly salient and important to women with breast cancer.

Conceptualization and Clarification of the Social Support Construct

As noted above, some findings regarding the relationship between social support and outcomes in breast cancer are contradictory. These conflicting results may be due to problems in the conceptualization and measurement of the social support construct (Krause, Liang, & Yatomi, 1989). As a result of attempts to refine the definition of social support, researchers have devised many approaches to measuring the construct.

Perhaps the crudest measure of social support is structural support or social embeddedness (Barrera, 1986). Using this method, researchers attempt to approximate levels of social support by determining the number of social ties participants have (Krause et al., 1989). At the most basic level, structural support is measured by basic demographic information, such as marital status. Other measures of structural support include number of social contacts, number of people to whom women feel they can talk, or social network size. These measures appear to capture conditions under which support might be provided, rather than what support was actually provided. Further, the measures do not specify what occurred during the social interaction, and so, provided limited information on how support affects outcomes.

A second method of assessing social support is perceived support.¹ Perceived support

¹Here, I am using the term “perceived support” to refer to participants’ ratings of the amount of support they have received from others. Thus, it is the amount of support that participants have *perceived* receiving from

consists of participants' reports of how much support they have received from other people. Thus, participants are reporting their perceptions of the support they received by tallying support behaviors or by rating the amount of support received on a subjective scale. This method allows researchers to investigate the impact of specific amounts of perceived support on outcomes; however, it provides no information regarding the qualitative or evaluative aspects of support (Krause et al., 1989). Thus, a third way to measure support is support quality, in which participants rate the quality of the support they have received. In addition, some researchers have found that some supportive interactions can actually have negative outcomes if the support is unwanted (e.g., Reynolds & Perrin, 2004); consequently, it is important to assess desirability of support. Accordingly, researchers also measure participants' satisfaction with support they have received. In this way, researchers may capture mismatches in social support, in which participants receive more or less support than they desire. Reports of satisfaction with support also encompass receipt of negative support behaviors and support behaviors of low quality. Thus, including measures of both amount of support and satisfaction with support can provide researchers with additional important information regarding the relationship between social support and outcomes in breast cancer.

Daily Diary Assessment of Social Support

Besides difficulties in the conceptualization of the social support construct, the design of the majority of the previous studies makes it difficult to evaluate the effects of social support on outcomes in breast cancer. Generally, previous studies have utilized cross-sectional designs in which measures of social support and various outcomes are collected at

others. In other literature, some researchers employ "perceived support" to refer to the perceived availability of support or the amount of support people believe they could mobilize, should something happen to them (see Alferi et al. (2001), Helgeson et al. (2004), and Procidano and Heller (1983) for examples of this type of perceived support).

one point in time. However, this type of design leads to a few problems. First, due to the cross-sectional nature of most previous studies, researchers were not able to examine the causal relationship between social support and various outcomes over time. Frequently, researchers interpreted an association between social support and psychosocial outcomes at one time point as support for a causal relationship. However, this association may be explained in numerous ways other than social support causing better outcomes. For example, women who are experiencing many negative effects of breast cancer may be less able to mobilize social support, or both social support and psychosocial outcomes may be related to a third variable, such as previous mental health status or neuroticism (Boger & Eckenrode, 1991). In order to eliminate alternate explanations to the desired causal relationship, social support and psychosocial outcomes should be studied in a longitudinal manner. To address this concern, researchers have conducted a few longitudinal studies (e.g., Alferi et al., 2001; Neuling & Winefield, 1988; Northouse, 1988; Wimberly et al., 2005); however, these studies contain additional methodological difficulties, similar to cross-sectional studies, which will be discussed next.

A second methodological flaw involved in cross-sectional research designs is the issue of recall bias. Most current social support measures instruct participants to rate their perception of social support received in the past week, two weeks, month, or longer. In this case, participants must attempt to remember instances of social support during the entire time period they are rating; however, their ratings will probably be affected more by current levels of social support, rather than levels of social support at the beginning of the prescribed time period. Thus, participants' ratings of perceived social support may be biased by a recency effect. Third, because participants rate social support only once for a long time period,

participants must make broad generalizations about social support levels over the entire month. Therefore, these measures of social support are not sensitive to micro-level variations in social support; they reflect more imprecise averages of social support over an extended period of time. These methodological difficulties in these studies substantially weaken arguments for a causal relationship.

In an attempt to correct these methodological flaws, researchers in other areas have utilized daily data collection techniques. Daily diaries are a methodological technique in which participants complete relevant measures multiple times over a prescribed time period; thus, each participant rates the same construct multiple times over a short period of time. Researchers have utilized a few different diary techniques, depending on their research questions. Some studies utilize event sampling, while others use daily diaries. For example, in one study, participants were instructed to complete diaries according to their mood and emotions at the exact moment a random pager alarm sounded (Harlow & Cantor, 1995). In this design, researchers collected a random sample of the participants' mood at very specific points in time. In a different study, participants rated their mood, pain, health care use, and work absence once a day for the entire 24-hour period (Gil et al., 2004). Here, researchers were interested in collecting a continuous measure of variables of interest. Daily diaries also differ in the number of times per day data are collected, the length of the assessment period, and random versus nonrandom collection points. For example, researchers have collected data every 40 minutes (Marco, Neale, Schwartz, Shiffman, & Stone, 1999) or only once a day (Gil et al., 2004). Assessment periods range from 48 hours (Marco et al., 1999) to 6 months (Gil et al., 2004). Some researchers contact participants at random times throughout the day (Harlow & Cantor, 1995), whereas others collect data at set times during the day (Gil

et al., 2004). Thus, daily diaries methodologies vary a great deal depending on the research question.

Study designs utilizing daily measures minimize many flaws discussed above. When daily measures are included in studies, relationships between the variables can be examined repeatedly over small amounts of time. The data can be used to investigate certain variables of interest and whether they can predict specific outcomes on the same day and on subsequent days, which establishes one criterion of causality – time precedence. This ability to investigate associations between variables over time aids in ruling out alternative explanations for specific patterns of results. In addition, recall bias is reduced, as participants are rating various measures for the past 24 hours only, rather than making ratings for an entire three-month period, for example. Further, daily measures can aid in examining variables on a micro-level. Due to the small increments in time, daily measures are a more sensitive measure of relevant constructs. The frequency of collection allows the measures to capture multiple changes in the variables of interest that occur over a short period of time.

Daily diaries have been used successfully in many areas. Results are reliable, valid, and usually consistent with cross-sectional findings. Most notably, Bolger and Eckenrode (1991) utilized daily measures of anxiety in order to demonstrate the protective effect of social support against anxiety in medical students. Thus, findings from daily diaries can help elucidate the causal relationship between social support and psychological outcomes. Daily diaries have also been used in medically-challenged populations, such as patients with sickle cell disease (Gil et al., 2004), and completion rates have been acceptable (73%). Further, daily diaries have been used in a couples intervention in order to investigate the association between relationship happiness and stress in a mindfulness-based relationship enhancement

intervention (Carson, Carson, Gil, & Baucom, 2004). Therefore, even though daily diaries have not been used to investigate social support and outcomes in women with breast cancer, studies from similar areas of research suggest that this method would be pertinent and helpful to the investigation.

The Current Investigation

In summary, due to the increased prevalence of breast cancer, a great deal of research over the past three decades has focused on the disease and its effects. Findings from these studies show that breast cancer has many deleterious psychosocial outcomes, such as increased negative mood, depression and anxiety. However, these effects might be reduced by sufficient levels of social support. In the stress and coping area, research has found that social support protects people from negative psychological effects of stressful events, such as breast cancer.

As noted earlier, research examining social support in women with breast cancer has shown that social support may decrease the negative psychosocial effects of the disease. Given that women with breast cancer most often nominate their spouses as the most important support providers during the course of their disease, some researchers have investigated the effects of spousal support on psychosocial outcomes of breast cancer. In the few studies that exist, partner support reduces negative psychosocial outcomes in women with breast cancer (Hoskins et al., 1996; Pistrang & Barker, 1995; Wimberly et al., 2005). Furthermore, spouses provide emotional and instrumental support much more than they provide informational support (Neuling and Winefield, 1988). Given that emotional and instrumental support from a spouse is related to more positive, less negative outcomes (Maly et al., 2005), these two types of support should be encompassed in a measure of support

when investigating the relationship between partner support and outcomes in women with breast cancer.

In order to further elucidate the relationship between partner support and psychosocial outcomes in women with breast cancer, the current study investigated associations between these constructs utilizing daily diary measures. Thus, the purpose of the current study was to investigate relationships between partner support amount and satisfaction and mood, cancer-related symptoms, and role functioning on a daily level. To facilitate the clarification of this relationship, support was partitioned into average support, same-day support, and previous-day support. Examining the relationship between each level of support and the women's outcomes would address different research questions of interest. Consistent with the theory that social support has a causal effect on psychosocial outcomes in women with breast cancer, three hypotheses are posited.

Hypothesis 1: Previous cross-sectional studies have found that partner support is related to psychological and health outcomes in women with breast cancer (Hoskins et al., 1996; Pistrang & Barker, 1995; Wimberly et al., 2005). As discussed previously, including measures of both quantity of support and satisfaction with support is important to the investigation of the relationship between social support and outcomes in women with breast cancer. Both constructs are considered to be important; however, satisfaction provides extra information about the match of support received with the support desired and the quality of the support. Therefore, both quantity and satisfaction of social support were expected to be related to outcomes; however, satisfaction was predicted to be more strongly related to those outcomes. More specifically, participants with a greater average amount of support and higher average satisfaction with partner support were expected to have more positive and less

negative mood, lower ratings of symptoms, and higher role functioning. Moreover, women with a high average amount of support who are highly satisfied with that support were expected to experience disproportionately greater positive and lower negative outcomes, resulting in an interaction effect.

Hypothesis 2: Again, consistent with previous cross-sectional studies (Hoskins et al., 1996; Pistrang & Barker, 1995; Wimberly et al., 2005), it was predicted that fluctuations in support amount and satisfaction on a given day would predict same-day outcomes. More specifically, higher levels of support and more satisfaction with that support on a given day were expected to predict more positive, less negative mood, less symptoms, and higher role functioning on that same day. Both support amount and satisfaction were expected to contribute to the outcomes; however, the unique combination of high support amount and high support satisfaction was expected to predict even greater positive, less negative outcomes than either amount or satisfaction alone. More specifically, when a woman received a greater amount of support *and* was more satisfied with that support on a given day, she was predicted to experience disproportionately greater positive and lower negative outcomes on that same day, again resulting in an interaction effect.

Hypothesis 3: In order to elucidate the causal nature of the relationship between social support and psychological and health outcomes, partner support and its relationship to various outcomes were examined over time. Consistent with the theory that social support causes decreases in negative outcomes, it was predicted that partner support amount and satisfaction would predict next day mood, symptoms, and role functioning. More specifically, higher levels of support and more satisfaction with that support on a given day were expected to predict more positive, less negative mood, less symptoms, and higher role

functioning on the next day. Again, an interaction between support amount and satisfaction was predicted, such that when a woman received a greater amount of support on a given day and was more satisfied with that support, she was expected to experience disproportionately greater positive and lesser negative outcomes.

In this investigation, examining relationships between average support, same-day support, and previous-day support and the various outcomes would address separate research questions of interest. First, utilizing average support amount and satisfaction would clarify the relationship between women's overall average support levels for the 30-day period and their internal affective state, physical symptoms, and role functioning. Second, incorporating same-day support would allow the examination of the relationship between a woman's fluctuations in support and her internal affective state, physical symptoms, and role functioning on that same day. Third, including previous-day support would help elucidate the relationship between a woman's fluctuations in support on a given day and her internal affective state, physical symptoms, and role functioning on the next day. Thus, incorporating the average support along with the same-day and previous-day support measures would allow the between-person effects and within-person effects to be disentangled.

Method

Participants

Participants were 54 females who had recently been diagnosed with early-stage breast cancer. These participants were part of a larger study focused on treating heterosexual couples in which the female has breast cancer. Participants were recruited at the University of North Carolina (UNC) Hospital, Duke University Medical Center, and various cancer clinics in the same geographic area. Women were eligible to participate if the following

criteria had been met: (1) they had been diagnosed with Stage I, II, or IIIA breast cancer within one calendar year of the recruitment date, and their diagnosis had never exceeded Stage IIIA, (2) they had no prior history of breast cancer unless it occurred in the past year in which the invasive cancer was diagnosed, (3) they had not had any form of cancer (except basal cell carcinoma) within five years of their breast cancer diagnosis, (4) they were married or had lived with a male partner in a committed relationship for 12 months or more, (5) both the woman and her partner were willing to participate, and (6) both partners spoke English.

In order to determine if a woman was eligible for the study, the research team reviewed potential participants' medical records. For women who met inclusion criteria, a letter from the attending physician was sent to the women, briefly informing the women about the study. Then, each woman was approached by members of the research team during her following appointment at the breast clinic at UNC Hospitals or at the Duke University Medical Center. The team provided the woman with information about the study and a brochure and asked the woman to complete a form allowing the research team to contact her about participating in the study. If the research team was unable to meet with the woman at her appointment, the research team contacted her by telephone in order to describe the study. These procedures were approved by UNC's Institutional Review Board.

Seventy-two women participated in the daily diary portion of the study. Thirteen women were excluded from the final statistical analyses because they completed less than 20 calls and their data was not considered to be reliable, and five women were excluded because their daily diary period was extended beyond 39 days and their daily diary data was considered atypical. Thus, data from 54 women were included in this investigation. The following demographic information describes these participants. Of these women, 85.2%

were white; 9.3% were African-American; and 5.6% were Asian or Pacific Islander. Age ranged from 31 to 75 years with a median age of 54. Women had a median education level of 16 years (i.e., college educated), and education ranged from 12 to 26 years. Participants' household income ranged between (a) \$10,000 to \$14,999 and (b) over \$250,000, with a median income range of \$100,000 to \$249,999. Women had been married or living together in a committed relationship between 1 and 56 years with a median of 22 years.

The women's medical status and treatments were as follows. By assessment, 2 women had been diagnosed with Stage 0 breast cancer, 15 with Stage I, 18 with Stage IIA, 12 with Stage IIB, and 7 with Stage IIIA breast cancer. The women had been diagnosed an average of 117.6 days (range = 20.0 to 452.0) prior to assessment. Before assessment, 39 women (72.2% of the sample) had undergone surgery. Twenty-three women had breast conserving treatment, 14 had undergone mastectomy without reconstruction, and 2 had a mastectomy with anticipated reconstruction. In terms of adjuvant therapies, 38.9% of the women had undergone chemotherapy, and 9.3% had undergone radiation. Thirty-three percent of the women were premenopausal at the time of diagnosis, and 27.8% of the women had experienced menopausal symptoms by this point in their cancer treatment. During the participants' daily diary periods, only 1 woman underwent surgical procedures, 23 received chemotherapy treatment, and 7 underwent radiation treatment. Medical data were missing for 10 women, as they had received care at an institution outside of UNC or Duke and their data were not readily available.

The women who were excluded from the analyses did not significantly differ from the participants in terms of demographic or medical characteristics, except for age and surgery during the daily diary period. Women who were excluded from the investigation

were significantly younger ($M = 47.78$) than participants in the current study ($M = 54.09$; $t(69) = -2.20, p = .031$). In addition, women who were excluded from the analyses underwent surgical procedures during their daily diary period at a disproportionately higher rate than women included in the study, $\chi^2(1) = 7.58, p = .017$. Four of the 18 excluded women (22.2%) had surgery during the 30-day period; whereas, only 1 of the 54 study participants (2.1%) had surgery during this time period.

