INTIMACY AS A MEDIATOR OF THE ASSOCIATION BETWEEN
RELATIONSHIP EVENTS AND FEAR OF RECURRENCE IN COUPLES
COPING WITH EARLY-STAGE BREAST CANCER

by

Elizabeth C. Pasipanodya

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the Masters of Arts in Psychology

Spring 2013

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ACKNOWLEDGMENTS

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ABSTRACT

Fear of recurrence (FOR) is a concern that remains relevant to the well-being of women that have had breast cancer, even years after diagnosis. Partners of breast cancer survivors also harbor, and are affected by, their own concerns of cancer recurrence. Although FOR has been associated with psychological distress, little longitudinal work has examined factors that prospectively predict FOR, and no past research has examined predictors in the context of everyday life. The present study focused on daily relationship factors that may have an influence on both partners’ FOR. It was hypothesized that intimacy would mediate the relationship between positive and negative daily relationship events and the experience of FOR. Forty-four women with breast cancer and their partners completed a daily online diary for 10 consecutive evenings. Dyadic multilevel modeling revealed that the daily experience of relationship events could influence the experience of FOR in both breast cancer patients and their partners through changes in relational intimacy. Specifically, the occurrence of positive relationship events, independent of the occurrence of negative relationship events, was found to predict higher evening intimacy and, in turn, lower FOR. The occurrence of negative relationship events, independent of the occurrence of positive relationship events, also predicted lower intimacy which, in turn, predicted higher FOR. These findings help to expand our knowledge of the progression of FOR in the everyday lives of couples coping with breast cancer.
Chapter 1

INTRODUCTION

Recent estimates indicate that close to 12 million American adults live with a personal history of cancer, the majority of these being women who have had a diagnosis of breast cancer (Rowland, Mariotto, & Alfano, 2011). Women diagnosed and treated for breast cancer often report elevated levels of emotional distress (Stanton & Snider, 1993; Millar, Purushotham, McLatchie, George, & Murray, 2005) as well as significant treatment side effects, such as hair loss, nausea, and lymphedema (Coates et al., 1983). Even after the completion of adjuvant therapy, patients continue to struggle with poorer functioning, and some women report concerns with physical symptoms, such as fatigue and pain, and sexual dysfunction (Broeckel, Jacobsen, Horton, Balducci, & Lyman, 1998; Ganz, Rowland, Desmond, Meyerowitz, & Wyatt, 1998).

Several studies have identified fear of recurrence (FOR) as a particularly salient concern that persists for years after diagnosis among cancer survivors (Ferrell, Grant, Funk, Otis-Green, & Garcia, 1997; Mellon, Kershaw, Northouse, & Freeman-Gibb, 2007). Studies on the course of fear of recurrence over time have produced contradictory evidence but it has generally been found that while distress due to FOR does diminish for some women (King, Kenny, Shiell, Hall, & Boyages, 2000), it remains a significant concern for survivors as far out as 10 years after initial diagnosis (Hodgkinson et al., 2007). FOR has been found to encapsulate concerns about health, role changes, treatment, and death (Vickberg, 2003). Factors that have been found to influence FOR have tended to be those that are relatively immutable, such as younger age, gender of the cancer survivor, and cancer severity (Davis-Ali, Chesler, & Chesney, 1993; Kim, Carver,
Spiller, Love-Ghaffari, & Kaw, 2012; Vickberg, 2003). Psycho-social factors, and in particular close relationship factors, have not been examined although greater social support has been linked to less fear of recurrence in one study (Matulonis et al., 2008).

It has been suggested that the anxiety associated with FOR may have negative effects on long-term quality of life (Lee-Jones, Humphris, Dixon, & Bebbington Hatcher, 1997). Indeed, FOR has been linked consistently to maladjustment in cross-sectional research with findings indicating that higher FOR is associated with significantly higher emotional distress (Stanton et al., 2002), lower well-being (Vickberg, 2003), and interpersonal problems (Stefanek, Shaw, DeGeorge, & Tsottles, 1989). Moreover, levels of distress and FOR have been shown to be moderately to strongly correlated in both patients and partners of couples coping with breast cancer (Hagedoorn, Sanderman, Bolks, Tuinstra, & Coyne, 2008; Mellon et al., 2007). It is also worth noting that it has been found in some cases that partners reported even greater levels of FOR than patients themselves (Mellon et al., 2007). In addition, it is known that FOR can occur in a dyadic context, such that one partner’s FOR can predict subsequent FOR and distress in his/her partner (Hodges & Humphris, 2009). These findings support the notion that couples coping with breast cancer react as an “emotional system”, as opposed to individuals that have isolated emotional experiences (Hagedoorn, et al., 2008; Zahlis & Shands, 1993).

1.1 The Dyadic Context, FOR, and Mortality Salience

The correlation, and potentially reciprocal influence of FOR, between cancer patients and their partners does indeed suggest the importance of viewing concerns about the patient’s health and cancer recurrence from a relationship, and not only from an individual, perspective. Research shows that as couples with breast cancer learn to cope with stressors that affect both partners’ quality of life as well as the quality of their
relationship, successful coping strategies often involve taking a “we” approach, whereby partners work together to maintain their relationship so that through their relationship, they can jointly manage their shared stress (Badr & Carmack-Taylor, 2008).

