

A Feasibility Study of an Uncertainty Management Intervention for Patient–Partner Dyads Experiencing Breast Cancer

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OBJECTIVES: To examine the feasibility, acceptability, and effects of a dyad-based uncertainty management intervention for breast cancer, including tailored information and coping skills training.

SAMPLE & SETTING: 16 patient–partner dyads experiencing breast cancer were enrolled from a midwestern comprehensive cancer center.

METHODS & VARIABLES: A single-group pre-/post-test design was used, and descriptive statistics and Cohen's *d* were calculated. Measures were completed before the intervention and during each treatment cycle. Feasibility, acceptability, fidelity, uptake, and outcome variables (uncertainty, dyadic coping, family functioning) were included.

RESULTS: 16 dyads were enrolled during a 13-month period; 15 dyads completed the training for the study, and 13 dyads completed all study activities. Overall, participants reported satisfaction with the intervention. Small to medium effect sizes were observed across the outcomes.

IMPLICATIONS FOR NURSING: This study highlights the need for nurses to help couples manage uncertainty related to new cancer treatment. Tailored interventions can allow nurses to use their time efficiently by focusing on an individuals' actual needs.

KEYWORDS patient–partner dyads; uncertainty management; intervention; breast cancer; feasibility

Patients may experience multiple psychosocial responses while undergoing treatment for breast cancer, including uncertainty. Uncertainty is the inability to determine the meaning of illness-related experiences, such as cancer diagnoses, treatment options, side effects, and healthcare environments, because of the random, complex, and unpredictable nature of illness (Mishel, 1981, 1988). Uncertainty has been associated with negative outcomes in patients with breast cancer, including emotional distress, poor psychological adjustment, diminished quality of life, and symptom burden (Ahadzadeh & Sharif, 2018; Hall et al., 2014; Kim et al., 2012; Knopf, 2007; Sammarco, 2001). Unrelieved uncertainty can increase the need for emergency care (Rising et al., 2016, 2019).

Uncertainty mutually influences the patient–partner dyad and can affect dyadic coping. The physical and emotional support of partners is important to patients' physical recovery and psychological functioning (Hilton et al., 2000; Zahlis & Lewis, 2010, Zimmerman, 2015). According to Northouse et al. (1995), partners experience slightly greater uncertainty but receive less support than patients with breast cancer. Partners with unrelieved uncertainty have reported decreased psychosocial well-being and quality of life, diminished dyadic coping, and altered family functioning (Northouse et al., 1998; Rolland, 2005; Senatore, 2013; Song et al., 2011, 2012). Challenges of a cancer diagnosis and treatment may also threaten reciprocal support, joint problem solving, and emotional strategies that are necessary for effective dyadic coping (Rottmann et al., 2015; Traa et al., 2015). Changes in the patient–partner dynamic can affect the entire family system (Friedman et al., 2003). Cancer often disrupts the daily routines of families, as

well as their ability to plan for the future, and high uncertainty associated with a cancer diagnosis can weaken family functioning (Northouse et al., 1998; Schmitt et al., 2008; Woźniak & Iżycki, 2014). Because of the interdependence between patients' and partners' experiences of coping with cancer (Falconier & Kuhn, 2019), a couple-based uncertainty management intervention (UMI) may improve dyadic coping and family functioning more than patient-centered interventions alone.

Previous systematic reviews of couple-based interventions identified various strategies for improving coping, sexuality, and quality of life among couples facing cancer, including psychoeducation, skills training, and therapeutic counseling (Li & Loke, 2014); cognitive behavioral therapy, behavioral marital therapy, and emotion-focused therapy (Badr & Krebs, 2013); and couple-based communication (Li et al., 2020). These reviews found that patients and partners reported improvements in quality of life, psychosocial distress, sexual functioning, and marital satisfaction, as well as improvements in patients' physical health and partners' perceptions of their sexual relationships (Badr & Krebs, 2013; Li et al., 2020; Li & Loke, 2014). However, none of the interventions studied in these systematic reviews used Mishel's uncertainty in illness theory or were designed to address dyadic