Procedure

As part of a larger study (see Gremore et al., 2005 for details), participants were recruited as described above. Following recruitment, participants and their partners completed an initial assessment session, consisting of a number of baseline questionnaires, which included demographic data and background characteristics of the participants that were utilized in the present study, and videotaped interaction tasks. The couples were then assigned to one of three experimental conditions (i.e., Relationship Enhancement, a couple-based cognitive behavioral therapy with a focus on cancer-related issues; couple-based Cancer Education, in which couples received medical information about breast cancer; or Community and Internet Resources, in which couples received written materials about breast cancer and a list of community resources). Twenty-three women were assigned to Relationship Enhancement, 20 to Cancer Education, and 7 to Community and Internet Resources. The couples received \$40 for completing the initial assessment session.

The present study focused on daily measures completed by the participants for 30 days following initial assessment. During the initial assessment, participants chose a fifteen-minute time slot between 5 p.m. and 10 p.m., during which they called the daily diary telephone system. All time slots were scheduled after 5 p.m., if possible, in order to

minimize effects that time of day may have had on participants' ratings. Due to extenuating circumstances, four women requested calling times that were before 5 p.m. Participants were instructed to call within their scheduled time slot. However, if they could not call within 12 hours of their scheduled time slot, they were instructed to skip the call for that day and to call at their normally scheduled time slot on the next day, rating the items for the past 24 hours only. These call rules were created to minimize memory bias and effects created by the time of day. Participants were trained regarding the daily diary system during the initial assessment session and were given a handout containing the items assessed by phone and the call rules that were outlined above. Participants were also given a daily diary pocket card with their id number, timeslot, and the daily diary telephone number. They were encouraged to keep the card in their wallet or purse so that they would have the daily diary number with them if they needed to call while traveling or in the hospital. Women were also given a daily diary calendar check-off sheet, which was a calendar with the beginning and end dates marked. Women were encouraged to keep the check-off sheet in a convenient location where the sheet would help them to remember to call into the system.

Beginning the night after their initial assessment, the participants called the daily diary telephone number during their specified calling time. A recorded female voice introduced them to the daily diary system and asked them to enter their ID number. Each set of items began with a short description and instructions. Then, each item was read aloud. After each item, the participants were asked to rate that item on a specified scale for the past 24-hour time period. The participants then pressed the telephone key that corresponded to their rating. If they pressed a key outside of the range of the scale, the participants were notified that they had pushed an invalid key, and the item was repeated. The participants

could also press a key if they made a mistake or if they wanted the item to be repeated. After the women completed all the items, they received a message thanking them and notifying them of the steps to take if they had encountered technical difficulties. Participants completed the daily diary once daily for the 30 days following initial assessment. During this 30-day period, women in the Relationship Enhancement or Cancer Education conditions completed no more than two sessions with a therapist. Therefore, the intervention was not expected to have a significant effect at this point of data collection. In order to encourage daily diary completion, participants received \$20 for completing the daily diary period.

Data were collected utilizing the VoiceGuide Interactive Voice Response (IVR) system. After the participants entered all their information by phone, the system automatically entered the data into a computerized database. This database was checked every two to three days to ensure the women were adhering to the daily diary procedure correctly. If a woman missed two calls in a row, missed three calls in 7 days, or called more than 2 hours before or after her scheduled timeslot on 5 days in a row, the daily diary coordinator was notified. The daily diary coordinator then decided whether contacting the woman regarding her participation in the daily diary was appropriate and helpful. In order to increase compliance, women also received a weekly phone call designed to increase contact with the women during the 30-day period. If a woman did not complete 20 of the 30 calls in the 30 days following her initial assessment, she was asked to extend her daily diary period, if possible, until she completed a minimum of 20 calls.

Women included in this investigation completed an average of 27 calls ($SD = 3.82$), which corresponds to a compliance rate of 91.2%.

Materials

Daily Measure of Breast Cancer Experience. Participants completed brief scales or individual items assessing daily relationship satisfaction, daily partner support, daily mood, daily symptoms, and daily role functioning once a day for 30 days following initial assessment. The Daily Measure of Breast Cancer Experience consisted of 23 items, divided into five parts (see Appendix). As participants were expected to complete the scale daily, the measure was brief and took only five to ten minutes to complete. In general, items were selected from existing measures based on brevity, relevance to the current study, and content validity. The items that comprised the daily diary rating are described below.

Quality of Marriage Index. Daily relationship satisfaction was measured with one item (i.e., “All things considered, what was your degree of happiness with your relationship today?”), rated on a 7-point scale from 0 (“extremely unhappy”) to 6 (“extremely happy”). This item was selected from the Quality of Marriage Index (QMI; Norton, 1983). This item was not included in data analyses in this study.

Source Specific Social Provisions Scale. To assess daily partner support, participants completed the Source Specific Social Provisions Scale (SPS; Cutrona, 1989), adapted for use on a daily basis. These items measured general social support in terms of how much partners helped with routine chores or tasks, how much partners supported the women emotionally, how much partners helped with decision making, and how satisfied the women were with each type of support. These support items were rated on a 6-point scale ranging from 0 (“not at all”) to 5 (“a great deal”). Ratings were summed to create two subscales: amount of support (3 items) and satisfaction with support (3 items). Given that this was an adaptation of the Source Specific SPS for daily use, no reliability or validity statistics exist; however, internal reliability for the male partner source-specific SPS is high ($\alpha = .78$), and these scores

have a significant relationship with the original SPS ($r = .31, p < .001$; Cutrona, 1989).

Cronbach's alpha coefficients for individual subscales in the original SPS range from .64 to .76 (Cutrona & Russell, 1987).

Positive and Negative Affect Schedule. Daily mood was assessed by a brief mood scale, which had been adapted from the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The scale used in the current study included five positive affect items ("happy", "joyful", "calm", "enjoyment or fun" and "pleased") and six negative affect items ("depressed", "unhappy", "worried or anxious", "angry or hostile", "guilty" and "frustrated"). These items were rated on a 6-point scale from 0 ("not at all") to 5 ("extremely"). Ratings were summed to form two subscales, positive affect (PA) and negative affect (NA). Similar scales have been used previously in a number of daily studies (Gil et al., 2004; Porter, Gil, Carson, Anthony, & Ready, 2000; Porter et al., 2003; Porter & Stone, 1995), and these studies have reported high reliability for both mood scales (for PA, $\alpha = .88$; for NA, $\alpha = .89$; Gil et al., 2004).

Brief Pain Inventory and Brief Fatigue Inventory. In order to assess daily symptoms associated with cancer, participants rated one question from the Brief Pain Inventory ("What was your average amount of cancer-related pain during the past 24 hours?"; BPI; Cleeland & Ryan, 1994) and one question from the Brief Fatigue Inventory ("What was your average amount of fatigue, weariness, or tiredness during the past 24 hours?"; BFI; Mendoza et al., 1999). These items were rated on a 10-point scale ranging from 0 ("no pain or fatigue") to 9 ("as bad as you can imagine").

Functional Assessment of Cancer Therapy. Daily role functioning was assessed by three items from the Functional Well-Being Subscale of the Functional Assessment of

Cancer Therapy (FACT-B; Cella, 1994). This measure assessed perceived quality of life in several domains, including emotional and functional. The Daily Measure of Breast Cancer Experience scale contained the following questions from the FACT-B: “How much were you able to work today, including work in the home?”, “How much were you able to do things today that you enjoy?”, and “How content were you with the quality of your life today?” These items were rated on a 5-point scale ranging from 0 (“not at all”) to 4 (“very much”). Given that this measure was adapted for daily use, no reliability or validity statistics exist; however, the Functional Well-Being Subscale demonstrates good internal consistency ($\alpha = .80$; Cella & Bonomi, 1996).

Results

In order to evaluate the hypotheses of this investigation, hierarchical linear modeling (HLM) was utilized to estimate various models to fit the data. HLM is a data analytic technique that is used to address a nested data structure. In a repeated-measures design, if every individual is assessed at identical, fixed time points, then the conventional way to view the design is time crossed by individual. However, when the number and spacing of time points varies from individual to individual, the design can be viewed as time nested within individual (Raudenbush & Bryk, 2002). Thus, an important advantage of HLM is its allowance for unequal numbers of time points. In addition, missing data is generally not problematic when using HLM. These advantages of HLM are particularly important in the current investigation, as participants completed measures once daily for 30 days. The number of time points was not equal for all participants and there were some missing data, as women occasionally missed their daily call. As reported above, women called 27 times, on average, during their daily diary periods (range of 20 to 39 calls), which is a compliance rate of

91.2%. Thus, because of the unequal numbers of observations and due to the repeated-measures design of the current study, HLM is appropriate for this investigation.

Evaluation of Error Structure

Before evaluating the hypotheses of the study, a continuous-time version of an autocorrelated error structure was evaluated in order to account for the decreasing correlation between observations over time. When observations are collected over time, participants' ratings are typically more highly correlated at adjacent time points than at more distant points in time (West & Hepworth, 1991). If the correlation between time points is not taken into account, the inferential tests will be biased. In order to correct for this correlational structure, Schwartz and Stone (1998) recommend utilizing an autoregressive error structure, which models a decreasing correlation between observations as the time between them increases. One of the simplest models of autocorrelation is a first-order autoregressive error structure. In this structure, if data are collected at equally spaced time intervals, the residuals for adjacent observations for an individual are correlated most highly, the residuals for observations two time points apart are correlated less highly, and the correlation between residuals decreases exponentially as a function of the amount of time intervals between observations.

Unfortunately, the first-order autoregressive error structure requires that the observations be evenly spaced in time, which is often not the case in daily diary data due to missed assessments or random data collection (Schwartz & Stone, 1998). However, there is a continuous-time version of the first-order autoregressive error structure that can address unevenly spaced observations. This continuous-time autocorrelation structure models the correlation between the residuals as “an exponentially declining function of the time interval

between two assessments” (Schwartz & Stone, p.11). That is, as the time interval between two observations increases, their correlation decreases. This residual covariance structure can be represented mathematically as $\text{cov}(r_{ij}, r_{i'j}) = \sigma^2 \rho^{|j-i'|}$.

In order to test whether this autoregressive error structure would improve the fit of the model, two empty models for each outcome variable were estimated, one with a homoscedastic error structure, meaning that the correlation between any two residuals is the same for all pairs of residuals, and one with a continuous-time version of the autoregressive error structure, in which residuals from observations that occur closer together in time are more highly correlated. A likelihood ratio test (LRT) was then utilized to evaluate the improvement of model fit with the addition of an autoregressive error structure. The two empty models can be represented mathematically as follows:

$$\text{Homoscedastic Model: PosMood}_{ij} = \gamma_{00} + u_{0j} + r_{ij}, \text{cov}(r_{ij}, r_{i'j}) = \sigma^2$$

$$\text{Autoregressive Model: PosMood}_{ij} = \gamma_{00} + u_{0j} + r_{ij}, \text{cov}(r_{ij}, r_{i'j}) = \sigma^2 \rho^{|j-i'|}$$

As expected, the LRT suggested that the allowance of autocorrelation significantly improved the fit of the models for positive mood ($\chi^2(1) = 162.8, p < .0001$), negative mood ($\chi^2(1) = 135.6, p < .0001$), pain ($\chi^2(1) = 551.9, p < .0001$), fatigue ($\chi^2(1) = 252.5, p < .0001$), and role functioning ($\chi^2(1) = 215.2, p < .0001$). Thus, an autoregressive error structure was retained in all of the following analyses.

Evaluation of Assumptions of HLM

In an initial examination of histograms of the data, the dependent variables of negative mood, pain, and role functioning appeared to be skewed. A log transformation was performed on these three dependent variables to enhance the normality of the distributions. However, this log transformation did not improve the normality of the dependent variables’

distributions; therefore, the following analyses were conducted using non-transformed dependent variables in order to facilitate interpretation of the results. When diagnostic tests were conducted on the final models, the residuals appeared to be fairly normally distributed. These diagnostic tests also confirmed that no severe violations of the other assumptions of HLM occurred. Thus, the results of the models should be unbiased, as no major violations occurred.

Control Variables

In general for the hypotheses, daily partner support variables were used to predict daily outcome measures (positive affect, negative affect, pain, fatigue, and role functioning). In addition to support, the variables of age, ethnicity, education, income, medical treatment regimen, and treatment condition of the study may be viewed to represent indices of additional resources or stresses on the individual that may affect the outcome variables of interest. Therefore, these demographic variables were evaluated as potential individual-level predictors for each dependent variable. First, separate multilevel models for each variable predicting each outcome were estimated in order to determine which of these variables significantly predicted the outcome variables. Only one variable significantly predicted one outcome variable: age was significantly negatively related to negative mood, $B = -0.12$, $t(53) = -2.49$, $p = .016$.

In addition, the change in each dependent variable predicted from a change from the 25th percentile to the 75th percentile of the control variable was evaluated in terms of its meaningfulness (i.e., defined as 0.5 standard deviations of the dependent variable). Only one variable was associated with a meaningful change in any dependent variables: having surgery was associated with a -0.62 standard deviation change in positive mood, a -0.78 standard

deviation change in negative mood, and -1.15 standard deviation change in fatigue. However, as only one woman in the sample had surgery during her daily diary period, this predictor was not considered reliable or meaningful. Thus, eight variables were tested as predictors of five different outcome variables; only one was a significant predictor of one of the outcome variables, and none was associated with a meaningful change in any of the outcome variables. Therefore, none of these variables was included in the following analyses.

Creating Predictor Variables

Means and standard deviations of the partner support and outcome variables are displayed in Table 1. From this table, it seems that, in general, these women with breast cancer are experiencing moderate to high levels of support amount and satisfaction, while also experiencing high levels of positive outcomes (positive mood and role functioning), and low levels of negative outcomes (negative mood, pain, and fatigue). Across all observations, support amount and support satisfaction were highly correlated ($r = .79, p < .0001$).

Before testing the hypotheses of this study, measures of amount of partner support and satisfaction with partner support were lagged by one day in order to create measures of the previous day's support amount and satisfaction. Next, all measures were person-mean centered. In order to person-mean center support amount and satisfaction and their lagged counterparts, a mean of each variable was calculated for each woman. Each woman's mean on a particular variable was then subtracted from all of her daily ratings on that specific variable. The resulting person-mean centered variables now have a meaningful zero point: when satisfaction with support is equal to 0, the woman's rating of satisfaction for that day is equal to her overall average rating of satisfaction. For descriptive statistics of the support variables computed for the main analyses of the study, see Table 2. Mean support amount

and satisfaction were highly correlated ($r = .85, p < .0001$). Within women, support amount and satisfaction correlations ranged from $r = -.04$ ($p = .81$) to $r = .99$ ($p < .0001$), suggesting a large amount of variability in the relationship between fluctuations of support amount and satisfaction within women.

By performing this person-mean centering procedure, both the person-mean centered predictor of support and the person mean of support could be included in each model. In these models, the person means of each variable represent each woman's mean amount or satisfaction with support for the 30 days, while the person-mean centered variables represented each woman's daily fluctuation around her own mean amount or satisfaction with support. As person-mean centered predictors and person means are orthogonal, including both types of predictors in the model allows the within-person and between-person effects to be disentangled more easily.

Creating Models to Evaluate Hypotheses 1-3

In order to test the three hypotheses regarding amount of partner support, satisfaction with partner support, and their interaction in predicting same-day and next-day mood, symptoms, and role functioning, a series of multilevel models were estimated. Specifically, to test the hypothesis that amount of partner support, satisfaction with that support, and the interaction between amount and satisfaction would be positively related to same-day and next-day positive affect, a multilevel model was estimated. Conceptually, this model can be divided into two levels. Level 1 consists of within-person predictors. At this level, positive affect was modeled as a function of person-mean centered amount of partner support, person-mean centered satisfaction with partner support, the interaction between amount and satisfaction, the person-mean centered lagged amount of partner support, person-mean

centered lagged satisfaction with partner support, and the interaction between lagged amount and lagged satisfaction.