Social support and equity theories propose the view that intimate relationships can be a resource for individuals to draw on for assistance during difficult life events (Manne & Badr, 2008). One feature of close relationships that may contribute to the resource that relationships provide to individuals could be intimacy, which involves the perception that one is understood, validated, and cared for by a relationship partner (Laurenceau, Feldman-Barrett, & Rovine, 2005; Reis & Shaver, 1988). In addition, it has been suggested that aspects of close relationships, particularly those relevant to intimacy processes, may be involved in regulating the anxiety of mortality salience which, like FOR, involves an existential fear of dying (Goldenberg, Pyszczynski, McCoy, Greenberg, & Solomon, 1999; Mikulincer & Florian, 2000).

Close relationships have been theorized to provide protection from concerns of death and dying through a basic emotional attachment mechanism that is geared towards maintaining proximity to significant others in times of stress in order to regulate distress (Bowlby, 1969/1982; Taylor, 2006). In attachment theory, close others function both as a haven of safety in times of stress as well as a “secure base” for exploration and development (Bowlby, 1969/1982).

Recent studies have experimentally shown the distress regulation function that close relationships can have (Florian, Mikulincer, & Hirshberger, 2002). In a series of studies, Cox and Arndt (2012) found that perceived regard, a component of intimacy which includes perceiving that one is valued by those close others, buffered against the accessibility of death-related thoughts when participants were reminded of their own mortality. As such, it may be that close relationships in general, and intimacy in
particular, have a role in regulating FOR and other forms of distress related to mortality salience.

Furthermore, other aspects of relationships such as the occurrence of positive and negative behaviors in the relationship have been implicated in the prominence of death-related thoughts. Florian et al. (2002) found that recollections of relationship problems or transgressions against a partner led to higher death-related thoughts. Conversely, recollections of positive relationship experiences were found to lead to higher perceptions of regard and reduced death-related thoughts, via lowered perceived regard, when individuals were reminded of their own mortality (Cox and Arndt, 2012). Such findings evidence the ability of the valence of relationship events and perceptions of relational intimacy to impact coping to death-related concerns.

1.2 Overview of the Current Study and Hypotheses

Despite substantial anecdotal, clinical, and cross-sectional evidence of the existence and correlates of FOR, at present, little is known empirically about the day-to-day factors that predict the daily experience of FOR in both breast cancer patients and their partners. In particular, very little is known about the importance of relationship factors and whether they can predict FOR in a dyadic context, despite the clear importance of relational coping to psychological adjustment to cancer (Manne & Badr, 2008). Consequently, the present study was motivated to study predictors of daily FOR in women with breast cancer and their partners with a focus on the valence of relationship events and intimacy, as these have been found in previous research to be relevant to buffering against the impact of death-related thoughts (Cox & Arndt, 2012; Florian et al., 2002).
We chose to study cancer patients and their partners in order to examine the associations between relationship factors and FOR, as it is important to understand how aspects of close relationships affect the progression and maintenance of FOR. Empirical (King et al., 2000) and anecdotal (McKinley, 2000) evidence suggests that fear of recurrence emerges soon after the end of acute and adjuvant therapy as patients, accustomed to regular care from nurses and physicians, transition to the uncertainty of survivorship. Consequently, we recruited couples coping with early-stage breast cancer 9 months after surgery, reasoning this to be a realistic interval of time to assess symptoms of incipient FOR as most early-stage breast cancer patients would have progressed through adjuvant therapy. We utilized an intensive longitudinal methodology (Bolger, Davis, & Rafaeli, 2003) to assess the daily occurrence of certain positive and negative relationship events, perceived levels of intimacy, and FOR from each partner’s perspective at the end of the day. The daily diary methodology allowed us to obtain more reliable and less biased (due to minimizing retrospective recall) indices of partners’ reports of relationship events, intimacy, and FOR (Bolger et al., 2003; Laurenceau & Bolger, 2005; Shiffman, Stone, & Hufford, 2008).

Another unique methodological feature of this work was its dyadic approach. We assessed perceptions of the occurrence of relationship events, intimacy, and FOR from both the patient and the partner perspectives, allowing us to explore whether individual reports are important determinants of the patient’s and the partner’s outcomes. Family systems theories explain the necessity of studying families and couples as interdependent systems, as individuals cannot be understood in isolation from one another but rather are better seen as an emotional unit (Papero, 1990). Consequently, it is important to examine both members of a couple in order to account for their interdependence and their reciprocal influences. Additionally, we developed an internet-based daily diary survey
because, unlike paper and pencil measures, internet diaries capture the date and time diaries are completed and enable researchers to ensure compliance with study procedures.

