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Interdependence in Women with Breast Cancer and their Partners: An Inter-Individual Model of Distress

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Abstract

Objective—The aim of this investigation was to test whether interdependence in dyads living with breast cancer could account for person-partner crossover effects in distress outcomes.

Method—The sample consisted of 95 dyads with early-stage breast cancer. By using reciprocal dyadic data from women with breast cancer and their partners, we fit a structural equation model (SEM) of the actor-partner interdependence model (APIM) to examine the interaction of participants' depression and stress in predicting their partner's health outcomes.

Results—Results revealed a pattern of influence whereby the interaction of high levels of depression coupled with high levels of stress in women with breast cancer was associated with lowered physical health and well-being in their partners. Although depression seemed to be the key mechanism in predicting distressing outcomes, when depression is combined with any additional stress, the level of physical distress was significantly greater. Results provided preliminary empirical support for crossover effects in the physical well-being of close relational partners in a cancer-related context. Further, results showed that distressing outcomes do not have to be limited to emotional distress, but can also include physical distress.

Conclusions—The findings from this study illustrate why it is not sufficient to concentrate care solely on the patient with cancer. Monitoring the social well-being of patients as they go through the cancer process could be as important as assessing their psychological state or other peripheral biomarkers. This line of inquiry would be advanced by including methods other than self-report to assess psychological and physical health.

The diagnosis and treatment of breast cancer involves substantial stress for patients and affects the well-being of their larger social networks. A multitude of psychosocial stressors occur, such as adjustments in social and family roles, worries about changes in appearance or attractiveness, anxiety about the spreading or recurrence of cancer, and fear of death (Manne et al., 2004). Psychological distress is a significant problem for cancer patients and their partners because it negatively affects other aspects of their quality of life (Ell, Sanchez, & Vourlekis, 2005; Northouse et al., 2007). Social support, especially from family members, is associated with lower psychological distress in patients with breast cancer (Baider et al., 2004). However, partners may have difficulty providing social support because of their own distress (Grunfeld et al., 2004). Approximately 30% of caregivers or partners experience significant emotional distress (Hagedoorn, Sanderman, Bolks, Tunistra, & Coyne, 2008).

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Emotional distress and quality of life indicators are highly correlated between women with breast cancer and their partners (Hagedoorn et al., 2008; Northouse et al., 2007). Partners often experience the same, and sometimes *higher*, levels of emotional distress as cancer patients themselves (e.g., Manne et al., 2006). Broadly, the *systems theory* concept of interdependence predicts that major events such as serious illness affect the larger family and social networks, and not just the ill individual. More specifically, *family systems theory* (Broderick, 1993) predicts that close network members (e.g., kin, spouses) experience increases in distress as the family member with major illness becomes more distressed, reflecting interdependence within the family system. Such findings highlight the need to focus on the distress experienced by the dyad, rather than only the individual, living with cancer. Therefore this study investigates how interdependence during cancer contributes to a dyadic, or inter-individual, model of distress.

Modeling interdependence requires special data analytic approaches, and the Actor-Partner Interdependence Model (APIM; Cook & Kenny, 2005) represents a versatile approach to modeling dyadic data. Several studies using the APIM to examine interdependence among married couples living with breast cancer have documented the interdependence of psychosocial variables and adjustment among couples living with cancer, and that negative outcomes are often evident for partners of the person with cancer (Dehle & Weiss, 2002; Northouse, Templin, & Mood, 2001). Therefore the aim of this investigation is to test whether interdependence in patients and partners is expressed by crossover effects in distress. In testing an inter-individual model of distress, we expected that interdependence in close relationships might manifest as person-partner crossover effects for distress. Stress associated with a close partner's diagnosis and treatment of cancer could be a risk factor that produces a greater level of interdependence in the adjustment of couples living with cancer. An inclusive focus on patient-partner distress would allow for better understanding of how women with breast cancer and their partners contribute to each other's well-being throughout the experience of cancer.

The potential of dyadic interdependence and crossover in distress outcomes will be tested by using the APIM (Cook & Kenny, 2005). The fundamental concept of the actor-partner interdependence model is that the dyad is treated as the unit of analysis and participants' scores on various independent variables are used to predict both their own (actor effects) and their partners' (partner effect) scores on the dependent variable, after taking into account the dyad's interdependence on the independent variable. In the present investigation, participants' depression and stress will be treated as the predictor variables, and measures of physical well-being will serve as the dependent variable.

Method

Participants

Participants in this study were part of a larger investigation of interpersonal counseling interventions for women with breast cancer and their partners (see Badger et al., 2005) and only those details relevant to the present analyses are included here. Participants were recruited from a regional cancer center, oncologists' offices, and support groups. Eligibility criteria for this study were (a) diagnosis of Stage I–III breast cancer in a primary episode, (b) currently receiving adjuvant treatment for breast cancer, and (c) a partner willing to participate in the investigation.