Level 2 consists of between-person predictors only. These predictors do not vary within a given individual but vary across individuals. At this level, the mean level of positive affect for an individual (intercept) was modeled as a function of person-mean amount of partner support, person-mean satisfaction with partner support, and their interaction

Even though these equations can be written separately for heuristic purposes, functionally, these level 1 and level 2 equations are estimated simultaneously. The resulting model is a weighted linear combination of within-person predictors and between-person predictors to predict the outcome of positive affect. The reduced-form equation associated with this model estimates positive affect as a function of the amount of support a woman receives on a given day, her satisfaction with that support on that day, the interaction between support amount and support satisfaction on that day, the amount of support a woman received the previous day, her satisfaction with that support the previous day, the interaction between support amount and support satisfaction on the previous day, the women's average amount of support, the women's average satisfaction with support, and the interaction between women's average amount and average satisfaction with support. Furthermore, in this model, there are two sources of random variability: the between person residual from the intercept and random error. That is, the mean level of positive affect varies randomly between individuals, and positive affect varies within individuals due to pure error. The model included fixed slopes only, meaning the relationship between positive affect and partner support was not allowed to vary randomly between individuals. Thus, the model assumed that the strength of the relationship between positive affect and partner support was

the same for all individuals. A continuous-time version of the autoregressive error structure was retained, as discussed above. This model is represented mathematically as follows:

$$\text{Level 1: PosMood}_{ij} = \beta_{0j} + \beta_{1j}\text{Amount}_{ij} + \beta_{2j}\text{Satisfaction}_{ij} + \beta_{3j}\text{AmountXSatisfaction}_{ij} + \beta_{4j}\text{Amount}_{(i-1)j} + \beta_{5j}\text{Satisfaction}_{(i-1)j} + \beta_{6j}\text{AmountXSatisfaction}_{(i-1)j} + r_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}\text{MeanAmount}_j + \gamma_{02}\text{MeanSatisfaction}_j + \gamma_{03}\text{MeanAmountXMeanSatisfaction}_j + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

$$\beta_{6j} = \gamma_{60}$$

$$\begin{aligned} \text{Reduced Form: PosMood}_{ij} = & \gamma_{00} + \gamma_{01}\text{MeanSupport}_j + \gamma_{02}\text{MeanSatisfaction}_j + \\ & \gamma_{03}\text{MeanAmountXMeanSatisfaction}_j + \gamma_{10}\text{Amount}_{ij} + \gamma_{20}\text{Satisfaction}_{ij} + \\ & \gamma_{30}\text{AmountXSatisfaction}_{ij} + \gamma_{40}\text{Amount}_{(i-1)j} + \gamma_{50}\text{Satisfaction}_{(i-1)j} + \\ & \gamma_{60}\text{AmountXSatisfaction}_{(i-1)j} + u_{0j} + r_{ij} \\ \text{cov}(r_{ij}, r_{i'j}) = & \sigma^2 \rho^{|i-i'|} \end{aligned}$$

Similar multilevel models were estimated for each outcome of interest (positive affect, negative affect, pain, fatigue, and role functioning) as delineated above, using the same within-person and between-person predictors.

The results from these five models are displayed in Tables 3-7 and are presented below. The discussion of results is organized first by predictor variable, and the outcomes

within each predictor variable are grouped into three categories: internal affective states (positive mood and negative mood), physical domain (pain and fatigue), and behavioral domain (role functioning). When interpreting significant interactions, high support satisfaction is defined as 1.5 *SD* above the mean of support satisfaction, and low support satisfaction is defined as 1.5 *SD* below the mean of support satisfaction.

Relationships between Average Support Amount and Outcomes

Internal Affective States. As shown in Table 3, the effect of mean support amount on positive mood is not significant. Similarly, the effect of mean support amount on negative mood is not significant (see Table 4). Thus, it seems that women's average amount of support does not predict their internal affective state.

Physical Domain. The effect of mean support amount on pain approaches significance (see Table 5); however, the meaning of this main effect will not be interpreted here, given the significant interaction between mean support amount and mean support satisfaction in predicting pain. As can be seen in Table 6, the effect of mean support amount on fatigue is not significant. From these results, it seems that women's average support amount may differentially predict pain and fatigue; however, these discrepant results will be interpreted in more detail when the interaction between mean support amount and mean support satisfaction is discussed.

Behavioral Domain. The effect of mean support amount on role functioning is not significant (see Table 7). It appears that women's average amount of support does not predict their role functioning.

Across Domains. Overall, the results suggest that women's average amount of support does not predict their internal affective states, fatigue, or role functioning. However,

the women's average amount of support, in conjunction with average support satisfaction, predicts pain.

Relationships between Average Support Satisfaction and Outcomes

Internal Affective States. As can be seen in Table 3, the effect of mean support satisfaction on positive mood is not significant. Similarly, the effect of mean support satisfaction on negative mood is not significant (see Table 4). Thus, it seems that women's average satisfaction with support does not predict their internal affective state.

Physical Domain. As shown in Table 5, the effect of mean support satisfaction on pain is significant; however, the meaning of this main effect will not be interpreted here, given the significant interaction between mean support amount and mean support satisfaction in predicting pain. As can be seen in Table 6, the effect of mean support satisfaction on fatigue is not significant.

Behavioral Domain. The effect of mean support satisfaction on role functioning is not significant (see Table 7).

Across Domains. Overall, the results suggest that women's average satisfaction with support does not predict their internal affective states, fatigue, or role functioning. However, the women's average satisfaction with support, in conjunction with average support amount, predicts pain.

Interaction between Average Support Amount and Satisfaction in Predicting Outcomes

Internal Affective States. As shown in Table 3, the interaction between mean support amount and mean support satisfaction in predicting positive mood approaches significance. The pattern of results is noted here, and the reader should exercise caution in interpreting the findings given the marginally significant findings. This interaction is depicted in Figure 1. At

a high average satisfaction with support, amount of support is positively related to their positive mood. However, at a low average satisfaction with support, women's average amount of support is not related to their positive mood. That is, for women who are more highly satisfied with support they receive, as they receive more support, on average, they also experience greater positive mood. In contrast, women who are less highly satisfied with the support they receive experience relatively less positive mood, regardless of the amount of support they receive. In contrast, the interaction between mean support amount and mean support satisfaction in predicting negative mood is not significant (see Table 4).

Physical Domain. As can be seen in Table 5, the interaction between mean support amount and mean support satisfaction in predicting pain is significant. This interaction is shown in Figure 2. At a high average satisfaction with support, amount of support is negatively related to their pain. However, at a low average satisfaction with support, women's average amount of support is not related to their pain. That is, for women who are more highly satisfied with support they receive, as they receive more support, on average, they also experience less pain. In contrast, women who are less highly satisfied with the support they receive experience relatively higher levels of pain, regardless of the amount of support they receive.

In contrast, the interaction between mean support amount and mean support satisfaction in predicting fatigue is not significant (see Table 6).

Behavioral Domain. As shown in Table 7, the interaction between mean support amount and mean support satisfaction in predicting role functioning is not significant. It seems that women's average amount of support and average satisfaction with support does not interact to predict their role functioning.

Across Domains. Overall, the results suggest that women who receive a greater average amount of support and are more satisfied on average with that support experience greater positive mood and less pain. However, women who are less satisfied on average experience less positive mood and more pain, regardless of the amount of support they receive. In contrast, the interaction between women's average amount of support and their average satisfaction with support does not predict their negative mood, fatigue, or role functioning.

Relationships between Support Amount and Same-Day Outcomes

Internal Affective States. As shown in Table 3, the effect of support amount in predicting same-day positive mood is significant. However, because there is a significant interaction between support amount and support satisfaction in predicting same-day positive mood, the main effect of support amount must be interpreted in light of the interaction, which is presented below. Thus, an interpretation of the effect of support amount in predicting same-day positive mood will be given later.

The main effect of support amount in predicting same-day negative mood is significant (see Table 4). However, because there is a significant interaction between support amount and support satisfaction in predicting same-day negative mood, an interpretation of the effect of support amount in predicting same-day negative mood will be given later, taking this significant interaction into account.

Physical Domain. The main effect of support amount in predicting same-day pain is not significant (see Table 5). That is, the amount of support a woman receives on a given day does not predict her pain on that day. In contrast, the main effect of support amount in predicting same-day fatigue approaches significance (see Table 6). However, this main effect

will not be interpreted here, given the significant interaction between support amount and support satisfaction in predicting same-day fatigue.

Behavioral Domain. The main effect of support amount in predicting same-day role functioning is not significant (see Table 7). That is, the amount of support a woman receives on a given day does not predict her role functioning on that day.

Across Domains. Taken together, these results suggest that the amount of support a woman receives on a given day predicts her internal affective state and fatigue on that day; however, meaningful interpretations cannot be formulated without taking satisfaction with support on that day into account. In contrast, the amount of support a woman receives on a given day does not predict her pain or role functioning on that day.

Relationships between Support Satisfaction and Same-Day Outcomes

Internal Affective States. As shown in Table 3, the effect of support satisfaction in predicting same-day positive mood is significant. However, because there is a significant interaction between support amount and support satisfaction in predicting same-day positive mood, the main effect of support satisfaction must be interpreted in light of the interaction.

Similarly, the main effect of support satisfaction in predicting same-day negative mood is significant (see Table 4). However, because there is a significant interaction between support amount and support satisfaction in predicting same-day negative mood, an interpretation of the effect of support satisfaction in predicting same-day negative mood will be given later, taking this significant interaction into account.

Physical Domain. The main effect of support satisfaction in predicting same-day pain is not significant (see Table 5). In contrast, the main effect of support satisfaction in predicting same-day fatigue approaches significance (see Table 6). However, this main effect

will not be interpreted here, given the significant interaction between support amount and support satisfaction in predicting same-day fatigue.

Behavioral Domain. As can be seen in Table 7, the effect of support satisfaction in predicting same-day role functioning is significant. However, because there is a significant interaction between support amount and support satisfaction in predicting same-day role functioning, the main effect of support satisfaction must be interpreted in light of the interaction.

Across Domains. Taken together, these results suggest that a woman's satisfaction with support she receives on a given day predicts her internal affective state, fatigue, and role functioning on that day; however, meaningful interpretations cannot be formulated without taking amount of support received on that day into account. In contrast, a woman's satisfaction with support she receives on a given day does not predict her pain on that day.

Interaction between Support Amount and Satisfaction in Predicting Same-Day Outcomes

Internal Affective States. As can be seen in Table 3, there is a significant interaction between amount of support and satisfaction with support in predicting same-day positive mood. This interaction is depicted in Figure 3. At higher levels of satisfaction with support on a given day, the amount of support a woman receives is not related to her positive mood. However, at low levels of satisfaction with support on a given day, when a woman receives more support that day, she experiences greater positive mood on that same day. That is, when a woman is more satisfied than she typically is, she experiences more positive mood on a given day, regardless of how much support she receives on that day. However, when a woman is less satisfied than she typically is, when she receives more support that day, she experiences more positive mood.

There is also a significant interaction between amount of support and satisfaction with support in predicting same-day negative mood (see Table 4). This interaction is shown in Figure 4. At a high level of satisfaction with support, as amount of support increases, negative mood increases; however, at a low level of satisfaction with support, amount of support on a given day is not related to negative mood. That is, when a woman is more satisfied with support than she typically is, as she receives less support on a given day, she is also experiencing less negative mood on that day. In contrast, when a woman is less satisfied with support than she typically is, she experiences a relatively high negative mood on a given day, regardless of the amount of support she receives on that day.

Thus, it seems that, when a woman is more satisfied with a smaller amount of support on a given day, she is experiencing an improved internal affective state – greater positive and lower negative mood.

Physical Domain. As can be seen in Table 5, the interaction between amount of support and satisfaction with support in predicting same-day pain approaches significance. The pattern of results is noted here, and the reader should exercise caution in interpreting the findings given the marginally significant findings. At a high level of satisfaction with support, as amount of support increases, pain increases; however, at a low level of satisfaction with support, amount of support on a given day is not related to pain. That is, when a woman is more satisfied with support than she typically is, as she receives less support on a given day, she is also experiencing less pain. In contrast, when a woman is less satisfied with support than she typically is, she experiences a relatively high amount of pain on a given day, regardless of the amount of support she receives on that day.

There is a significant interaction between amount of support and satisfaction with

support in predicting same-day fatigue (see Table 6). This interaction is shown in Figure 6. At a high level of satisfaction with support, as amount of support increases, fatigue increases; however, at a low level of satisfaction with support, amount of support on a given day is not related to fatigue. That is, when a woman is more satisfied with support than she typically is, as she receives less support on a given day, she is also experiencing less fatigue. In contrast, when a woman is less satisfied with support than she typically is, she experiences a relatively high amount of fatigue on a given day, regardless of the amount of support she receives on that day.

Thus, it seems that, when a woman is more satisfied with a smaller amount of support on a given day, she is experiencing less physical symptoms – less pain and fatigue – on that day.

Behavioral Domain. As can be seen in Table 7, there is a significant interaction between amount of support and satisfaction with support in predicting same-day role functioning. This interaction is depicted in Figure 7. At a high level of satisfaction with support, as amount of support decreases, role functioning increases; however, at a low level of satisfaction with support, amount of support on a given day is not related to role functioning. That is, when a woman is more satisfied with support than she typically is, as she receives less support on a given day, she is also experiencing higher role functioning. In contrast, when a woman is less satisfied with support than she typically is, she experiences a relatively low level of role functioning on a given day, regardless of the amount of support she receives on that day.

Across Domains. In summary, when a woman is more satisfied with support than she typically is, as she receives more support on a given day, she is also experiencing higher

negative mood, more pain and fatigue, and lower role functioning on that day. She also experiences relatively high levels of positive mood on that day, regardless of the amount of support she receives on that day. In contrast, when a woman is less satisfied with support than she typically is, she experiences a relatively high amount of negative mood, pain and fatigue, and a relatively low level of role functioning on a given day, regardless of the amount of support she receives on that day; however, as she receives more support on that day, she experiences greater positive mood. Thus, it seems that when a woman is more satisfied with a relatively smaller amount of support on a given day, she is experiencing a more positive, less negative internal affective state, less physical symptoms, and better role functioning on that day.

Relationships between Support Amount and Next-Day Outcomes

Internal Affective States. As shown in Table 3, the main effect of support amount in predicting next-day positive mood is significant. That is, when a woman receives more support on a given day, she experiences a more positive mood on the next day.

Similarly, the main effect of support amount in predicting next-day negative mood is significant (see Table 4). However, this main effect must be interpreted in light of the significant interaction between support amount and support satisfaction in predicting next-day negative mood. This interaction will be interpreted later.

Physical Domain. As shown in Table 5, the main effect of support amount in predicting next-day pain is not significant. The main effect of support amount in predicting next-day fatigue is not significant (see Table 6).

Behavioral Domain. The main effect of support amount in predicting next-day role functioning is not significant (see Table 7).

Across Domains. Overall, these results suggest that the amount of support a woman receives on a given day predicts her internal affective state, but not her pain, fatigue, or role functioning, on the next day. The more support a woman receives on a given day, the greater the positive mood she experiences on the next day. The relationship between amount of support and next-day negative mood depends on support satisfaction and will be interpreted later.

Relationships between Support Satisfaction and Next-Day Outcomes

Internal Affective States. As can be seen in Table 3, the main effect of support satisfaction in predicting next-day positive mood approaches significance. The pattern of results is noted here, and the reader should exercise caution in interpreting the findings given the marginally significant findings. When a woman is more satisfied with support on a given day, she experiences a *lower* positive mood on the next day.

Similarly, the main effect of support satisfaction in predicting next-day negative mood approaches significance (see Table 4). However, this main effect must be interpreted with regard to the significant interaction between support amount and support satisfaction in predicting next-day negative mood. This interaction will be interpreted later.

Physical Domain. As shown in Table 5, the main effect of support satisfaction in predicting next-day pain is not significant. The main effect of support satisfaction in predicting next-day fatigue is not significant (see Table 6).

Behavioral Domain. The main effect of support satisfaction in predicting next-day role functioning is not significant (see Table 7).