This study used a dyadic framework to determine: (1) whether the relationship between relationship events and FOR is mediated by perceptions of intimacy, (2) the extent to which cancer patients’ and partners’ perceptions of relationship events and intimacy influence one another’s FOR, and (3) whether there are differences in predictors of FOR, or differences in the magnitude of their effects, between cancer patients and their partners. In particular, we hypothesized that intimacy would mediate the association of the experience of positive relationship events and FOR and subsequently cause decreases in daily FOR. We conversely hypothesized that intimacy would mediate the positive relationship between the experience of negative events and FOR and would consequently be associated with higher levels of reported FOR in both patients and partners. This prediction was made as the valence of relationship events is known to contribute to relationship strength (Gottman, 1994) while high levels of intimacy are known to contribute to well-being in general and to death-related concerns in particular (Cox and Arndt, 2012; Prager, 1995; Florian et al., 2002). Because of the findings of reciprocal influence in relationships (Hodges & Humphris, 2009), we predicted that there would be some influence of cancer patients’ and partners’ perceptions of intimacy on one another’s outcomes. Additionally, as no role-specific differences in models of FOR have been found in prior research, we predicted the relationships between variables examined in our model to be the same for patients and their partners.
Chapter 2
METHOD

2.1 Participants and Procedure

Prospective participants for this study were identified from their medical records and tumor registry at the Helen F. Graham Cancer Center of the Christiana Care Health System (HFGCC). Eligibility was determined for English-speaking women above the age of 18 who had diagnoses of early stage breast cancer (i.e., Stage I, II, IIIa, or Ductal Carcinoma in situ), had undergone breast cancer surgery within the past 9 months, and were married or cohabitating with a significant other who was also English-speaking and above the age of 18. Forty-four consenting patients and their partners completed an initial questionnaire that included questions capturing demographics and other self-report measures. Once the initial questionnaires were received by the research team, both partners from each couple completed an online daily diary survey for ten consecutive evenings. Both partners were instructed to complete their diaries independently on the same evening before going to bed. Participants were compensated up to $130 per couple ($25 for each initial questionnaire and $5 for each diary completed). All procedures were approved by the Human Subjects Institutional Review Boards of both University of Delaware and Christiana HealthCare System.

The majority of patients (84.4%) and partners (82.2%) were Caucasian. Most patients received hormonal therapy (41%), chemotherapy (20%), or both (16%). The majority of patients and their partners were married (92%; $M = 24.4$ years, SD = 13.8 years) with the remainder (8%; $M = 12$ years, SD = 6 years) in committed relationships.
Additionally, most patients and partners worked either full-time (66%) or part-time (2%). Sixty-four percent of couples reported earning a combined income > $60,000. The average age for patients was 52.18 years (SD = 11.14) and 54.55 years (SD = 12.85) for partners.

Only entries that fell within valid evening time intervals for diary completion were used in this study. Patients and partners averaged approximately 8.38 diary entries out of the 10 instructed. All available valid data were used in analyses.

2.2 Daily Diary Measures

2.2.2 Relationship Events. The occurrence of positive and negative daily relationship events were assessed with a separate question for each. Patients and partners indicated whether or not they had engaged in “a positive event with my spouse/partner” and whether or not they had “an argument my spouse/partner” by specifying either “Event did occur today” or “Event did not occur today.”

2.2.2.2 Intimacy. Intimacy was assessed using the daily average of three separate diary items. The first two items, “At this moment, how much intimacy/connectedness do you feel with your spouse/partner?” and “At this moment, how emotionally close do you feel to your partner?” were rated on a 7-point Likert scale (1 = none at all to 7 = an extreme amount) while the third item, which asked participants to rate their degree of happiness, all things considered, with their relationship “right now”, was also rated on a 7-point Likert scale (1 = extremely unhappy to 7 = perfect). Items such as these have been used previously to assess daily relationship intimacy in dating university samples (e.g., Laurenceau, Troy, & Carver, 2005), married community samples (Laurenceau, Feldman-Barrett, & Rovine, 2005), and couples coping with breast cancer (Belcher et al., 2011). Reliability of the intimacy items was assessed using an
indicator of reliability (Rc.) that is appropriate for multi-item scales used in intensive longitudinal designs as it assesses consistency of change in scores within-person across all diary days (Cranford et al., 2006). The Rc value for patient-reported intimacy was .80 while the Rc for partner-reported intimacy was .88, indicating moderate to good reliability (Shrout, 1998).

2.2.2.2 Fear of Recurrence. Daily FOR was measured using cancer-related worry items taken from the Assessment of Survivor Concerns questionnaire (Gotay & Pagano, 2007). The ASC has demonstrated good internal consistency, convergent validity, and divergent validity in breast cancer populations (Gotay & Pagano, 2007).

The 3 items that tapped the worry domain and included in this study were “I worried about future diagnostic tests”, “I worried about another type of cancer”, and “I worried about my cancer coming back.” Responses were scored on a 4-point scale from ‘0 = not at all to 3= very much’. Partners completed complementary items assessing their cancer-related worries (e.g., “I worried about my spouse/partner's cancer coming back”). In analyses, these three items were summed into a FOR composite. Reliability analyses showed moderate reliability for both patient (Rc = .76) and partner (Rc = .80) FOR composites.