The sample consisted of 95 dyads living with breast cancer. The women with breast cancer were on average 54.11 years ($SD = 10.60$), and the ethnic composition was 85% White, 14% Hispanic, and 1% another race/ethnicity. In terms of disease progression, 33% had stage I breast cancer, 53% stage II, and 14% stage III. For treatment of cancer, 75% were receiving chemotherapy, 54% radiation therapy, and 36% were on hormone blocking therapy. Many

women were receiving multiple therapies; thus the percentages for treatment do not equal 100%.

Each woman with breast cancer was asked to nominate a partner for participation in the study. They were informed that this individual could be any person whom they felt was a significant person in their coping and recovery. The inclusion of members of the social network other than spouses was allowed, and is consistent with related investigations of women's recovery from or coping with breast cancer (e.g., Grunfeld et al., 2004).

Partners were on average 51.68 years ($SD = 14.83$); 74% were male and 26% were female. Similar to patients, 87% of the partners were White and 12% were Hispanic. Partners' relationship to the cancer patient was: 63% husbands, 14% "significant other," 17% daughters, 3% friends, and 3% indicated some other relationship (e.g., cousin, sister).

Procedure

Shortly after recruitment, trained nurse counselors contacted the women and their partners by telephone to complete a baseline data assessment of variables described in the *Measures* section. It is important to note that the data presented in this report were collected before any intervention actually commenced.

Measures

Depression was measured using the 20-item Center for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977). Scores above 16 are considered positive for depression. Thirty-two percent of the women in this study scored above this range at the baseline assessment. This scale was internally consistent for both women and their partners ($\alpha = .90$), with means (and standard deviations) of 13.5 (11.10) and 14.7 (9.50), respectively.

Stress was measured using the 25-item Index of Clinical Stress (ICS; Abnell, 1991). This questionnaire was designed to assess the amount of personal stress respondents feel they are currently experiencing. This scale was internally consistent for women and their partners ($\alpha = .96$ and $.94$), with means and (standard deviations) of 62.5 (28.17) and 57.3 (26.15), respectively.

Physical Health was measured using the 12-item Short Form Health Survey (MOS SF-12; Ware, Kosinski, & Keller, 1996). Participants were asked to assess whether their physical health had limited them over the past four weeks in moderate or higher-intensity activities, and how much pain interfered with daily tasks. High scores indicate less dysfunction, impairment, or pain. The four physical well-being subscales (physical functioning, role-physical, bodily pain, and general health) were combined to create a global measure of physical health and well-being (Ware et al.), with reliabilities of ($\alpha = .76$ and $.75$), and means and (standard deviations) of 56.82 (26.77) and 78.10 (21.29), for women and their partners respectively. The modest internal consistency does not attenuate the results given the latent variable analyses (Little, Lindenberger & Nesselroade, 1999).

Planned Analyses

According to an intra-individual model of distress, actor effects are an individual's own characteristics (and possibly interactions among these characteristics) predicting that individual's health outcomes. We expected that depression and stress would each predict poorer health within a person (actor effects). Adapting an inter-individual model of distress, we use the APIM to account for relational interdependence. In this way, the APIM uses reciprocal dyadic data to evaluate across-person (partner) effects; here examining whether

depression and stress (and their interaction) in women with breast cancer predict partners' distress, and vice versa.

Data were analyzed using a structural equation model (SEM) representation of the APIM (using Lisrel 8.8). We fit several successive models: (1) an initial Confirmatory Factor Analysis in which we evaluated measurement invariance across partners, obtained preliminary information regarding latent correlations, and a baseline model fit; (2) an APIM SEM in which we evaluated actor and partner main effects among the latent variables (i.e., women and their partner's depression and stress predicting their own and their partners' physical health); and (3) an APIM SEM with interaction effects (see Figure 1) to evaluate whether women and their partners' stress moderates associations between depression and distress.

Results

Confirmatory Factor Analysis Model

We fit an initial Confirmatory Factor Analysis (CFA) to achieve three goals: 1) to evaluate equivalence of measurement across women and their partners, 2) to evaluate bivariate associations among the variables of interest, and 3) to examine the fit of this model both to evaluate the adequacy of our measurement model and to provide a baseline for subsequent structural models. We fit an initial CFA using three parceled indicators of each construct using an item-to-construct balanced method of parceling, supported by preliminary exploratory factor analyses supporting the unidimensionality of each construct (Little, Cunningham, Shahar, & Widaman, 2002). This initial model fit the data adequately ($\chi^2_{(120)} = 187.9$, RMSEA = .069_(.045-.091), CFI = .98) according to most criteria (e.g., Kline, 2005), and inspection of modification indices did not suggest any changes to the model. From this model, we next constrained the factor loadings equal across partners in order to evaluate the equivalence of measurement across partners (Olsen & Kenny, 2006). This restriction did not change the fit of the model ($\Delta\chi^2_{(6)} = 5.61$, *ns*), supporting the equivalence of measurement of these constructs across partners.