Across Domains. Overall, these results suggest that a woman's satisfaction with support she receives on a given day predicts her internal affective state, but not her pain,

fatigue or role functioning, on the next day. When a woman is more satisfied with support on a given day, she experiences *less* positive mood the next day. Support satisfaction also predicts negative mood on the next day, but this relationship depends on support amount.

Interaction between Support Amount and Satisfaction in Predicting Next-Day Outcomes

Internal Affective States. The interaction between support amount and support satisfaction in predicting next-day positive mood is not significant (see Table 3). In contrast, the interaction between support amount and support satisfaction in predicting next-day negative mood is significant (see Table 4). This interaction is depicted in Figures 8. When a woman has a low level of satisfaction with support she receives on a given day, as she receives less support, she experiences more negative mood the next day. However, when a woman has a high level of satisfaction with the support she receives on a given day, the amount of support she receives on that day is not related to her negative mood on the next day.

Physical Domain. As can be seen in Table 5, the interaction between support amount and support satisfaction in predicting next-day pain is not significant. Similarly, the interaction between support amount and support satisfaction in predicting next-day fatigue is not significant (see Table 6).

Behavioral Domain. The interaction between support amount and support satisfaction in predicting next-day role functioning is not significant (see Table 7).

Across Domains. Overall, these results suggest that support amount and support satisfaction on a given day interact to predict negative mood, but not positive mood, physical symptoms, or role functioning on the next day. Specifically, when a woman has a low level of satisfaction with support she receives on a given day, as she receives less support, she

experiences more negative mood the next day. However, when a woman has a high level of satisfaction with the support she receives on a given day, the amount of support she receives on that day is not related to her negative mood on the next day.

Summary of Results for Hypotheses 1-3

In summary, the results suggest that women's average amount of support and average satisfaction with support is related to positive mood and pain, but not to negative mood, fatigue or role functioning. That is, women who receive a greater average amount of support and are more satisfied on average with that support experience greater positive mood and less pain. However, women who are less satisfied with support on average experience less positive mood and more pain, regardless of the amount of support they receive.

In addition, same-day support amount and support satisfaction predict internal affective states, physical symptoms, and role functioning. That is, when a woman is more satisfied with a relatively smaller amount of support on a given day, she is experiencing a more positive, less negative internal affective state, less physical symptoms, and better role functioning on that day. However, when a woman is relatively dissatisfied with support on a given day, she experiences greater negative mood, more physical symptoms, and less role functioning on that day, regardless of the amount of support she receives.

Finally, the results suggest that support amount and support satisfaction on a given day predict a woman's internal affective state, but not her physical symptoms or role functioning, on the next day. That is, the more support a woman receives on a given day, the more positive mood she experiences on the next day. The more satisfied a woman is with support on a given day, the *less* positive mood she experiences on the next day. Additionally, when a woman receives less support on a given day than she typically does and is less

satisfied with that support, she experiences greater negative mood the next day. However, when a woman is satisfied with the support she receives on a given day, the amount she receives on that day is not related to her negative mood on the next day.

Discussion

A large body of literature confirms that women with breast cancer face many challenges and experience many negative psychological and physical effects from the disease. As such, it is important for research to evaluate factors that may help women avoid the full impact of these negative consequences. In fact, a great deal of research suggests that social support may help women during times of immense stress, such as while coping with breast cancer. Support from partners may be especially important for women with breast cancer, as this type of cancer affects women's sense of femininity, sexuality, body image, and other aspects critical to relationships (Bloom, 2002; Glanz & Lerman, 1992; Irvine et al., 1991). The few studies that have investigated the effects of partner support in women with breast cancer have mostly been cross sectional in nature. Therefore, the current investigation examined daily partner support and its relationship to various psychosocial and physical outcomes from day to day.

In this investigation, it was important to distinguish between average support, same-day support, and previous-day support. Including each of these measures of support addressed separate research questions of interest. First, utilizing average support amount and satisfaction clarified the relationship between women's overall average support levels for the 30-day period and their internal affective state, physical symptoms, and role functioning. Second, incorporating same-day support allowed the examination of the relationship between a woman's fluctuations in support and her internal affective state, physical symptoms, and

role functioning on that same day. Third, including previous-day support helped elucidate the relationship between a woman's fluctuations in support on a given day and her internal affective state, physical symptoms, and role functioning on the next day. Thus, incorporating the average support along with the same-day and previous-day support measures allowed the between-person effects and within-person effects to be disentangled.

Overall, the findings indicated that amount of partner support and satisfaction with that support were related to various psychological outcomes. First, women's average amount of support and average satisfaction with support is related to positive mood and pain. Women who receive a greater average amount of support and are more satisfied on average with that support experience greater positive mood and less pain. Women who are less satisfied with support on average experience less positive mood and greater pain, regardless of the amount of support received. These findings suggest that support amount and satisfaction have wide-ranging effects on women with breast cancer. Outcomes in two different domains were affected: the internal affective state and the physical domain. In addition, greater partner support was related to an increase in one positive outcome (i.e., positive mood) and a decrease in one negative outcome (i.e., pain), further suggesting the breadth of the effects of support. These results are generally consistent with previous investigations suggesting that greater support and higher quality support are related to better physical and psychological outcomes (e.g., Hoskins et al., 1996; Pistrang & Barker, 1995; Wimberly et al., 2005).

In contrast, the relationship between fluctuations in daily support and the various outcomes were somewhat different from what was anticipated. The hypotheses were formulated based on the idea that support would influence the outcome variables of interest. However, the results are more consistent with viewing the relationships among support and

the outcome variables as simply correlational, or perhaps the proposed outcome variables have actually influenced the support a woman receives. The results suggest that when a woman is more satisfied with a relatively smaller amount of support on a given day, she experiences a more positive, less negative internal affective state, fewer physical symptoms, and better role functioning on that day. Stated differently, when a woman is experiencing a more positive, less negative internal affective state, less physical symptoms, and greater role functioning, she appears to be having a “good day.” On these good days, she likely needs less support and can be satisfied with a smaller amount of support. However, when a woman is relatively dissatisfied with support on a given day, she experiences greater negative mood, more physical symptoms, and less role functioning on that day, regardless of the amount of support she receives. That is, if a woman is not getting the support she wants, she does not do well, no matter if she receives a lot or a little support. Thus, the amount of support a woman receives and how satisfied she is with that support might be caused by her functioning on that day and her partner’s responsiveness to her experience. Again, these results suggest that a number of different outcomes of interest in various domains are related to partner support.

Furthermore, the results suggest that support amount and support satisfaction on a given day predict a woman’s internal affective state on the next day. That is, the more support a woman receives on a given day, the more positive mood she experiences the next day. This first finding makes intuitive sense and is consistent with the longitudinal prediction of more support one day leading to better mood the next. In contrast, the more *satisfied* a woman is with support on a given day, the *less* positive mood she experiences on the next day. This finding is counterintuitive and may be an aberration in this study, as this result only approached significance. The relationship between support amount and satisfaction on a

given day and negative mood are complicated by an interaction effect. First, when a woman receives less support on a given day than she typically does and is less satisfied with that support, she experiences greater negative mood the next day. This part of the interaction predicting negative mood makes intuitive sense. When a woman is not satisfied with the support she is receiving and she is not receiving much support, she is in a more negative mood tomorrow. Second, when a woman is not satisfied with the support she is receiving but she is receiving a lot of it, she experiences less negative mood the next day. In this case, even though the woman is not satisfied with what she is receiving, she is still receiving a lot of support, which may help her to feel less negatively the next day. This result is consistent with the finding that more support is related to more positive mood on the next day, regardless of satisfaction.

Third, when a woman *is* satisfied with the support she receives on a given day, the amount of support she receives on that day is not related to her negative mood on the next day. This result seems somewhat inconsistent with the other findings in this study. In almost every other case, the relationship between support amount and the outcome of interest is stronger when satisfaction is high. Here, the relationship between support and satisfaction is stronger when satisfaction is *low*. It is unclear why satisfaction functions in a different manner in this case, and more research is needed to clarify the relationship between support satisfaction and amount in predicting next-day negative mood. However, what *is* clear from these findings is the notable impact of support amount on next-day mood. When a woman receives more support on a given day, she experiences more positive mood the next day, and when she is less satisfied with that high amount of support, she also experiences less negative mood on the next day. Thus, it seems there is something helpful about a high amount of

support on a given day, even when a woman is not as satisfied with the support as she typically is.

From these results, it appears that different mechanisms underlie the relationships between average support, same-day support, and previous-support with the various outcomes. Average support amount and satisfaction were related to positive mood and pain in the expected directions. Thus, women's average amount and satisfaction with support may help protect the women from the negative impact of breast cancer. Next, women's fluctuations in support from day to day were related to what they were experiencing on that specific day. When a woman is functioning adaptively on a given day, she needs less support and is more satisfied with a low level of support. However, when a woman is dissatisfied with support on a given day, she is not functioning well on that day. Finally, for previous-day support, amount appears to operate in the expected direction, while the effect of satisfaction is unclear. A woman who receives more support on a given day is happier on the next day. In addition, a woman who receives little support on a given day and is not satisfied with that support experiences more negative mood the next day. Also, a woman who receives a great deal of support on one day, even though she is not satisfied with that support, experiences a less negative mood the next day. These results suggest that greater amounts of support on one day predict more positive mood and less negative mood (when a woman is less satisfied with the support) on the next day. However, greater satisfaction on one day is related to less positive mood on the next day. As suggested above, this counterintuitive finding may simply be an anomaly of this study. Further research is needed to clarify the relationship between support satisfaction and next-day mood. Thus, it seems three different processes explain the relationships between average, same-day, and previous-day support and the various

outcomes.

The results from the current investigation demonstrate several broad patterns. Clearly, support amount and satisfaction are both important factors to measure when conducting investigations examining support. Many of the interactions between support amount and satisfaction were significant, suggesting that the effect of amount depended on the level of satisfaction. Also, there were significant main effects of amount and satisfaction that differentially predicted outcomes of interest (e.g., increasing satisfaction on one day predicted less positive mood on the next day; whereas, increasing amount on one day predicted greater positive mood on the next day). Thus, amount and satisfaction have different effects on the outcomes, potentially based on different underlying mechanisms. In addition, the differential effects of amount and satisfaction were relevant with average, same-day, and next-day measures. In each of these time periods, there was at least one significant interaction between amount and support, suggesting that differentiating between these constructs is important across time. Many previous studies investigating social support in women with breast cancer (e.g., Helgeson et al., 2004; Koopman et al., 1998; Primomo et al., 1990) have not distinguished between the two concepts, and none have included both amount and satisfaction measures in one study. These results suggest that amount and satisfaction are related but distinct constructs that must both be included in future studies in order to gain a clear understanding of the effects of support. The results also indicate that participants can distinguish between support amount and satisfaction. However, this study does not clarify how women are making this distinction. Women may consider many different factors while making ratings of satisfaction, including appreciation for support regardless of its impact, quality of the support, whether the support helped or alleviated any symptoms, or match of

the support received to the support desired. Future studies should examine how people differentiate between amount and satisfaction and what factors they consider when rating satisfaction.

One additional reason to include both amount and satisfaction in future studies is that an interaction between the two seems contrary to the notion that people who are more optimistic or positive rate their partners higher on support. In the current study, even for women who are more satisfied with the support they receive, when they receive less support, they experience lower positive mood (see Figure 1). Therefore, satisfaction is not simply a measure of optimism. Thus, exploring the interaction between amount and satisfaction potentially can discount alternative explanations for results of an investigation.

A second broad pattern of results from this investigation rests in the robust relationship between support and mood. All three measures of support (i.e., average, same-day, and previous-day) were related to internal affective states. Internal affective states, such as positive and negative mood, by definition, are subjective internal experiences, and so, may be the most easily affected by support. Pain, fatigue, and role functioning, while also involving internal, subjective judgments, also are likely to be affected directly by the woman's disease state and medical treatment. The findings indicate that support from a partner might be most consistently related to the woman's internal subjective state; that is, feeling supported may affect and be affected by her mood.

In the current study, there was an interesting relationship between satisfaction and next-day mood, suggesting that when a woman was more satisfied on one day, she was in a less positive mood on the next. This finding could simply be an anomaly in this study. Since mood is an internal state and satisfaction is purely an internal judgment, these two measures

are more closely related than satisfaction with the other outcomes. Perhaps this overlap in the measures is the reason why only next-day mood was affected by satisfaction or perhaps it is the greater ease with which mood can be modified that allows it to be altered by support on the previous day. Future daily diary studies should clarify the relationship between support satisfaction and next-day mood and should test the daily fluctuation and malleability of mood.

A third broad pattern of findings in the current study involves the greater number of significant relationships between the various outcomes and same-day support, versus average or previous-day support. Every outcome variable included in the study demonstrated a significant relationship to same-day support (except pain, which approached significance). There are a few possible explanations for these strong effects. First, the more disparate two measures are, typically the lower the correlation between those measures will be. For example holding all other factors constant, if the method of data collection is different between two measures, these two variables will be less related than if they measured more similarly (i.e., self-report and observational measures compared to two self-report measures). This general pattern also appears to hold for both reporter and time period. Thus, two constructs measured on separate days (e.g., support on one day and mood on the next) will be less highly related than two measures reported on the same day (e.g., support on one day and mood on the same day). In addition, creating an average amount of support from each woman's daily ratings creates a methodological problem. The average of support is then not tied to an outcome on a specific day. Instead, a specific outcome variable is being predicted from an overall average of support, which again is likely to decrease the magnitude of the relationship between the two measures. Given this argument, the fact that two daily outcomes

(i.e., positive mood and pain) were related to the average measure of partner support only strengthens the assertion that support is related to mood and physical symptoms.

Despite the intriguing findings, this study is not without limitations. As discussed above, the measures included in the study did not tease apart the factors that women utilized to rate satisfaction. It is unclear whether women considered quality of support, effect of support, appreciation for support, match of support to what they wanted, or other factors that have not yet been considered. Clearly, it would be beneficial to understand what aspects of support women consider in determining their level of satisfaction with support. Importantly, different women may desire different types or levels of support based on individual preferences. For example, some women may want to be doted upon while sick, while others may want their husbands to take the kids out so they spend time alone. The match of support received to women's preferences for support may be especially important in predicting mood and other outcomes (Cutrona, 1990; Jackson, 1992; Laireiter, Baumann, Perkonigg, & Himmelbauer, 1997; Reynolds & Perrin, 2004).

A second limitation of the investigation was that, in order to decrease burden on the women, each construct was only measured by a few items, and some measures (i.e., pain and fatigue) were only measured using one item. These few items could cause a multidimensional construct to be misleadingly represented as one-dimensional. Support amount was measured by three specific questions that may not have captured all of the important types of support that might be utilized in caring for women with breast cancer. Also, the reliability of these few items could be lower than the reliability had more items been included. However, previous studies have suggested that one-item measures were a good representation of measures that were greater in length (Hooley & Teasdale, 1989).

Third, this investigation helps to elucidate the effects of partner support in this specific population of women with breast cancer, but the generalizability of the findings is unclear. That is, it is uncertain whether the pattern of findings are unique to a situation in which there is a threat to the couple, such as breast cancer, or whether these results generalize to people with diseases that are not as “relational” as breast cancer is. Also, most of the couples included in this study were maritally satisfied. Do these effects of partner support generalize to distressed couples? Marital satisfaction could potentially be a moderator of the relationship between partner support and mood, symptoms, and role functioning. For women who are in a happy relationship, there may be a stronger relationship between support and outcomes than for women in a distressed relationship. Alternatively, women in a happy relationship could feel more supported, and so, experience more positive, less negative outcomes, regardless of amount of support. In addition, the women included in the study were mostly White, well educated, and wealthy. Results may not generalize to women of different demographic backgrounds (e.g., minorities, less well educated, or lower class). Furthermore, women who called less than 20 times were excluded from the analyses, as their data points were not considered to be reliable. The exclusion of these women could have biased the results, to the extent that women who called in less often could have been functioning less adaptively, experiencing serious treatment side-effects or having more difficulty recovering from surgery. In fact, women who were excluded from the analyses underwent surgical procedures during their daily diary period at a disproportionately higher rate than women included in the study.