2.3 Overview of Data Analytic Strategy

The data consisted of ten consecutive daily observations from each of the 44 breast cancer patients and their spouses, conforming to a multilevel data structure where persons and days within each couple are treated as non-independent observations. Accordingly, we used multilevel modeling where patient and spouse diary data were modeled as multivariate outcomes (Bolger & Laurenceau, 2013; Laurenceau & Bolger, 2005; Raudenbush, Brennan, & Barnett, 1995). Moreover, we evaluated the presence of
within-person mediation effects within the context of a multilevel modeling framework (Bauer, Preacher, & Gil, 2006; Kenny, Korchmaros, & Bolger, 2003).

An important additional characteristic of the data from this study is that they come from dyads. Therefore, our analytic approach reflected features of an actor-partner interdependence mediation model (APIMeM; Lederman, Macho, & Kenny, 2011), allowing us to model factors that can contribute to the interdependence of patient and partner outcomes while also assessing the effects of mediation. Central to this approach is the ability to assess actor and partner effects (Kenny, Kashy, & Cook, 2006). Actor effects refer to whether a person’s score on a predictor variable influences the person’s own outcome (e.g., whether one’s experience of intimacy influences one’s own FOR). Partner effects refer to whether a partner’s score on the predictor variable influences the other person’s outcomes (e.g., whether one’s experience of intimacy influences the other partner’s FOR). Consequently, this approach allows for the examination of how relationship experiences influence one’s own outcomes as well as those of a partner. Additionally, in the APIMeM, all mutual influences are accounted for (controlled for) within the model so that reported findings represent each individual’s outcomes within the context of the couple.

Actor and partner effects are labeled in path models by referring to the dyad member of the explained variable (Lederman et al., 2011). Actor effects in the a (X→M), b (M→Y), and c’ (X→Y) paths are represented by paths labeled with the subscript capital letter “A” while partner effects are represented by paths labeled subscript capital letter “P”. Effects on the partner, referred to in the diagrams as “spouse”, are represented by paths labeled with the subscript small letter “s” while effects on the patient are represented by paths labeled with the subscript small letter “p”. Therefore, as depicted below in Figure 1, which represents a simplified depiction of the full model we tested,
effects from the spouse on the patient are patient partner effects while effects from patient on the spouse are spouse partner effects. For instance, the regression of patient intimacy on spouse relationship event is a patient partner effect and is labeled $a_{Pp}$ while the regression of spouse intimacy on patient relationship event is a spouse partner effect and is labeled $a_{Ps}$. Only effects reflecting within-person variability are represented in our figures due to an interest in day-to-day, rather than between-person, associations.
Figure 2.1  Generalized APIMeM Showing Intimacy as a Mediator of the Regression of FOR on Relationship Events
Analyses were carried out in Mplus v6.12 (Muthén & Muthén, 1998-2010) using robust maximum likelihood estimation (MLR). MLR parameter estimates are robust to non-normality and non-independence of observations (Yuan & Bentler, 2000). MLR is also able to handle the interdependencies inherent in repeatedly measured dyadic data as well as produce valid statistical inferences in the presence of data that are missing at random. Regarding missing data, patient positive and negative event entries were 86.6% and 87.4% complete respectively across all days and all participants, while partner positive and negative event entries were 80.8% and 81.2% complete respectively. Patient and partner intimacy were 87.6% and 81.0% complete respectively while patient FOR and partner FOR were 85.9% and 75.9% complete respectively across the diary days and participants. In our models, residual error in patient intimacy was allowed to correlate with error in partner intimacy; residual error in patient FOR was similarly allowed to correlate with error in partner FOR. Finally, because the FOR outcomes for patients and partners demonstrated a count distribution, we modeled FOR as a Poisson distribution.
### Chapter 3

**RESULTS**

Means and standard deviations for study variables are presented in Table 3.1 while correlations of predictor variables are presented in Table 3.2.

**Table 3.1  Means, Standard Deviations, and Interclass Correlations of Study Variables**

<table>
<thead>
<tr>
<th>Daily Variable</th>
<th>Mean</th>
<th>Variance Between</th>
<th>Variance Within</th>
<th>ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Intimacy</td>
<td>4.290</td>
<td>0.734</td>
<td>0.266</td>
<td>0.734</td>
</tr>
<tr>
<td>Partner Intimacy</td>
<td>4.278</td>
<td>0.851</td>
<td>0.414</td>
<td>0.673</td>
</tr>
<tr>
<td>Patient Positive Event</td>
<td>0.602</td>
<td>0.083</td>
<td>0.158</td>
<td>0.344</td>
</tr>
<tr>
<td>Partner Positive Event</td>
<td>0.600</td>
<td>0.076</td>
<td>0.168</td>
<td>0.082</td>
</tr>
<tr>
<td>Patient Negative Event</td>
<td>0.061</td>
<td>0.006</td>
<td>0.051</td>
<td>0.054</td>
</tr>
<tr>
<td>Partner Negative Event</td>
<td>0.057</td>
<td>0.006</td>
<td>0.049</td>
<td>0.011</td>
</tr>
<tr>
<td>Patient FOR</td>
<td>1.644</td>
<td>4.524</td>
<td>1.077</td>
<td>0.808</td>
</tr>
<tr>
<td>Partner FOR</td>
<td>1.761</td>
<td>4.377</td>
<td>1.579</td>
<td>0.735</td>
</tr>
</tbody>
</table>
Table 3.2  Within-person Correlations of Study Predictor Variables