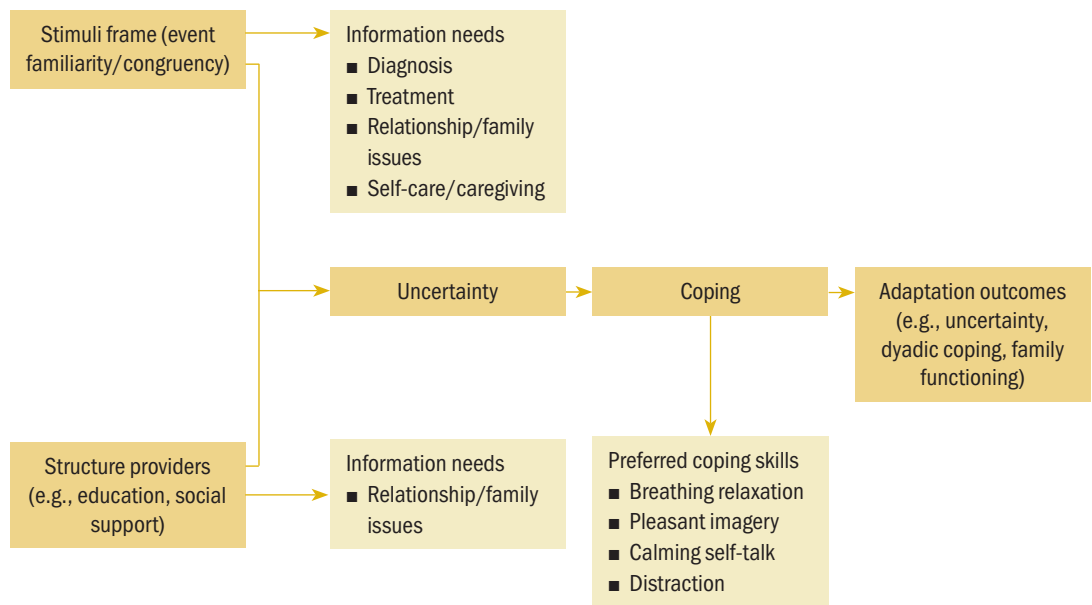
uncertainty. Previous studies have demonstrated the beneficial effects of UMIs that provide standardized information and training on coping strategies (Bailey et al., 2004; Germino et al., 2013; Gil et al., 2006; Mishel et al., 2005, 2009). Although a few previous studies included partners in their interventions, they did not measure dyad- or family-level outcomes or tailor the intervention's content to the needs of both patients and partners (Northouse et al., 2005, 2007, 2013).

This study addresses three major gaps in managing uncertainty among patient-partner dyads experiencing cancer. Few previous UMIs have targeted the patient-partner dyad, and none have measured dyad- or family-level outcomes. In addition, previously developed UMI content was not tailored to the individual needs of patients and partners. Because both dyad members may experience negative effects of uncertainty, a dyad-focused UMI was developed based on Mishel's uncertainty in illness theory to help patients and partners to manage uncertainty, promote joint coping efforts, and improve or maintain family functioning.

Theoretical Framework

Mishel's uncertainty in illness theory has previously guided UMI efforts in patients with cancer, patients

FIGURE 1. Intervention Framework



Note. Based on information from Mishel, 1988.

awaiting liver transplantation, and patients with chronic obstructive pulmonary disease (Bailey et al., 2017; Jiang & He, 2012). Mishel's theory explains how people cognitively process illness-related stimuli and construct meaning in such situations. Stimuli frame refers to the degree to which the illness trajectory is patterned, familiar, and congruent with expectations. Structure providers refers to healthcare providers and other credible authorities, social support, and education, which facilitate understanding of the situation. Structure providers view the partner as someone in the patient's social network who can help them to interpret illness-related stimuli. For each stimulus, individuals appraise the illness-related event as a danger or an opportunity and adapt to that event using different coping strategies (Mishel, 1988).

The UMI in the current study included two main components based on Mishel's theory: information targeting antecedents of uncertainty, including lack of knowledge and social support between dyad members, and training in cognitive-behavioral coping strategies (see Figure 1). Information can help patients and partners to understand the cancer experience and common uncertainty triggers and promote mutual support. Dyads can use information to interpret illness-related events and communicate with each other, as well as their healthcare provider, which may allow for restructuring of beliefs and expectations. Cognitive-behavioral strategies can include breathing relaxation or imagery exercises, which can manage tense muscles and alleviate hyperventilation or feelings of unease, as well as instructions for calming self-talk and distraction (e.g., book or word game), which can limit intrusive thoughts and control anxiety and fear (Germino et al., 2013; Gil et al., 2006; Mishel et al., 2005, 2009).

Tailored interventions may be more effective than generic interventions (Beck et al., 2010); therefore, information and coping strategies in the current study's UMI were tailored to the needs and preferences of each dyad member as theory-driven pathways to reduce uncertainty. Patients and partners may differ in their information and coping strategy needs, and tailoring can avoid providing excessive or undesired content (Adams et al., 2009; Ben-Zur et al., 2001; Rutten et al., 2005). This study extends a theory-based UMI to patient-partner dyads experiencing uncertainty in the context of breast cancer and evaluates family- and dyad-level outcomes, including feasibility and acceptability (Zhang, 2017). This knowledge is essential for developing a UMI that addresses couples' uncertainty management needs and promotes

adjustment to the cancer experience while providing preliminary data for larger randomized controlled trials on UMIs. The brief tailored UMI is designed to be achievable, allowing sustainable implementation in oncology nursing practice. The specific aims of this study were to (a) test the feasibility and acceptability of the dyad-based UMI; (b) evaluate study processes, intervention fidelity, and intervention uptake; and (c) describe the UMI's effects on uncertainty, dyadic coping, and family functioning.