Another potentially problematic aspect of this study was that the amount of time husbands were available to provide support was not accounted for in any way. Thus, the

amount of contact a woman had on any given day with her husband may have influenced her ratings in an unknown way. For example, a husband's availability might have influenced a woman's ratings of satisfaction with support: if her husband was not available due to real life circumstances, the woman might have found a small amount of support from him to be satisfactory. However, if he was generally available but provided only a small amount of support, that same amount might be viewed as less satisfactory. That is, her attributions for his support might influence her support ratings. Finally, the daily diary may have served as an intervention for the women completing this portion of the study. Measuring the construct of support could have actually changed it over the thirty days. If the women were monitoring support more closely to complete the daily diary, they may have been less satisfied with a lack of support, simply because they were more attuned to shortcomings in the support provided by their husbands. Also, when the women monitored their mood and symptoms, the close observation may have altered their experience of their internal states. Monitoring could have made these women more in tune with their mood and symptoms. One woman remarked that she noticed that her fatigue and negative mood were tied closely together. On days when she was more tired, she was in a worse mood. Monitoring these symptoms together from day to day helped her to realize that the fatigue would eventually alleviate and that she did not need to allow this fatigue to have such a strong influence on her mood. In fact, monitoring mood and symptoms related to a psychological issue is an intervention technique often used by clinicians in many areas of psychology (Burns, 1999; Danielson, Feeny, Findling, & Youngstrom, 2004; Lam et al., 2000). In addition, monitoring support could increase communication within the couple about support, how it is provided, and what is needed on a daily basis. If women are more attuned to the support they are receiving and their husbands

are aware that the women are monitoring their support, perhaps this allows the couple to have more open communication about these issues. Thus, the conclusions of this study may be limited to women who are closely observing their daily experience.

Although this study has its limitations, it raises many interesting new questions that may be pursued by future research. First, it would be interesting for women to monitor, not only how much support they receive, but also how much time they spend with their husbands on a daily basis. For men who are employed, there could potentially be a weekday versus weekend effect in which the husband is around more on the weekends and so is able to provide more support than on the weekdays. In this way, women's ratings could be averaged over weekdays and weekends to examine whether there are differences in support amount and satisfaction and their effects over the two time periods. This phenomenon has been detected in daily diary studies in other areas of psychology, such as in the investigation of the relationship between drinking and mood in college-aged adults (Hussong, Hicks, Levy, & Curran, 2001). Hussong et al. averaged ratings of drinking and mood over each weekday block and then over each weekend block and used these measures to predict drinking and mood over time. A similar set of analyses could be utilized with daily support. It may also be useful to compare daily diary ratings to ratings made on a weekly basis. Although the daily ratings do not seem to unduly burden the participants, ratings made on a less frequent basis may increase compliance rates within this health population. Thus, it would be beneficial to replicate results of daily diary studies utilizing different time increments. Another interesting question suggested by this study is whether the overall average amount of support is important or whether the accumulation of support over a period of time is more predictive of mood. Due to the method of data analysis in this study, this accumulation effect was not

tested. However, an interesting question to examine would be whether the accumulation of support during one week affects outcomes during the next week, rather than one day in isolation affecting the next. Perhaps the effects of support become strong when examined cumulatively. Future studies could also examine differential effects between daily support and cumulative support over time.

Besides differential effects of varied time periods, it would also be useful to investigate whether the average support variables would correspond to a woman's monthly retrospective self-report. Including both measures of support in one study would allow investigators to disentangle a woman's daily experience during the month from her retrospective biases looking back over the month. In addition, daily diary averages and self-rated support for the entire month could both be utilized to predict overall mood and symptoms during the month, which may help explain the differences between this study and previous research. As most previous research has only included women's ratings of support and mood over a long period of time, these ratings may have contained retrospective biases, which caused the variables to be more highly correlated than they normally would be. Disentangling these retrospective biases from a woman's actual experience may then eliminate some noise from the data.

Future daily diary studies also could be expanded to include the partner. It would be interesting to examine the support a woman reports receiving and how that corresponds to her husband's experience. Some studies have suggested that the support a woman perceives is more important in predicting her functioning (e.g., Helgeson et al., 2004; Lichtman et al., 1988; Primomo et al., 1990), while a few have investigated the phenomenon of "invisible support," in which a woman's functioning can be affected by support her partner is giving

but that she does not perceive (Bolger, Zuckerman, & Kessler, 2000). This phenomenon could be examined on a daily basis by including both partners' experience in the daily diary system. The partners' experiences could be compared and could be utilized to predict the woman's functioning. Perhaps these partners' experiences would match particularly well when the woman is highly satisfied with support; at a high level of satisfaction, the man may be in tune with his wife's experience and could be giving his wife the support she wants and needs. Thus, including both spouses in the daily diary would also help clarify factors included in the satisfaction measure. In addition, including a broader measure of support in order to incorporate more diverse types of support that women consider helpful during this health crisis may further elucidate the relationship between support and women's functioning. Also, determining the match between women's preferences for support, what type and amount of support they receive, the support the husbands perceive as important, and the support the husbands report giving may be particularly important in these studies. Relatedly, daily diary studies could investigate couples' communication around issues of support. By including measures of communication, investigators could determine what issues couples are discussing on a daily basis and the effects of this communication on support and the couples' functioning.

Besides implications for future research, this investigation also has implications for clinical work with couples. The information gathered from this study can be used to enhance couples' education about partner support, its effects, and its importance. Clinicians can inform couples about the difference between the effects of daily support versus average support over a long period. Obviously, a woman needs more support on days she is not functioning as adaptively, and a husband should try to be responsive to these needs on a daily

basis. If he can provide a large amount of support that she is generally satisfied with, the woman might function more adaptively than a woman who receives less support and is less satisfied. Clearly, not only the amount of support a husband gives, but also how the woman perceives the support and how satisfied she is with that support, is extremely important to her functioning.

As discussed above, it is unclear whether the results from this investigation generalize to couples in areas beyond breast cancer. However, what is clear from this research is the importance of partner support for women with breast cancer. Future research should elucidate this link between partner support and women's functioning and also clarify how couples respond to each other during this stressful time. Because breast cancer is such a relational disease, both partners need to be included in future daily diary investigations of partner support in women with breast cancer. Hopefully, the current investigation has helped paved the way for future studies involving daily diary measures in women with breast cancer in order to investigate the myriad of issues noted above.

Table 1

Means and Standard Deviations of Initial Support Variables and Women's Outcome

Variables

Variable	<i>M</i>	<i>SD</i>
Amount of Support	10.17	3.39
Satisfaction with Support	11.48	3.26
Positive Mood	15.03	5.03
Negative Mood	5.49	5.62
Pain	1.72	1.93
Fatigue	3.53	2.22
Role Functioning	8.02	2.82

Table 2

Means and Standard Deviations of Support Variables Computed for Analyses

Variable	<i>M</i>	<i>SD</i>
Average Support Amount	10.09	2.43
Average Support Satisfaction	11.42	2.47
Same-Day Support Amount ^a	0.00	2.43
Same-Day Support Satisfaction ^a	0.00	2.14
Previous-Day Support Amount ^a	0.00	2.41
Previous -Day Support Satisfaction ^a	0.00	2.11

^aPerson-mean centered variables, by definition, have means of 0.

Table 3

Results from the Analyses Modeling Positive Mood as a Function of Partner Support Variables

Fixed Effect	B	SE	<i>t</i>	<i>df</i>	<i>p</i>
Intercept	15.91	5.62	2.83	50	.007
Average Amount	-0.81	0.75	-1.07	50	.288
Average Satisfaction	-0.39	0.53	-0.73	50	.466
Average Amt by Sat	0.10	0.05	1.79	50	.079
Same-Day Amount	0.13	0.06	2.19	1189	.029
Same-Day Satisfaction	0.34	0.07	4.52	1189	<.0001
Same-Day Amt by Sat	-0.05	0.01	-4.11	1189	<.0001
Previous-Day Amount	0.16	0.06	2.57	1189	.010
Previous-Day Satisfaction	-0.13	0.07	-1.73	1189	.084
Previous-Day Amt by Sat	-0.01	0.01	-0.87	1189	.386
Random Effect	Estimate	SE	<i>z</i>	<i>p</i>	
Random Intercept Variance	6.59	1.53	4.30	<.0001	
Autoregressive Parameter	0.32	0.03	10.09	<.0001	
Level-1 Residual Variance	13.76	0.64	21.43	<.0001	

Note. Average Amt by Sat = the interaction between average support amount and average support satisfaction. Same-Day Amt by Sat = the interaction between same-day support amount and same-day support satisfaction. Previous-Day Amt by Sat = the interaction between previous-day support amount and previous-day support satisfaction.

Table 4

Results from the Analyses Modeling Negative Mood as a Function of Partner Support

Variables

Fixed Effect	B	SE	<i>t</i>	<i>df</i>	<i>p</i>
Intercept	9.61	7.38	1.30	50	.199
Average Amount	0.35	0.98	0.35	50	.726
Average Satisfaction	-0.37	0.69	-0.53	50	.596
Average Amt by Sat	-0.03	0.07	-0.43	50	.671
Same-Day Amount	0.13	0.07	2.04	1189	.042
Same-Day Satisfaction	-0.49	0.08	-6.11	1189	<.0001
Same-Day Amt by Sat	0.05	0.01	3.61	1189	.0003
Previous-Day Amount	-0.16	0.07	-2.37	1189	.018
Previous-Day Satisfaction	0.14	0.08	1.84	1189	.066
Previous-Day Amt by Sat	0.03	0.01	2.37	1189	.018
Random Effect	Estimate	SE	<i>z</i>	<i>p</i>	
Random Intercept Variance	12.05	2.64	4.56	<.0001	
Autoregressive Parameter	0.30	0.03	9.59	<.0001	
Level-1 Residual Variance	15.32	0.70	21.75	<.0001	

Note. Average Amt by Sat = the interaction between average support amount and average support satisfaction. Same-Day Amt by Sat = the interaction between same-day support amount and same-day support satisfaction. Previous-Day Amt by Sat = the interaction between previous-day support amount and previous-day support satisfaction.

Table 5

Results from the Analyses Modeling Pain as a Function of Partner Support Variables

Fixed Effect	B	SE	<i>t</i>	<i>df</i>	<i>p</i>
Intercept	-2.97	2.47	-1.20	50	.235
Average Amount	0.62	0.33	1.90	50	.064
Average Satisfaction	0.50	0.23	2.16	50	.035
Average Amt by Sat	-0.06	0.02	-2.52	50	.015
Same-Day Amount	0.02	0.02	1.23	1189	.220
Same-Day Satisfaction	-0.01	0.02	-0.29	1189	.768
Same-Day Amt by Sat	0.01	0.00	1.84	1189	.066
Previous-Day Amount	0.00	0.02	0.03	1189	.980
Previous-Day Satisfaction	0.02	0.02	0.67	1189	.506
Previous-Day Amt by Sat	0.00	0.00	1.05	1189	.293
Random Effect	Estimate	SE	<i>z</i>	<i>p</i>	
Random Intercept Variance	1.12	0.30	3.71	.0001	
Autoregressive Parameter	0.64	0.03	24.56	<.0001	
Level-1 Residual Variance	2.35	0.16	14.29	<.0001	

Note. Average Amt by Sat = the interaction between average support amount and average support satisfaction. Same-Day Amt by Sat = the interaction between same-day support amount and same-day support satisfaction. Previous-Day Amt by Sat = the interaction between previous-day support amount and previous-day support satisfaction.

Table 6

Results from the Analyses Modeling Fatigue as a Function of Partner Support Variables

Fixed Effect	B	SE	<i>t</i>	<i>df</i>	<i>p</i>
Intercept	-1.02	3.12	-0.33	50	.745
Average Amount	0.65	0.42	1.56	50	.125
Average Satisfaction	0.32	0.29	1.10	50	.278
Average Amt by Sat	-0.05	0.03	-1.56	50	.126
Same-Day Amount	0.04	0.03	1.68	1189	.093
Same-Day Satisfaction	-0.06	0.03	-1.96	1189	.051
Same-Day Amt by Sat	0.02	0.01	2.93	1189	.004
Previous-Day Amount	0.03	0.03	1.05	1189	.296
Previous-Day Satisfaction	-0.03	0.03	-1.07	1189	.284
Previous-Day Amt by Sat	0.00	0.01	0.48	1189	.633
Random Effect	Estimate	SE	<i>z</i>	<i>p</i>	
Random Intercept Variance	2.09	0.47	4.41	<.0001	
Autoregressive Parameter	0.46	0.03	15.35	<.0001	
Level-1 Residual Variance	2.77	0.15	18.71	<.0001	

Note. Average Amt by Sat = the interaction between average support amount and average support satisfaction. Same-Day Amt by Sat = the interaction between same-day support amount and same-day support satisfaction. Previous-Day Amt by Sat = the interaction between previous-day support amount and previous-day support satisfaction.

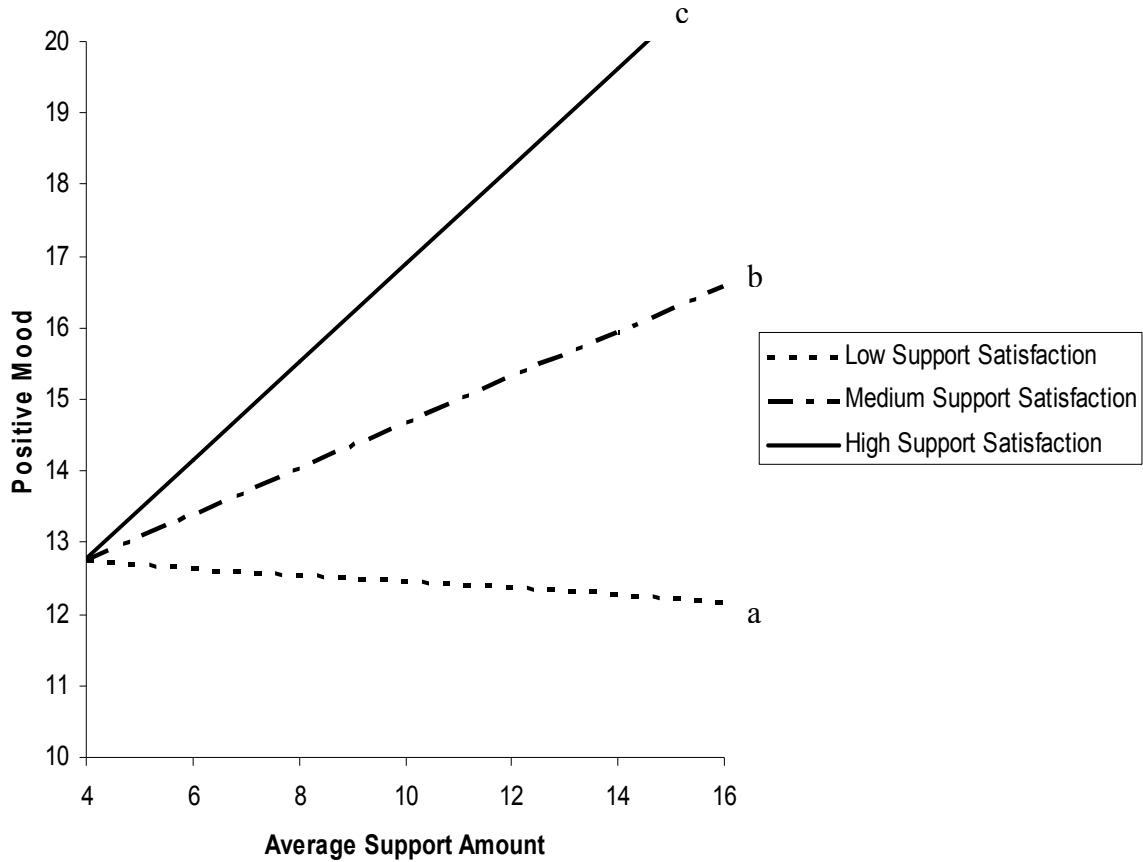
Table 7

Results from the Analyses Modeling Role Functioning as a Function of Partner Support Variables

Fixed Effect	B	SE	<i>t</i>	<i>df</i>	<i>p</i>
Intercept	6.84	3.40	2.01	50	.049
Average Amount	-0.05	0.45	-0.11	50	.916
Average Satisfaction	0.06	0.32	0.20	50	.843
Average Amt by Sat	0.01	0.03	0.26	50	.794
Same-Day Amount	-0.04	0.04	-1.14	1189	.253
Same-Day Satisfaction	0.15	0.04	3.53	1189	.0004
Same-Day Amt by Sat	-0.03	0.01	-4.26	1189	<.0001
Previous-Day Amount	-0.02	0.04	-0.60	1189	.550
Previous-Day Satisfaction	0.01	0.04	0.20	1189	.843
Previous-Day Amt by Sat	0.00	0.01	0.26	1189	.794
Random Effect	Estimate	SE	<i>z</i>	<i>p</i>	
Random Intercept Variance	2.32	0.56	4.13	<.0001	
Autoregressive Parameter	0.42	0.03	13.47	<.0001	
Level-1 Residual Variance	5.15	0.26	19.46	<.0001	

Note. Average Amt by Sat = the interaction between average support amount and average support satisfaction. Same-Day Amt by Sat = the interaction between same-day support amount and same-day support satisfaction. Previous-Day Amt by Sat = the interaction between previous-day support amount and previous-day support satisfaction.