<table>
<thead>
<tr>
<th></th>
<th>Patient Intimacy</th>
<th>Partner Intimacy</th>
<th>Patient Positive Event</th>
<th>Partner Positive Event</th>
<th>Patient Negative Event</th>
<th>Partner Negative Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Intimacy</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner Intimacy</td>
<td>0.377</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Positive Event</td>
<td>0.210</td>
<td>0.198</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner Positive Event</td>
<td>0.168</td>
<td>0.250</td>
<td>0.341</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Negative Event</td>
<td>-0.399</td>
<td>-0.312</td>
<td>-0.143</td>
<td>-0.064</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Partner Negative Event</td>
<td>-0.362</td>
<td>-0.328</td>
<td>-0.129</td>
<td>-0.138</td>
<td>0.611</td>
<td>1.000</td>
</tr>
</tbody>
</table>
Figure 2.1 (previously depicted) represents a generalized actor-partner mediation model. The specific models tested are shown in Figures 3.1 and 3.2. As reported above, only within-person effects were modeled in these regressions due to an interest in daily processes, rather than between-person effects. As all possible actor and partner effects are included in the model, each path represents a unique effect.
Figure 3.1 Path Diagram of Unconstrained Multilevel APIMeM
The first model tested (Figure 3.1) was one with unconstrained pathways, such that all parameters were freely estimated. This model was compared to one in which all similar path coefficients across patients and partners were constrained to be equal (Figure 3.2), consistent with a model in which there are no effects of gender or role on associations between variables. To test model fit between the constrained and the unconstrained model, we used a Satorra-Bentler scaled $\chi^2$ difference test in which the usual normal-theory $\chi^2$ statistic is divided by a scaling correction to better approximate $\chi^2$ under non-normality (Satorra & Bentler, 2001). Usual assumptions of homoscedasticity were found to not be appropriate in our data as the outcome variable, FOR, was found to have a Poisson distribution. In the multilevel mediation models tested, dyad was considered the unit of analysis, rather than the individuals; as such, the number of couples in the study was used as the basis of degrees of freedom for inferential tests of parameters. Results of the $\chi^2$ difference test indicated similar fit for the fully constrained and unconstrained models, $\chi^2 (10, N = 44) = 8.90; p = 0.54)$. Consequently, the fully constrained model which posits no gender or role difference was selected as it was more parsimonious and satisfactorily reproduced the variance-covariance matrix of the unconstrained model.

Results of analyses of the constrained model with patients and partners as indistinguishable members of the dyad are shown in Table 3.3.
Table 3.3  Multilevel Regression of FOR on Relationship Events and Intimacy

<table>
<thead>
<tr>
<th>Effect</th>
<th>Estimate</th>
<th>SE</th>
<th>95% Confidence interval</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) effects ((X \rightarrow M))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Event</td>
<td>0.205***</td>
<td>0.050</td>
<td>0.107</td>
<td>0.303</td>
<td></td>
</tr>
<tr>
<td>Actor Effect ((a_A))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Event</td>
<td>-0.596***</td>
<td>0.135</td>
<td>-0.862</td>
<td>-0.331</td>
<td></td>
</tr>
<tr>
<td>Actor Effect ((a_A))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Event</td>
<td>0.115**</td>
<td>0.037</td>
<td>0.042</td>
<td>0.189</td>
<td></td>
</tr>
<tr>
<td>Partner Effect ((a_P))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Event</td>
<td>-0.429**</td>
<td>0.149</td>
<td>-0.721</td>
<td>-0.138</td>
<td></td>
</tr>
<tr>
<td>Partner Effect ((a_P))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) effects ((M \rightarrow Y))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actor Effect ((b_A))</td>
<td>-0.209*</td>
<td>0.088</td>
<td>-0.382</td>
<td>-0.036</td>
<td></td>
</tr>
<tr>
<td>Partner Effect ((b_P))</td>
<td>0.039</td>
<td>0.058</td>
<td>-0.074</td>
<td>0.153</td>
<td></td>
</tr>
<tr>
<td>(c') effects ((X \rightarrow Y))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Event</td>
<td>0.103</td>
<td>0.073</td>
<td>-0.040</td>
<td>0.247</td>
<td></td>
</tr>
<tr>
<td>Actor Effect ((c_{A1}))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Event</td>
<td>-0.077</td>
<td>0.158</td>
<td>-0.387</td>
<td>0.232</td>
<td></td>
</tr>
<tr>
<td>Actor Effect ((c_{A2}))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Event</td>
<td>-0.063</td>
<td>0.070</td>
<td>-0.201</td>
<td>0.074</td>
<td></td>
</tr>
<tr>
<td>Partner Effect ((c_{P1}))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Event</td>
<td>0.071</td>
<td>0.170</td>
<td>-0.263</td>
<td>0.405</td>
<td></td>
</tr>
<tr>
<td>Partner Effect ((c_{P2}))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Time on | | | | | | |
| Patient Intimacy | 0.001 | 0.002 | -0.004 | 0.005 |
| Partner Intimacy | 0.004 | 0.004 | -0.004 | 0.011 |
| Patient FOR | -0.014 | 0.015 | -0.044 | 0.016 |
| Partner FOR | -0.049* | 0.023 | -0.095 | -0.004 |