These latent correlations among women and their partners' depression, stress, and physical health are shown in Table 1. From this table it can be seen that depression, stress, and poor physical health are substantially correlated within persons. Moreover, we see that women and their partner's have medium similarity in these variables (latent *r*s = .37, .36, and .37, respectively). These similarities indicate the importance of considering the interdependence between women and their partners, our focus in the next section.

Actor-Partner Interdependence Models

We next evaluated an SEM APIM in which women and their partners' depression and stress predicted women and their partners' health. The unique contribution of analyzing these dyadic data within the APIM is the consideration of within- and between-person predictions (i.e., actor and partner effects). The resultant model fit the data well ($\chi^2_{(128)} = 208.1$, RMSEA = .074_(.052-.095), CFI = .98). Examination of latent regression coefficients indicated significant within-person (i.e., actor) effects whereby depression strongly predicted lower health among both the women ($\beta = -.95$) and their partners ($\beta = -.93$). Stress did not significantly predict depression within persons. We did not find evidence of partner effects for depression or stress predicting the other's health.

We next evaluated four latent interaction terms: (a) women's depression X women's stress (within-person interaction); (b) partner's depression X partner's stress (within-person interaction); (c) women's depression X partner's stress (across-person interaction); and (d) partner's depression X women's stress (across-person interaction). Latent interactions were

indicated by orthogonalized product terms from the parcels of relevant indicators (see Little, Bovaird, & Widaman, 2006). This model fit the data marginally well ($\chi^2_{(1290)} = 2943.0$, RMSEA = .084_(.078-.091), CFI = .89), and significantly better than a nested model containing these interactions with predictive paths fixed to zero (i.e., no interaction effects; $\Delta\chi^2(8) = 460.23$, $p < .0001$). Inspection of modification indices did not suggest changes to the model. Two significant interactions were evident. The first was the interactions of women's depression and stress in predicting their partners' health ($\beta = .35$, $p < .01$). Follow-up analyses indicate that the relation between women's depression and their partners' health is most strongly negative when the women experience high stress. The second significant interaction involved women's depression and their partner's stress predicting the partner's health ($\beta = -.31$, $p < .05$). Again, the negative association between women's depression and their partners' health is strongest when the partner experiences high stress. The results of this APIM are summarized in Figure 1, with this model fitting the data well for the main effects model and marginally for the interaction effects model (and better when interaction effects were constrained to zero).

Discussion

This is, to our knowledge, the first study to test an inter-individual model of distress in patients and partners with cancer by incorporating a dyadic and interdependent dimension to distressing health outcomes. The results provide preliminary empirical support for crossover effects in the physical well-being of close relational partners in a cancer-related context. By testing the hypotheses with dyadic data, we were able to document a pattern of influence whereby the interaction of high levels of depression coupled with high levels of stress in women with breast cancer was significantly associated with lowered physical health and well-being in their partners.

The depreciation of partners' physical health complements the psychosocial stress and health literature by illustrating that psychological disturbances (i.e., depression and stress) are negatively associated with physical health and well-being. A reasonable explanation for this finding is that the partners' physical health suffers due to increased activation of stress, which agitates normal physiological processes and creates disturbances in physical health. Accordingly, this investigation yielded a contemporary advancement to a well-established notion of intra-individual distress during cancer. In so doing, we were able to capture the essential building blocks of distress, and revamp it from a traditionally individualized perspective, to an inter-individual model that complements the social context in which interdependence between close relationship partners occurs, and from where distress can often emerge.

It should be noted, that there were no partner effects for stress predicting physical health. Ironically, in the within-person analyses, the interaction of depression and stress on physical health outcomes were unremarkable (only depression was able to predict one's own health outcomes). However the addition of a dyadic (i.e., between-persons) dimension in distress outcomes revealed significantly lower health and well-being for partners. Although depression seemed to be the key mechanism in predicting distressing physical health outcomes, our results showed that when depression is combined with any additional stress, the level of physical distress becomes significantly greater.

One limitation to the current study is that the final model provided an adequate but not particularly strong fit to the sample data. Also, the sample size of this study precluded detection of weak effects. According to Kenny, Kashy, and Cook (2006) the minimum N needed for sufficient power (80%) to detect a small effect is 783 dyads. However, our sample size just exceeded the critical minimum number of participants to be able to test for medium to large effects ($N = 90$ dyads). Nevertheless, by using reciprocal dyadic data and the APIM test an

inter-individual model of distress, these results provide compelling evidence that dyadic interdependence can account for crossover effects in distress in close relationships. This is the first study to take an interdependent approach to what is normally considered an individualized development of distress, and support the idea of an inter-individual model of distress empirically. Our results provide a more realistic model of the interpersonal context in which the development of distress among partners occurs. Further, we were able to show that the distressing outcomes do not have to be limited necessarily to emotional distress, but can also include physical distress.