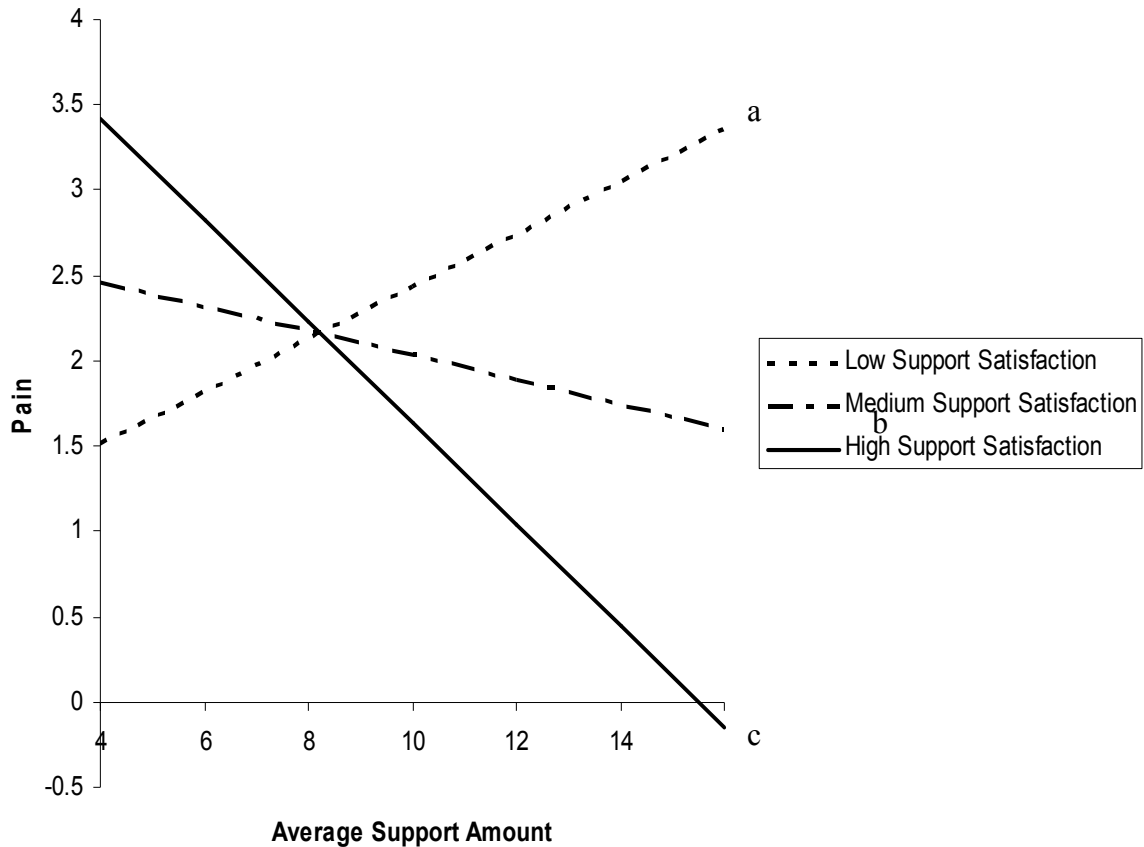
Figure 1. The interaction between average amount of support and average satisfaction with support on positive mood.



Note. Low support satisfaction is defined as 1.5 standard deviations below the mean, medium support satisfaction is at the mean, and high support satisfaction is defined as 1.5 standard deviations above the mean. The mean of average support satisfaction was 11.42 ($SD = 2.47$).

^aThe simple slope for low support satisfaction is not significant, estimate = -0.05, $t(50) = -0.12$, $p = .908$. ^bThe simple slope for medium support satisfaction is not significant, estimate = 0.32, $t(50) = 1.04$, $p = .302$. ^cThe simple slope for high support satisfaction is significant, estimate = 0.68, $t(50) = 2.06$, $p = .045$.

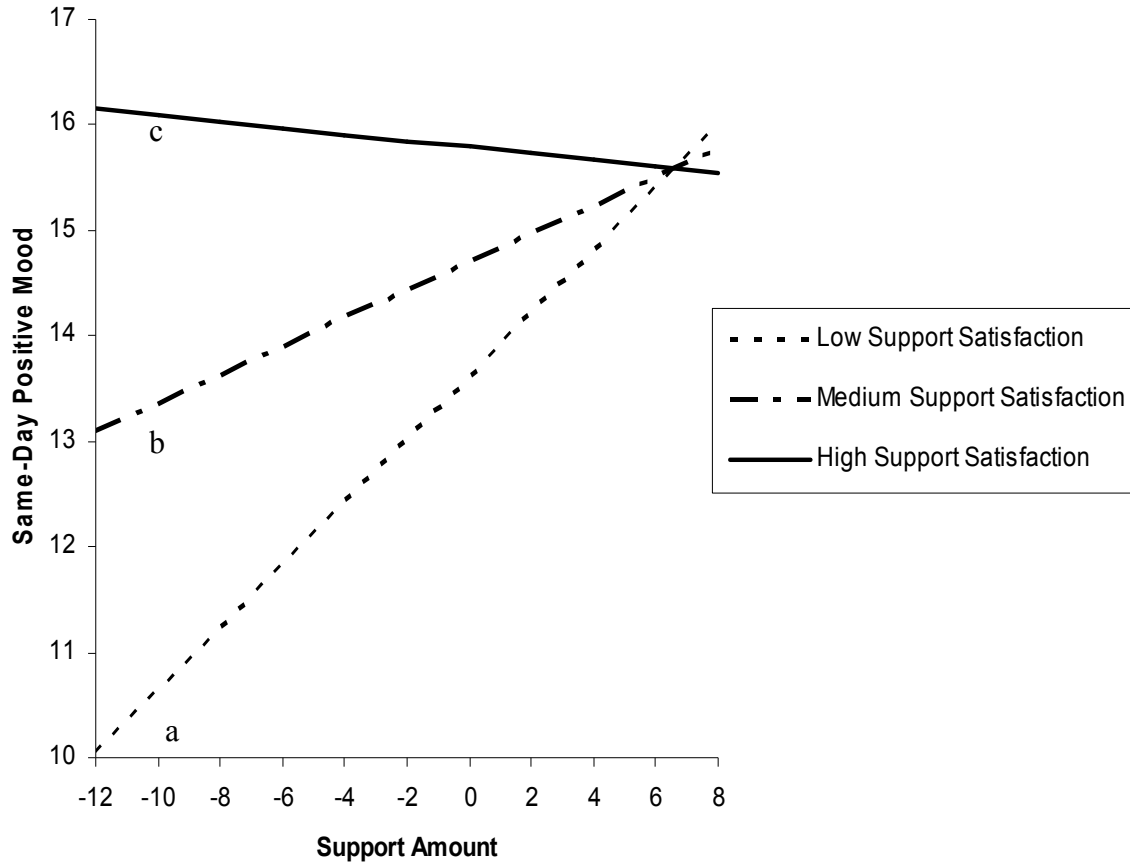
Figure 2. The interaction between average amount of support and average satisfaction with support on pain.



Note. Low support satisfaction is defined as 1.5 standard deviations below the mean, medium support satisfaction is at the mean, and high support satisfaction is defined as 1.5 standard deviations above the mean. The mean of average support satisfaction was 11.42 ($SD = 2.47$).

^aThe simple slope for low support satisfaction is not significant, estimate = 0.15, $t(50) = 0.88$, $p = .382$. ^bThe simple slope for medium support satisfaction is not significant, estimate = -0.07, $t(50) = -0.53$, $p = .596$. ^cThe simple slope for high support satisfaction is significant, estimate = -0.30, $t(50) = -2.04$, $p = .047$.

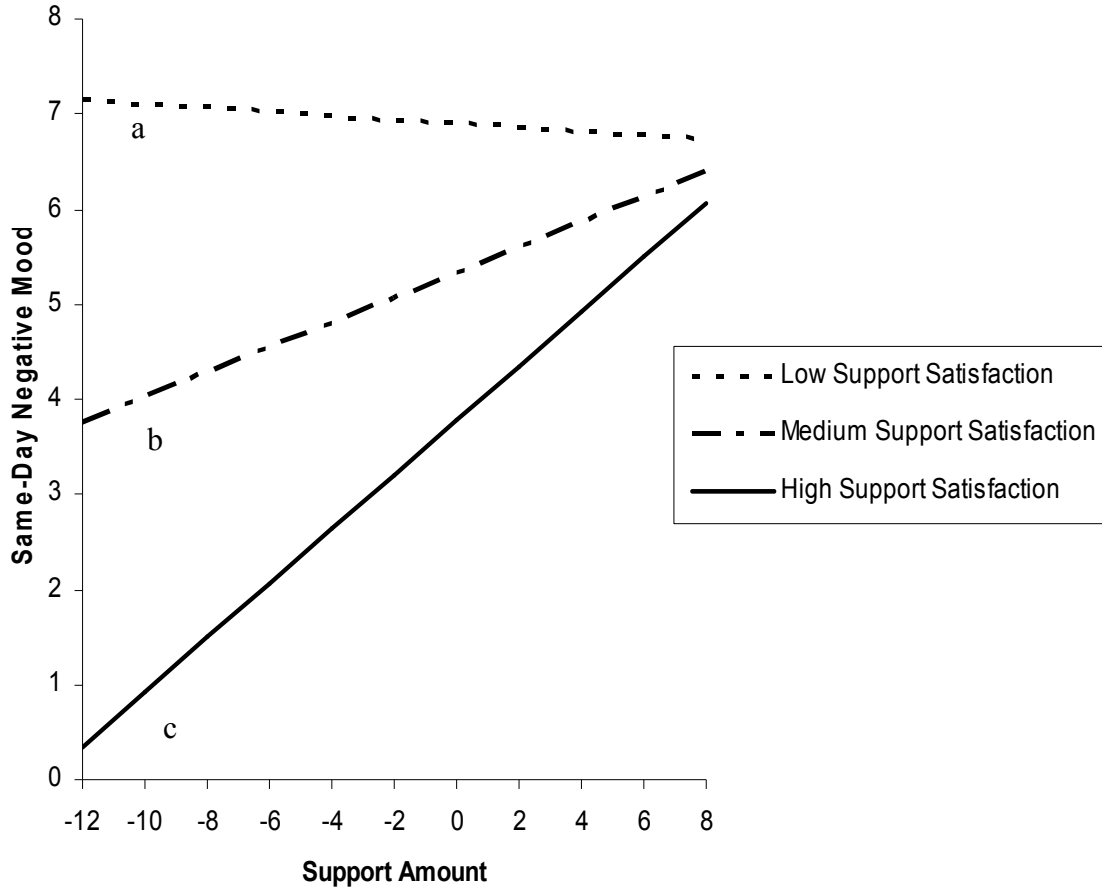
Figure 3. The interaction between support amount and support satisfaction on same-day positive mood.



Note. Low support satisfaction is defined as 1.5 standard deviations below the mean, medium support satisfaction is at the mean, and high support satisfaction is defined as 1.5 standard deviations above the mean. The mean of same-day support satisfaction was 0.00 ($SD = 2.14$).

^aThe simple slope for low support satisfaction is significant, estimate = 0.30, $t(1189) = 3.99$, $p < .0001$ ^bThe simple slope for medium support satisfaction is significant, estimate = 0.13, $t(1189) = 2.19$, $p = .029$. ^cThe simple slope for high support satisfaction is not significant, estimate = -0.03, $t(1189) = -0.42$, $p = .678$.

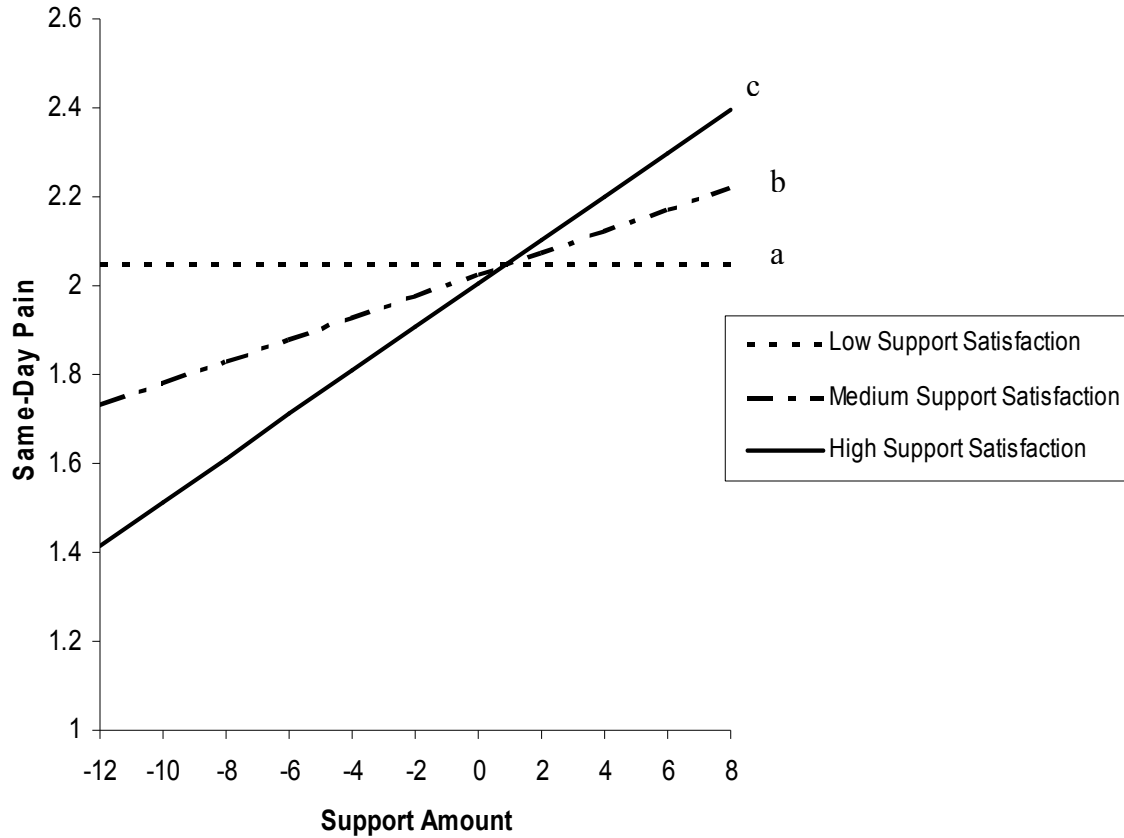
Figure 4. The interaction between support amount and support satisfaction on same-day negative mood.