Note. \(X = \) Positive or Negative Relationship Event, \(M = \) Intimacy, \(Y = \) Fear of Recurrence,

\(a = \) Actor Effect, \(p = \) Partner Effect *p<0.05 **p<0.01 ***p<0.001
Paths not found to be significant in these analyses are depicted in grey in Figure 3.2. Although not depicted in the figure, analyses were run controlling for the progression of time over the study duration. Regarding controlling for time, significant effects were found only for the regression of partner FOR on day ($B = -0.05, p = .032$) indicating that partner ratings of FOR tended to decrease on average over the 10-day diary period.
Figure 3.2  Path Diagram of Constrained Multilevel APIMeM
Regarding the actor effects for the a paths, days on which a positive relationship event occurred predicted higher evening reports of momentary intimacy ($B = 0.21, p < .001$). Conversely, days on which a negative relationship event occurred predicted lower evening reports of momentary intimacy ($B = -0.60, p < .001$). Mirroring these actor effects, significant partner effects for the a paths were found for both the regression of intimacy on positive ($B = 0.12, p = .002$) and negative ($B = -0.43, p = .004$) relationship events.

Regarding the actor effects for the b paths, days on which patients or partners reported higher intimacy predicted significantly lower evening reports of FOR ($B = -0.20, p = .018$; Rate Ratio = 0.81), suggesting that both patients and partners experienced less FOR on evenings on which they felt more intimate with their partners. This effect reflected a 19% decrease in the reported rate of experiencing FOR for a one unit increase in intimacy. No significant partner effects for b paths were found for the regression of FOR on intimacy ($B = 0.04, p = .50$; Rate Ratio = 1.04).

Regarding the actor effects for the c’ paths, no significant actor effects were found for the relationship between FOR and positive ($B = 0.10, p = .16$; Rate Ratio = 1.11) or negative ($B = -0.08, p = .62$; Rate Ratio = 0.92) relationship events. Additionally, no significant c’ partner effects were found for the relationship between FOR and positive ($B = -0.06, p = .37$; Rate Ratio = 0.94) and negative ($B = 0.07, p = .68$; Rate Ratio = 1.07) relationship events.

Tests of mediated effects were carried out using procedures outlined by Bauer et al. (2006) and reported in Table 3.4. Indirect effects were computed directly as the product of a and b coefficients, while total effects were computed as the sum of both
actor and partner mediated pathways and the direct effect. The proportion of the mediated effect was calculated as the indirect effect divided by the total effect (see Table 3.4).

None of the total effects measuring the association between relationship events and FOR was significant. However, it is worth noting that it is possible to have mediation in the absence of a significant c path, particularly when the a and b paths have a moderate effect size, as c would consequently have an even smaller effect size (Kenny, 2012; Zhao, Lynch, & Chen, 2010).
Table 3.4  Results of Tests of Mediation