The findings from this study illustrate why it is not sufficient to concentrate care solely on the patient with cancer. Monitoring the social well-being of patients as they go through the cancer process could be as important as assessing their psychological state or other peripheral biomarkers. This line of inquiry would be advanced by also including methods other than self-report to assess psychological and physical health. This study has shown that partners of cancer patients are significantly affected by their loved one's distress, and can experience that distress on a physical level. Our findings suggest that cancer patients' heightened depression and stress not only predicts their own compromised health, but the health and physical well-being *of their partners*, is also at stake.

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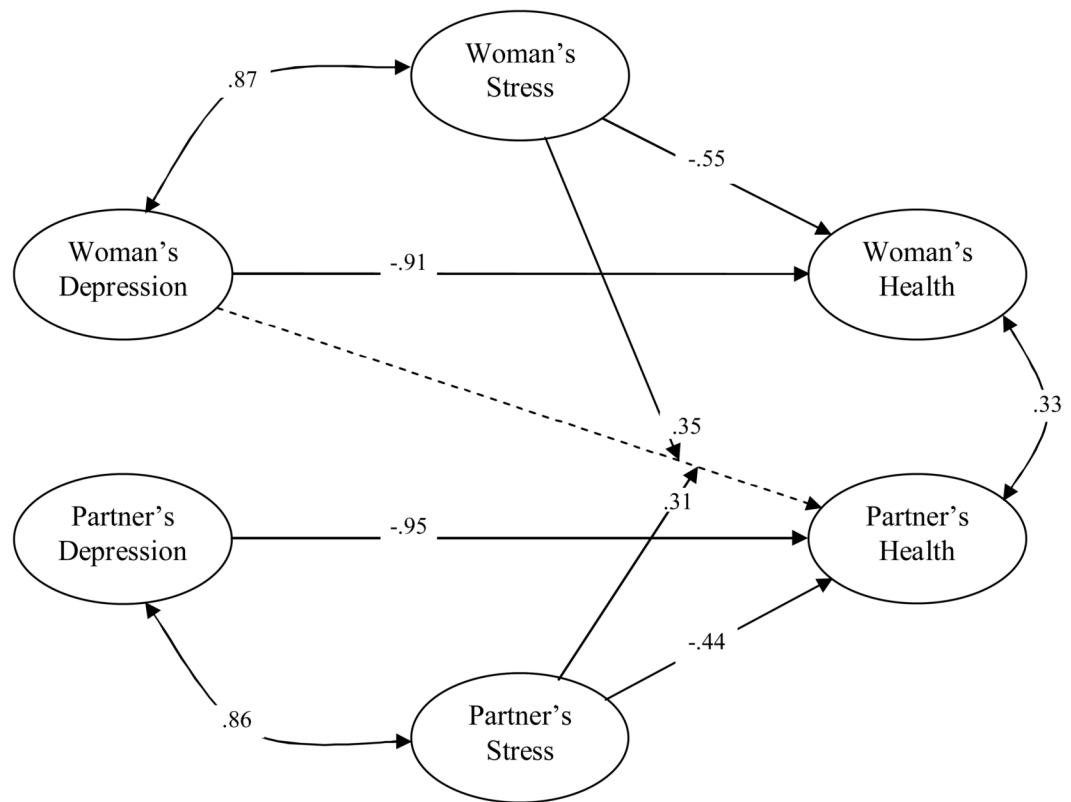


Figure 1.

Results of model of associations among women and their partners' depression, stress, and physical health.

Note: Values shown are standardized parameter estimates. All paths shown are significantly different from zero ($p < .05$), with the exception that nonsignificant main effects that were significantly moderated shown with dashed lines. Model imposes measurement invariance across partners. Model fit: $\chi^2_{(1290)} = 2943.0$, RMSEA = .084(.078–.091), CFI = .89.

Interclass Correlations of Within and Between-Dyad associations of Depression, Stress, and Physical Health of Women with Breast Cancer and their Partners

Table 1

	Woman Depression	Woman Stress	Woman Health	Partner Depression	Partner Stress	Partner Health
Woman Depression	—					
Woman Stress	.85***	—				
Woman Health	-.48**	-.45**	—			
Partner Depression	.36**	.34**	-.18 ($p = .091$)	—		
Partner Stress	.36**	.34**	-.19 ($p = .067$)	.82**	—	
Partner Health	-.18 ($p = .086$)	-.16 ($p = .111$)	.22*	-.20*	-.27**	—

Note.

* $p < .05$.

** $p < .01$.

*** $p < .001$.