Note. Low support satisfaction is defined as 1.5 standard deviations below the mean, medium support satisfaction is at the mean, and high support satisfaction is defined as 1.5 standard deviations above the mean. The mean of same-day support satisfaction was 0.00 ($SD = 2.14$).

^aThe simple slope for low support satisfaction is not significant, estimate = -0.02, $t(1189) = -0.26$, $p = .794$. ^bThe simple slope for medium support satisfaction is significant, estimate = 0.13, $t(1189) = 2.04$, $p = .042$. ^cThe simple slope for high support satisfaction is significant, estimate = 0.29, $t(1189) = 3.77$, $p = .0002$.

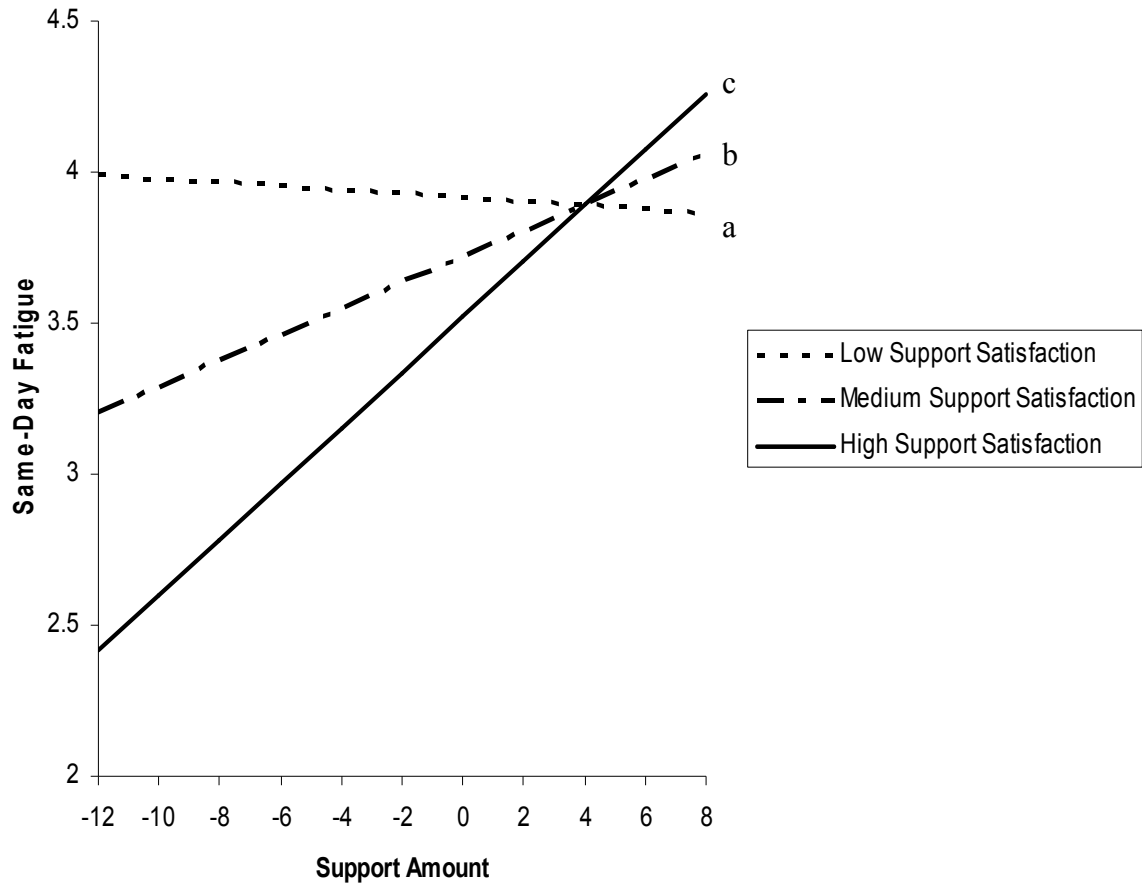
Figure 5. The interaction between support amount and support satisfaction on same-day pain.



Note. Low support satisfaction is defined as 1.5 standard deviations below the mean, medium support satisfaction is at the mean, and high support satisfaction is defined as 1.5 standard deviations above the mean. The mean of same-day support satisfaction was 0.00 ($SD = 2.14$).

^aThe simple slope for low support satisfaction is not significant, estimate = 0.00, $t(1189) = 0.00$, $p = .998$. ^bThe simple slope for medium support satisfaction is not significant, estimate = 0.02, $t(1189) = 1.23$, $p = .230$. ^cThe simple slope for high support satisfaction is significant, estimate = 0.05, $t(1189) = 2.09$, $p = .037$.

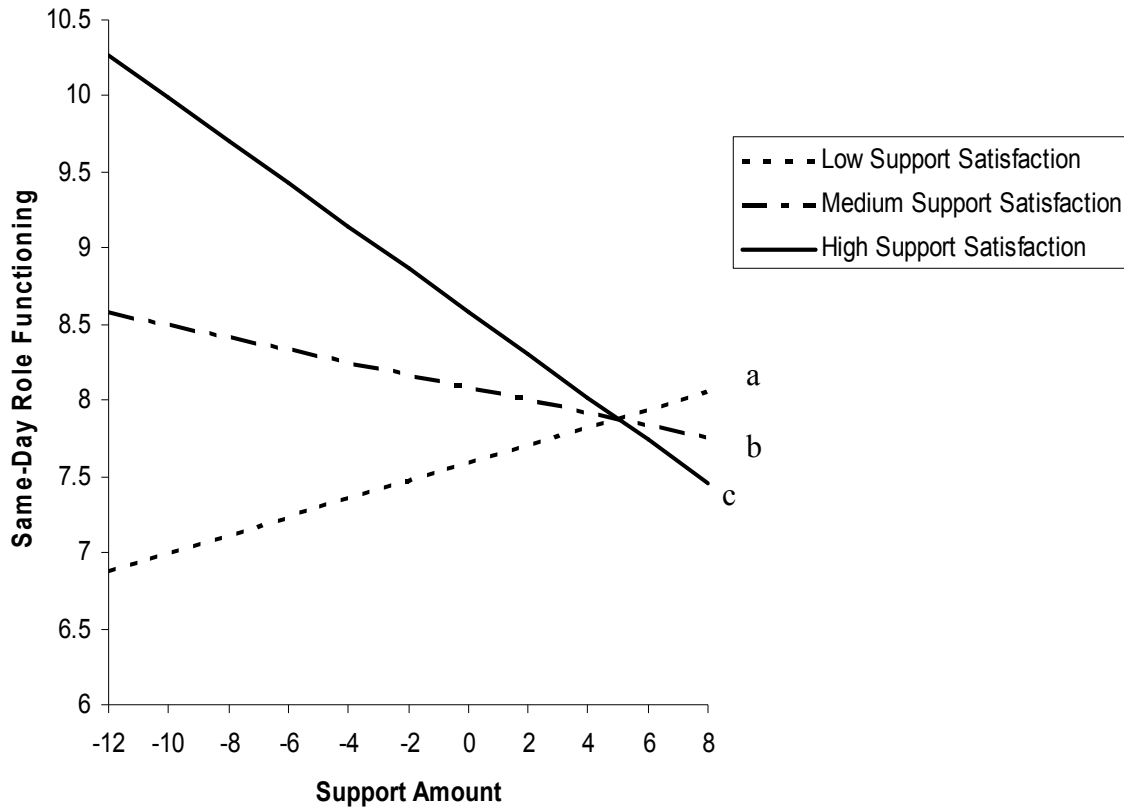
Figure 6. The interaction between support amount and support satisfaction on same-day fatigue.



Note. Low support satisfaction is defined as 1.5 standard deviations below the mean, medium support satisfaction is at the mean, and high support satisfaction is defined as 1.5 standard deviations above the mean. The mean of same-day support satisfaction was 0.00 ($SD = 2.14$).

^aThe simple slope for low support satisfaction is not significant, estimate = -0.006, $t(1189) = -0.20$, $p = .840$. ^bThe simple slope for medium support satisfaction is not significant, estimate = 0.04, $t(1189) = 1.68$, $p = .093$. ^cThe simple slope for high support satisfaction is significant, estimate = 0.09, $t(1189) = 3.09$, $p = .002$.

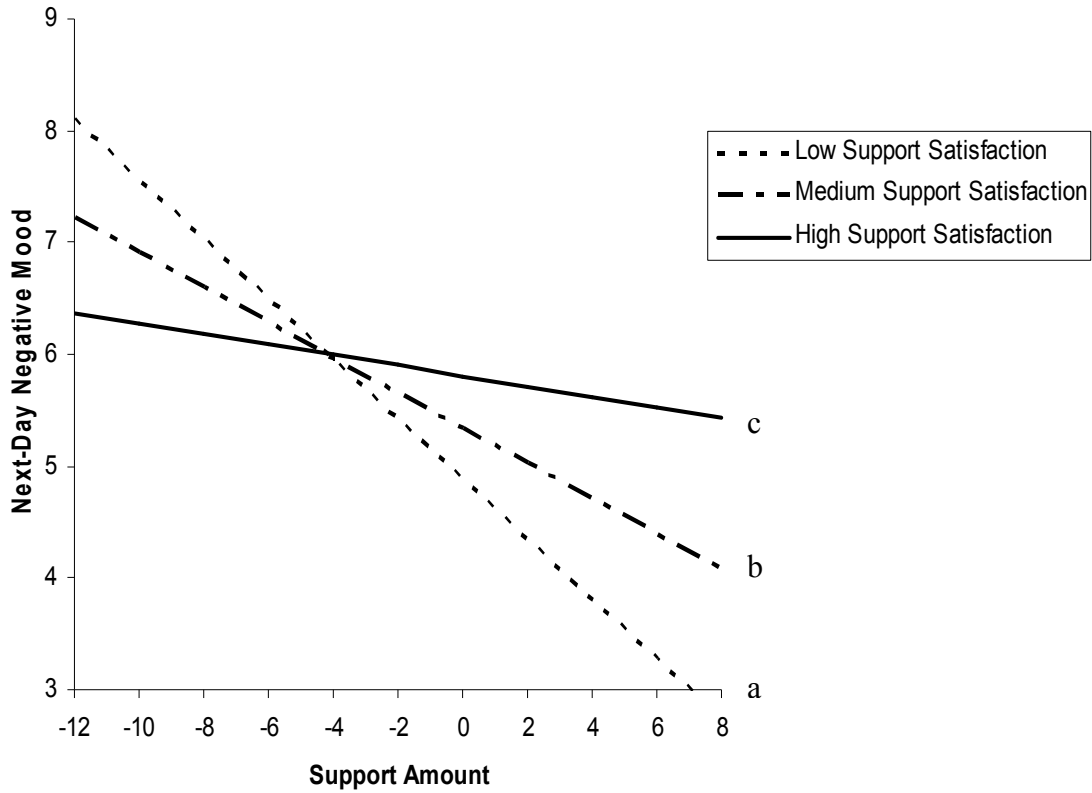
Figure 7. The interaction between support amount and support satisfaction on same-day role functioning.



Note. Low support satisfaction is defined as 1.5 standard deviations below the mean, medium support satisfaction is at the mean, and high support satisfaction is defined as 1.5 standard deviations above the mean. The mean of same-day support satisfaction was 0.00 ($SD = 2.14$).

^aThe simple slope for low support satisfaction is not significant, estimate = 0.06, $t(1189) = 1.34$, $p = .179$. ^bThe simple slope for medium support satisfaction is not significant, estimate = -0.04, $t(1189) = -1.14$, $p = .253$. ^cThe simple slope for high support satisfaction is significant, estimate = -0.14, $t(1189) = -3.37$, $p = .0008$.

Figure 8. The interaction between support amount and support satisfaction on previous-day negative mood.



Note. Low support satisfaction is defined as 1.5 standard deviations below the mean, medium support satisfaction is at the mean, and high support satisfaction is defined as 1.5 standard deviations above the mean. The mean of previous-day support satisfaction was 0.00 ($SD = 2.14$).

^aThe simple slope for low support satisfaction is significant, estimate = -0.27, $t(1189) = -3.19$, $p = .001$. ^bThe simple slope for medium support satisfaction is significant, estimate = -0.16, $t(1189) = -2.37$, $p = .018$. ^cThe simple slope for high support satisfaction is not significant, estimate = -0.05, $t(1189) = -0.60$, $p = .548$.

APPENDIX

Daily Diary Telephone Script

Hello, you have reached the CanThrive daily diary system. You will be asked a series of questions. Please respond to each question in terms of what you have experienced within the past 24 hours. You can answer a question at any time and do not need to wait for the question to be read aloud completely before answering. You can press * at any time to repeat the question. If you make a mistake, press # to return to the previous question. To begin, please enter your CanThrive code number.

PART I. All things considered, what was your degree of happiness with your relationship today? If you were extremely unhappy, press 0; if you were fairly unhappy press 1; a little unhappy, press 2; happy, press 3; very happy, press 4; extremely happy, press 5; perfectly happy, press 6. To repeat these options press *.

PART II. The following questions ask about the support you received from your partner today. For each question, enter a number from 0 to 5, where 0 means “not at all” and 5 means “a great deal”.

How much did your partner help out with chores or routine tasks today? Enter a number from 0 to 5 where 0 means “not at all” and 5 means “a great deal”.

How satisfied were you with that support? Enter a number from 0 to 5 where 0 means “not at all” and 5 means “a great deal”.

How much did your partner support you emotionally today? Enter a number from 0 to 5 where 0 means “not at all” and 5 means “a great deal”.

How satisfied were you with that support? Enter a number from 0 to 5 where 0 means “not at all” and 5 means “a great deal”.

How much did your partner help you make decisions or give you useful advice today? Enter a number from 0 to 5 where 0 means “not at all” and 5 means “a great deal”.

How satisfied were you with that support? Enter a number from 0 to 5 where 0 means “not at all” and 5 means “a great deal”.

PART III. The following questions are about what your mood has been like today. Please answer each of the following questions by entering a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Happy have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Depressed have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Joyful have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Unhappy have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Worried or Anxious have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Calm have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Angry or Hostile have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Guilty have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How much Enjoyment or Fun have you had today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Frustrated have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

How Pleased have you felt today? Enter a number from 0 to 5, where 0 means “not at all”, and 5 means “extremely”.

PART IV. Please answer the next 2 questions by entering a number from 0 to 9.

What was your AVERAGE amount of cancer-related pain during the past 24 hours?

Please enter a number from 0 to 9, where 0 means “no pain” and 9 means “pain as bad as you can imagine.”

What was your AVERAGE amount of fatigue, weariness, or tiredness during the past 24 hours? Please enter a number from 0 to 9, where 0 means “no fatigue” and 9 means “fatigue as bad as you can imagine.”

PART V. Please answer the next 3 questions by entering a number from 0 to 4. Rate these items for the past 24 hours.

How much were you able to work today, including work in the home? Not at all, press 0; a little bit, press 1; somewhat, press 2; quite a bit, press 3; very much, press 4; to repeat these options press *.

How much were you able to do things today that you enjoy? Not at all, press 0; a little bit, press 1; somewhat, press 2; quite a bit, press 3; very much, press 4; to repeat these options press *.

How content were you with the quality of your life today? Not at all, press 0; a little bit, press 1; somewhat, press 2; quite a bit, press 3; very much, press 4; to repeat these options press *.

Thank you for calling the CanThrive Daily Diary system. If you experienced any technical difficulties with this automated system, please contact Tina Gremore at 843-2073. Thank you and have a nice day.