<table>
<thead>
<tr>
<th>Effect</th>
<th>Coefficient</th>
<th>Estimate</th>
<th>95% CI</th>
<th>Proportion of the Total Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive Relationship Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Actor Effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effect</td>
<td>$a_A l<em>b_A + \frac{a_p l</em>b_P + c_A}{l}$</td>
<td>0.151†</td>
<td>-0.006</td>
<td>0.308</td>
</tr>
<tr>
<td>Total IE</td>
<td>$a_A l<em>b_A + \frac{a_p l</em>b_P}{l}$</td>
<td>0.047*</td>
<td>0.009</td>
<td>0.085</td>
</tr>
<tr>
<td>Actor-Actor IE</td>
<td>$a_A l*b_A$</td>
<td>-0.043*</td>
<td>-0.082</td>
<td>-0.004</td>
</tr>
<tr>
<td>Partner-Partner IE</td>
<td>$a_p l*b_P$</td>
<td>0.005</td>
<td>-0.009</td>
<td>0.018</td>
</tr>
<tr>
<td>Actor Direct Effect $c'$</td>
<td>$c_A l$</td>
<td>0.103</td>
<td>-0.040</td>
<td>0.247</td>
</tr>
<tr>
<td><strong>Partner Effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effect</td>
<td>$a_A l<em>b_A + \frac{a_p l</em>b_P + c_P l}{l}$</td>
<td>0.095</td>
<td>-0.045</td>
<td>0.236</td>
</tr>
<tr>
<td>Total IE</td>
<td>$a_A l<em>b_A + \frac{a_p l</em>b_P}{l}$</td>
<td>0.032*</td>
<td>0.001</td>
<td>0.063</td>
</tr>
<tr>
<td>Actor-Actor IE</td>
<td>$a_A l*b_A$</td>
<td>0.008</td>
<td>-0.016</td>
<td>0.032</td>
</tr>
<tr>
<td>Partner-Partner IE</td>
<td>$a_p l*b_P$</td>
<td>-0.024†</td>
<td>-0.049</td>
<td>0.001</td>
</tr>
<tr>
<td>Partner Direct Effect $c'$</td>
<td>$c_P l$</td>
<td>-0.063</td>
<td>-0.201</td>
<td>0.074</td>
</tr>
<tr>
<td><strong>Negative Relationship Event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Actor Effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effect</td>
<td>$a_A 2<em>b_A + \frac{a_p 2</em>b_P + c_A 2}{l}$</td>
<td>0.219</td>
<td>-0.137</td>
<td>0.575</td>
</tr>
<tr>
<td>Total IE</td>
<td>$a_A 2<em>b_A + \frac{a_p 2</em>b_P}{l}$</td>
<td>0.141*</td>
<td>0.022</td>
<td>0.261</td>
</tr>
<tr>
<td>Actor-Actor IE</td>
<td>$a_A 2*b_A$</td>
<td>0.125*</td>
<td>0.011</td>
<td>0.239</td>
</tr>
<tr>
<td>Partner-Actor IE</td>
<td>$a_p 2*b_P$</td>
<td>-0.017</td>
<td>-0.063</td>
<td>0.029</td>
</tr>
<tr>
<td>Actor Direct Effect $c'$</td>
<td>$c_A 2$</td>
<td>-0.077</td>
<td>-0.387</td>
<td>0.232</td>
</tr>
<tr>
<td><strong>Partner Effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effect</td>
<td>$a_A 2<em>b_A + \frac{a_p 2</em>b_P + c_P 2}{l}$</td>
<td>0.184</td>
<td>-0.173</td>
<td>0.541</td>
</tr>
<tr>
<td>Total IE</td>
<td>$a_A 2<em>b_A + \frac{a_p 2</em>b_P}{l}$</td>
<td>0.113*</td>
<td>0.013</td>
<td>0.213</td>
</tr>
<tr>
<td>Actor-Actor IE</td>
<td>$a_A 2*b_A$</td>
<td>-0.023</td>
<td>-0.094</td>
<td>0.048</td>
</tr>
<tr>
<td>Partner-Partner IE</td>
<td>$a_p 2*b_P$</td>
<td>0.090†</td>
<td>-0.014</td>
<td>0.193</td>
</tr>
<tr>
<td>Partner Direct Effect $c'$</td>
<td>$c_P 2$</td>
<td>0.071</td>
<td>-0.263</td>
<td>0.405</td>
</tr>
</tbody>
</table>

Note: IE = indirect effect, †p<0.10  *p<0.05
Mediation of the actor-actor indirect effect in the regression of own FOR on own reports of positive relationship events was negative, indicating a decrease in FOR through the experience of increased intimacy, and was statistically significant (B = -0.43, p = .030). This effect was calculated to account for 28.4% of the variance in the relationship between patient/partner’s own FOR and own positive relationship events (see Table 4). Similarly, mediation of the actor-actor indirect effect in the regression of own FOR on own reports of negative relationship events was significant (B = 0.13, p = .032) and positive, indicating an increase of FOR through the experience of lessened intimacy. This effect was calculated to account for 57.0% of the variance in the relationship between patient/partner’s own FOR and own negative relationship events. Mediation analyses of partner-partner indirect effects in the regression of own FOR on own positive (B = -0.02, p = .06) and on own negative relationship events (B = 0.09, p = .09) showed a trend towards mediation by other partner intimacy. The proportions of variance explained in the relationship between patient/spouse’s own FOR and own perception of relationship events via reports of intimacy provided by the partner were calculated to account for 25.3% for positive events and 48.7% for negative events.
Chapter 4

DISCUSSION

Fear of recurrence (FOR) is a significant concern that persists many years after diagnosis, surgery, and treatment for breast cancer patients and their partners (Hodges et al., 2009; Hodgkinson et al., 2007). The present study sought to fill a gap in the literature on FOR and relational coping to cancer by investigating the link between daily relationship events, intimacy, and FOR. Specifically, we hypothesized that positive relationship events would allay fears of recurrence while negative relationship events would cause FOR to increase via effects on intimacy. We also explored whether the proposed mechanism held for both patients and spouses and whether it did so to the same degree. As data were modeled using a multilevel actor-partner interdependence mediation model (APIMeM; Ledermann et al., 2011), we also explored the possibility of partners affecting each other’s outcomes.

Our findings extend previous research by identifying relationship-specific predictors of FOR within the context of everyday lives of couples coping with cancer. We found that the occurrence of positive relationship events, independent of the occurrence of negative relationship events, predicted higher evening intimacy in patients with breast cancer and their partners. Increases in intimacy were, in turn, associated with lower FOR. We conversely found that the occurrence of negative relationship events, independent of the occurrence of positive relationship events, predicted lower intimacy and, in turn, higher FOR. As such, we found preliminary evidence to suggest that the
daily experience of both positive and negative relationship events can influence the experience of FOR in both breast cancer patients and their partners through concomitant changes to relational intimacy. We found intimacy to be a significant mediator of the association between a patient/partner’s own reports of daily relationship events and their experience of FOR. This may be because aspects of relationships like intimacy can have distress-alleviation regulatory functions during times of need (Bowlby, 1982; Mikulincer, Shaver, & Pereg, 2003). Indeed, close relationships have been found to have anxiety-relieving functions as interactions with important relationship figures that are available and responsive can help promote a stable sense of self and the notion of a “safe haven” in times of stress, thus helping individuals overcome perceived threats or obstacles (Bowlby, 1982). Relationships characterized by a lack of responsiveness or lack of intimacy, on the other hand, can intensify negative responses to events because of perceived unavailability of the partner (Bowlby, 1982).