REFERENCES

- Alferi, S., Carver, C., Antoni, M., Weiss, S., & Durán, R. (2001). An exploratory study of social support, distress, and life disruption among low-income Hispanic women under treatment for early stage breast cancer. *Health Psychology, 20*(1), 41-46.
- American Cancer Society (2006). *Cancer facts and figures 2006*. Retrieved November 28, 2006, from <http://www.cancer.org/downloads/STT/CAFF2006PWSecured.pdf>.
- Aranda, S., Schofield, P., Weih, L., Yates, P., Milne, D., Faulkner, R., et al. (2005). Mapping the quality of life and unmet needs of urban women with metastatic breast cancer. *European Journal of Cancer Care, 14*, 211-222.
- Backus, V. P. (2002). Psychiatric aspects of breast cancer. *Harvard Review of Psychiatry, 10*, 307-314.
- Barrera, M. (1986). Distinctions between social support concepts, measures, and models. *American Journal of Community Psychology, 14*, 413-445.
- Bloom, J. (1982). Social support, accommodation to stress, and adjustment to breast cancer. *Social Science and Medicine, 16*, 1329-1338.
- Bloom, J. (2002). Surviving and thriving? *Psycho-oncology, 11*, 89-92.
- Bloom, J., & Spiegel, D. (1984). The relationship of two dimensions of social support to the psychological well-being and social functioning of women with advanced breast cancer. *Social Science and Medicine, 19*, 831-837.
- Bolger, N. & Eckenrode, J. (1991). Social relationships, personality, and anxiety during a major stressful event. *Journal of Personality and Social Psychology, 61*(3), 440-449.
- Bolger, N., Foster, M., Vinokur, A. D., & Ng, R. (1996). Close relationships and adjustment to life crisis: The case of breast cancer. *Journal of Personality and Social Psychology, 70*(2), 283-294.
- Bolger, N., Zuckerman, A., & Kessler, R. C. (2000). Invisible support and adjustment to stress. *Journal of Personality and Social Psychology, 79*(6), 953-961.
- Burgess, C., Cornelius, V., Love, S., Graham, J., Richards, M., & Ramirez, A. (2005). Depression and anxiety in women with early breast cancer: Five year observational cohort study. *British Medical Journal, 330*(7493), 1-4.
- Burns, D. D. (1999). *The feeling good handbook (Rev. ed.)*. New York: Plume/Penguin Books.
- Carson, J. W., Carson, K. M., Gil, K. M., & Baucom, D. H. (2004). Mindfulness-based

- relationship enhancement. *Behavior Therapy*, 35, 471-494.
- Cella, D. F. (1994). *F.A.C.T. Manual: Functional Assessment of Cancer Therapy (FACT) Scales*. Chicago, IL: Rush-Presbyterian-St. Luke's Medical Center.
- Cella, D. F. & Bonomi, A. E. (1996). The Functional Assessment of Cancer Therapy (FACT) and Functional Assessment of HIV Infection (FAHI) Quality of Life Measurement System. In B. Spiker (Ed.), *Quality of Life and Pharmacoeconomics in Clinical Trials* (2nd ed., pp. 203-214). Philadelphia: Lippincott-Raven Publishers.
- Cleeland, C. S. & Ryan, K. M. (1994). Pain assessment: Global use of the Brief Pain Inventory. *Annals of the Academy of Medicine, Singapore*, 23(2), 129-138.
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98, 310-357.
- Cordova, M. J., Cunningham, L. L. C., Carlson, C. R., & Andrykowski, M. A. (2001). Social constraints, cognitive processing, and adjustment to breast cancer. *Journal of Consulting and Clinical Psychology*, 69(4), 706-711.
- Cutrona, C. E. (1989). Ratings of social support by adolescents and adult informants: Degree of correspondence and prediction of depressive symptoms. *Journal of Personality and Social Psychology*, 57, 723-730.
- Cutrona, C. E. (1990). Stress and social support – in search of optimal matching. *Journal of Social and Clinical Psychology*, 9(1), 3-14.
- Cutrona, C. E. & Russell, D. W. (1987). The provisions of social relationships and adaptation to stress. *Advances in Personal Relationships*, 1, 37-67.
- Danielson, C. K., Feeny, N. C., Findling, R. L., & Youngstrom, E. A. (2004). Psychosocial treatment of bipolar disorders in adolescents: A proposed cognitive-behavioral intervention. *Cognitive and Behavioral Practice*, 11(3), 283-297.
- Dunkel-Schetter, C. (1984). Social support and cancer: Findings based on patient interviews and their implications. *Journal of Social Issues*, 40(4), 77-98.
- Figueiredo, M. I., Fries, E., & Ingram, K. M. (2004). The role of disclosure patterns and unsupportive social interactions in the well-being of breast cancer patients. *Psycho-oncology*, 13, 96-105.
- Friedman, L. C., Baer, P. E., Nelson, D. V., Lane, M., Smith, F. E., & Dworkin, R. J. (1988). Women with breast cancer: Perception of family functioning and adjustment to illness. *Psychosomatic Medicine*, 50, 529-540.
- Funch, D., & Mettlin, C. (1982). The role of support in relation to recovery from breast

- surgery. *Social Science and Medicine*, 16, 91-98.
- Ganz, P. (2000). Quality of life across the continuum of breast cancer care. *The Breast Journal*, 6(5), 324-330.
- Ganz, P., Coscarelli, A., Fred, C., Kahn, B., Polinsky, M., & Petersen, L. (1996). Breast cancer survivors: Psychosocial concerns and quality of life. *Breast Cancer Research and Treatment*, 38, 183-199.
- Gil, K. M., Carson, J. W., Porter, L. S., Scipio, C., Bediako, S. M., & Orringer, E. (2004). Daily mood and stress predict pain, health care use, and work activity in African American adults with sickle-cell disease. *Health Psychology*, 23(3), 267-274.
- Gilbar, O. (2005). Breast cancer: How do Israeli women cope? A cross-sectional sample. *Families, Systems, & Health*, 23(2), 161-171.
- Glanz, K., & Lerman, C. (1992). Psychosocial impact of breast cancer: A critical review. *Annals of Behavioral Medicine*, 14(3), 204-212.
- Gremore, T. M., Baucom, D. H., Heinrichs, N., Scott, J. L., Kirby, J. S., Zimmermann, T., et al. (2005, September). *Couple-based interventions for breast cancer: Findings from three continents*. Paper presented at the 35th Annual Convention of the European Association of Behavioural and Cognitive Therapies, Thessaloniki, Greece.
- Harlow, R. E. & Cantor, N. (1995). To whom do people turn when things go poorly? Task orientation and functional social contacts. *Journal of Personality and Social Psychology*, 69(2), 329-340.
- Helgeson, V., & Cohen, S. (1996). Social support and adjustment to cancer: Reconciling descriptive, correlational, and intervention research. *Health Psychology*, 15(2), 135-148.
- Helgeson, V. S., Snyder, P., & Seltman, H. (2004). Psychological and physical adjustment to breast cancer over 4 years: Identifying distinct trajectories of change. *Health Psychology*, 23(1), 3-15.
- Hirschman, K. B., & Bourjolly, J. N. (2005). How do tangible supports impact the breast cancer experience? *Social Work in Health Care*, 41(1), 17-32.
- Hooley, J. M., & Teasdale, J. D. (1989). Predictors of relapse in unipolar depressives: Expressed emotion, marital distress, and perceived criticism. *Journal of Abnormal Psychology*, 98, 229-237.
- Hoskins, C. N., Baker, S., Sherman, D., Bohlander, J., Bookbinder, M., Budin, W., et al. (1996). Social support and patterns of adjustment to breast cancer. *Scholarly Inquiry for Nursing Practice: An International Journal*, 10(2), 99-123.

- House, J. S. (1981). *Work stress and social support*. Reading, MA: Addison-Wesley.
- Hussong, A. M., Hicks, R. E., Levy, S. A., & Curran, P. J. (2001). Specifying the relations between affect and heavy alcohol use among young adults. *Journal of Abnormal Psychology, 110*(3), 449-461.
- Irvine, D., Brown, B., Crooks, D., Roberts, J., & Browne, G. (1991). Psychosocial adjustment in women with breast cancer. *Cancer, 67*, 1097-1117.
- Jackson, P. B. (1992). Specifying the buffering hypothesis: Support, strain, and depression. *Social Psychology Quarterly, 55*(4), 363-378.
- Koopman, C., Hermanson, K., Diamond, S., Angell, K., & Spiegel, D. (1998). Social support, life stress, pain and emotional adjustment to advanced breast cancer. *Psycho-oncology, 7*, 101-111.
- Krause, N., Liang, J., & Yatomi, N. (1989). Satisfaction with social support and depressive symptoms: A panel analysis. *Psychology and Aging, 4*(1), 88-97.
- Kulik, L., & Kronfeld, M. (2005). Adjustment to breast cancer: The contribution of resources and causal attributions regarding the illness. *Social Work in Health Care, 41*(2), 37-57.
- Laireiter, A., Baumann, U., Perkonig, A., & Himmelbauer, S. (1997). Social support resources in interpersonal relationships (social networks) during stressful life conditions: Results from two pilot studies. *Revue Européenne de Psychologie Appliquée, 47*, 123-128.
- Lam, D. H., Bright, J., Jones, S., Hayward, P., Schuck, N., Chisholm, D., et al. (2000). Cognitive therapy for bipolar illness – A pilot study of relapse prevention. *Cognitive Therapy and Research, 24*(5), 503-520.
- Lee, E., Chung, B. Y., Park, H. B., & Chun, K. H. (2004). Relationships of mood disturbance and social support to symptom experience in Korean women with breast cancer. *Journal of Pain and Symptom Management, 27*(5), 425-433.
- Lichtman, R., Taylor, S., & Wood, J. (1988). Social support and marital adjustment after breast cancer. *Journal of Psychosocial Oncology, 5*, 47-74.
- Luoma, M.-L., & Hakamies-Blomqvist, L. (2004). The meaning of quality of life in patients being treated for advanced breast cancer: A qualitative study. *Psycho-Oncology, 13*, 729-739.
- Maly, R. C., Umezawa, Y., Leake, B., & Silliman, R. A. (2005). Mental health outcomes in older women with breast cancer: Impact of perceived family support and adjustment.

- Psycho-Oncology*, 14, 535-545.
- Marco, C. A., Neale, J. M., Schwartz, J.E., Shiffman, S., & Stone, A. A. (1999). Coping with daily events and short-term mood changes: An unexpected failure to observe effects of coping. *Journal of Consulting and Clinical Psychology*, 67(5), 755-764.
- Mendoza, T. R., Wang, X. S., Cleeland, C. S., Morrissey, M., Johnson, B. A., Wendt, J. K., et al. (1999). The rapid assessment of fatigue severity in cancer patients: Use of the Brief Fatigue Inventory. *Cancer*, 85(5), 1186-1196.
- Meyerowitz, B. E., Watkins, I. K., Sparks, F. C. (1983). Psychosocial implications of adjuvant chemotherapy: A two-year follow-up. *Cancer*, 52, 1541-1545.
- Nelles, W., McCaffrey, R., Banchard, C., & Ruckdeschel, J. (1991). Social supports and breast cancer: A review. *Journal of Psychosocial Oncology*, 9, 21-34.
- Neuling, S., & Winefield, H. (1988). Social support and recovery after surgery for breast cancer: Frequency and correlates of supportive behaviors by family, friends, and surgeon. *Social Science and Medicine*, 27, 385-392.
- Northouse, L. (1981). Mastectomy patients and the fear of cancer recurrence. *Cancer Nursing*, 4, 213-220.
- Northouse, L. (1988). Social support in patients' and husbands' adjustment to breast cancer. *Nursing Research*, 37, 91-95.
- Norton, R. (1983). Measuring marital quality: A critical look at the dependent variable. *Journal of Marriage and the Family*, 45, 141-151.
- Peters-Golden, H. (1982). Breast cancer: Varied perceptions of social support in the illness experience. *Social Science and Medicine*, 16, 483-491.
- Pistrang, N., & Barker, C. (1995). The partner relationship in psychological response to breast cancer. *Social Sciences in Medicine*, 40(6), 789-797.
- Porter, L. S., Clayton, M. F., Belyea, M., Mishel, M., Gil, K. M., & Germino, B. B. (2006). Predicting negative mood state and personal growth in African American and White long-term breast cancer survivors. *Annals of Behavioral Medicine*, 31(3), 195-204.
- Porter, L. S., Gil, K. M., Carson, J., Anthony, K., & Ready, J. (2000). The role of stress and mood in sickle cell disease pain: An analysis of daily diary data. *Journal of Health Psychology*, 5, 53-63.
- Porter, L. S., Mishel, M., Neelon, V., Belyea, M., Pisano, E., & Soo, M. S. (2003). Cortisol levels and responses to mammography screening in breast cancer survivors: A pilot study. *Psychosomatic Medicine*, 65, 842-848.

- Porter, L. S. & Stone, A. A. (1995). Are there really gender differences in coping?: A reconsideration of previous data and results from a daily study. *Journal of Social and Clinical Psychology, 14*(2), 184-202.
- Primomo, J., Yates, B., & Woods, N. (1990). Social support for women during chronic illness: The relationship among sources and types of adjustment. *Research in Nursing and Health, 13*, 153-161.
- Raudenbush, S. W. & Bryk, A. S. (2002). *Hierarchical Linear Models: Applications and Data Analysis Methods* (2nd ed.). Thousand Oaks, CA: Sage Publications Inc.
- Reynolds, P., Hurley, S., Torres, M., Jackson, J., Boyd, P., Chen V. W., et al. (2000). Use of coping strategies and breast cancer survival: Results from the black/white cancer survival study. *American Journal of Epidemiology, 152*(10), 940-949.
- Reynolds, J. S. & Perrin, N. A. (2004). Mismatches in social support and psychosocial adjustment to breast cancer. *Health Psychology, 23*(4), 425-430.
- Roberts, C. S., Cox, C. E., Shannon, V. J., & Wells, N. L. (1994). A closer look at social support as a moderator of stress in breast cancer. *Health and Social Work, 19*(3), 157-164.
- Sandgren, A. K., Mullens, A. B., Erickson, S. C., Romanek, K. M., & McCaul, K. D. (2004). Confidant and breast cancer patient reports of quality of life. *Quality of Life Research, 13*, 155-160.
- Spiegel, D., Bloom, J. R., and Gottheil, E. (1983). Family environment as a predictor of adjustment to metastatic breast carcinoma. *Journal of Psychosocial Oncology, 1*(1), 33-44.
- Thoits, P. A. (1985). Social support and psychological well-being: Theoretical possibilities. In I. G. Sarason & B. R. Sarason (Eds.), *Social support: Theory, research, and applications* (pp. 51-72). Dordrecht, The Netherlands: Martinus Nijhoff.
- Trunzo, J. J. & Pinto, B. M. (2003). Social support as a mediator of optimism and distress in breast cancer survivors. *Journal of Consulting and Clinical Psychology, 71*(4), 805-811.
- Watson, D. C., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.
- Waxler-Morrison, N., Hislop, T. G., Mears, B., & Kan, L. (1991). Effects of social relationships on survival for women with breast cancer: A prospective study. *Social Sciences in Medicine, 33*(2), 177-183.

- Weihls, K. L., Simmens, S. J., Mizrahi, J., Enright, T. M., Hunt, M. E., & Siegel, R. S. (2005). Dependable social relationships predict overall survival in Stages II and III breast carcinoma patients. *Journal of Psychosomatic Research*, 59, 299-306.
- Wimberly, S. R., Carver, C. S., Laurenceau, J., Harris, S., & Antoni, M. H. (2005). Perceived partner reactions to diagnosis and treatment of breast cancer: Impact on psychosocial and psychosexual adjustment. *Journal of Consulting and Clinical Psychology*, 73(2), 300-311.
- Woods, N., & Earp, J. (1978). Women with cured breast cancer: A study of mastectomy patients in North Carolina. *Nursing Research*, 27, 279-285.
- Zemore, R., & Shepel, L. (1989). Effects of breast cancer and mastectomy on emotional support and adjustment. *Social Science and Medicine*, 28, 19-27.