We also found no significant effects for gender, suggesting that the relationships outlined above are the same for both breast cancer patients and their partners. Contrary to our hypotheses, we did not find significant partner effects for the relationship between intimacy and FOR, suggesting that changes to one partner’s feelings of intimacy do not necessarily relate to changes in the other partner’s FOR. Although not hypothesized, significant partner effects were found for the association between relationship events and intimacy, suggesting that despite a moderate to high degree of consensus between partners on the occurrence of positive ($r = .34$) and negative events ($r = .61$), partner perceptions uniquely affected patient intimacy and vice versa. Additionally, we found evidence, through marginally significant mediation effects, that points to cross-partner
mediation in the relationship of FOR and relationship events. These unhypothesized findings, if replicated and found to be robust in a larger sample, may be due to changes in actual and perceived partner responsiveness which subsequently influences intimacy.

It is of interest that both positive and negative relationship events predicted FOR, albeit through mediated pathways, and that both independently predicted intimacy. These findings suggest, as has been suggested elsewhere in the marital literature that, even when accounting for the effects of negative relational behaviors or events, positive relationship behaviors or events have the effect of relationship promotion and increased individual well-being. Conversely, accounting for the effects of positive relational behaviors or events, negative relationship behaviors or events can be detrimental to a relationship and individual well-being. Indeed, Gottman (1994) found that the ratio of positive-to-negative behaviors that occurs in flourishing marriages was 5.1 and only 0.77:1 in those that end up in divorce. While not nearly as precise as Gottman’s ratios, our results similarly suggest the importance of tipping the scales in favor of positive relationship behaviors in order for intimacy and well-being to thrive.

In sum, these findings clearly suggest the importance of considering aspects of close relationships, in particular intimacy, as predictors of the experience of women with early-stage breast cancer and their partners. These findings also suggest at the importance of including intimacy as a proximal target of interventions designed to alleviate FOR in cancer survivors and their partners.
4.1 Limitations and Conclusions

This study has some shortcomings. Firstly, our conceptualization of a positive relationship event was that of having a positive event with one’s partner, but this definition may not have been specific enough to capture particular relationship events nor broad enough to capture a wide range of possible positive relationship events. Similarly, our conceptualization of a negative relationship event was confined to having an argument with one’s partner. By leaving the participants to decide what constituted a relationship event, we hoped to capture what they considered to be positive and negative events. However, future studies looking at the effect that relationship events have on outcomes should consider presenting a fairly comprehensive list of relationship events. Not only would this clarify measurement concerns, it would allow discrimination of specific relationship events that may be important to the promotion of intimacy versus the progression of FOR.

Our operationalization of FOR also potentially limited the amount of variability in responses, as we utilized only the cancer worry subscale of the ASC. The decision to use this short measure was made in order to make the daily assessment as brief and as engaging as possible while reducing participant burden. Other measures such as the Concerns about Recurrence Scale (CARS; Vickberg, 2003), while longer, may be more inclusive by capturing other important facets of the experience of FOR.

Finally, an important component of mediational analyses is the temporal sequence of predictor, mediator, and outcome. To conduct a string test of a mediational mechanism, the occurrence of the predictor should precede that of the mediator which in turn should precede the occurrence of the predictor (McKinnon, Fairchild, & Fritz, 2007).
All our reports were gathered in a single evening assessment, so a clear temporal precedence cannot be cleanly set between FOR and intimacy. However, the relationship events are known to have occurred prior to the evening assessment so there is temporal precedence of the predictors over the mediator and outcome. Future studies should attempt to bolster the claim of directionality by measuring FOR after intimacy or by lagging the mediator.

Despite these shortcomings, the present study is valuable in that it expands the literature on the predictors of FOR beyond the more frequently examined medical and demographic predictors, and it provides evidence of the importance of characteristics of relationships to the daily experience of FOR in patients with breast cancer and their partners.
REFERENCES


Cox, C. R., & Arndt, J. (2012). How sweet it is to be loved by you: The role of perceived regard in the terror management of close relationships. *Journal of personality and social psychology, 102*(3), 616.


Appendix
IRB APPROVAL
DATE: September 22, 2009

TO: Jean-Philippe Laurenceau, Ph.D.
FROM: University of Delaware IRB

STUDY TITLE: [134656-1] Couples Coping with Cancer
IRB REFERENCE #: 
SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED
APPROVAL DATE: September 22, 2009
EXPIRATION DATE: September 21, 2010
REVIEW TYPE: Expedited Review

Thank you for your submission of Continuing Review/Progress Report materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.
If you have any questions, please contact Elizabeth Peloso at 302-831-8619 or epeloso@udel.edu. Please include your study title and reference number in all correspondence with this office.