Methods

Design

This study used a single-group, longitudinal pre-/post-test design for a dyad-based UMI in patients newly diagnosed with breast cancer and their partners. Because of the innovative nature of the dyad-based UMI, its feasibility and study procedures were tested prior to investing resources into a randomized controlled trial (Onken et al., 2014). The nurse principal investigator (PI) delivered the UMI during the first three cycles of treatment. Participants provided baseline data prior to completing training for the study and provided follow-up data one day before each of the four treatment cycles (study duration 9–12 weeks). The study was approved by the institutional review board at the University of Wisconsin (UW)–Madison Health Sciences Schools.

Sample and Setting

Participants were recruited from the UW–Madison Carbone Cancer Center (UWCCC). Patients were eligible if they were aged 18 years or older, diagnosed with invasive nonmetastatic breast cancer within the past six months, and receiving chemotherapy. Patients were not eligible if they had undergone more than three treatment cycles or had a prior history of cancer. Partners were eligible if they were in a romantic relationship and cohabitating with the patient and did not have a personal history of cancer. Patient-partner dyads could be married or unmarried and of the same or different sex. Both patients and partners had to be able to speak and read in English. After six months of limited recruitment, eligibility was expanded to include patients who were receiving any cancer treatment (e.g., hormonal therapy, chemotherapy).

Intervention

The dyad-based UMI consisted of information provision and coping skills training tailored to the needs and interests of each dyad member (see Figure 2). An

investigator-developed checklist was used to assess the information needs of dyads regarding cancer diagnoses, treatment concerns, patient-partner or family issues, and self-care or caregiving. Preferences were assessed for cognitive-behavioral coping strategies, such as breathing relaxation, imagery exercises, calming self-talk, and distraction (Germino et al., 2013; Gil et al., 2006; Mishel et al., 2005). Coping strategies were introduced with a basic description of the strategy; its benefits were not introduced until the in-person training session. The breathing

relaxation and imagery exercises were developed for and tested in previous trials of symptom clusters in patients with cancer and were found to have good acceptability (Kwekkeboom et al., 2010, 2012). The exercises were provided in a Waveform Audio File Format (.wav) that was compatible with Microsoft® Windows, Android, and MacOS. A tailored uncertainty management manual was then developed that included printed materials from the American Cancer Society and the National Cancer Institute, as well as instructions and materials on how to implement the

FIGURE 2. Intervention Components and Tailoring Measures

Information Provision

Participants selected from information topics based on their needs and interests.

- Diagnosis-related information
 - What is breast cancer?
 - Types of breast cancer
 - What are the risk factors?
 - Causes of breast cancer
 - Signs and symptoms
 - Diagnosis methods
 - Staging
 - Survival rate by stage
- Treatment-related information
 - How is breast cancer treated?
 - Surgery
 - Lymph node surgery and side effects
 - Radiation therapy
 - Common chemotherapy drugs
 - How is chemotherapy administered?
 - Side effects of chemotherapy
 - Hormone therapy
 - Targeted therapy
 - Treatment by stage
- Relationship and family-related information
 - Emotional aspects of breast cancer
 - Talking to family members about cancer
 - Helping children to cope with a family member's diagnosis and cancer treatment
 - Sexuality for women with cancer
 - Sex and chemotherapy or hormone therapy
 - Effects of surgery on sexuality
 - Dealing with sexual problems
 - Pregnancy after breast cancer
 - Facing cancer with your partner
- Patient self-care information
 - Nutrition
 - Lifestyle changes
 - Working during and following treatment
 - How to manage side effects of chemotherapy

- Finding local resources for support
- Partner caregiving information
 - What do caregivers do?
 - Communication tips
 - Making health-related decisions as a caregiver
 - Understanding the cancer experience as a caregiver
 - Managing multiple family roles
 - Taking care of yourself
- The nurse interventionist does the following:
 - Provides dyad with information on uncertainty during the cancer experience
 - Provides dyad with an introduction to the information manual
 - Reviews each information topic
 - Demonstrates how to look up information in the manual and obtains return demonstration

Coping Strategies

Participant selected from various types of coping strategies based on their preferences.

- Breathing relaxation (3 audio recordings): jaw relaxation, progressive muscle relaxation, focused breathing
- Imagery exercises (3 audio recordings): mountain imagery, beach imagery, country meadow imagery
- Calming self-talk (written instruction)
- Distraction (a list of distraction activities)
- The nurse interventionist does the following:
 - Explains why coping strategies are necessary
 - Reviews coping strategies based on the participant's preference
 - Familiarizes participants with each of the coping strategies by asking them to write down their answers to the prompt questions, such as "what guided imagery might you like?"
 - Encourages patients and partners to talk with each other and make plans for using coping strategies
 - Transfers audio recording to participant's mobile device and asks them to demonstrate how to find it

selected cognitive-behavioral coping strategies. The investigators met with dyads to provide the following training: (a) overview of cancer-related uncertainty, (b) introduction to selected information topics, (c) description and demonstration of how to use the coping strategies on personal mobile devices, and (d) personalized recommendations for daily intervention use. Joint training was provided for both dyad members to facilitate sharing of questions and concerns. If selected, recordings of the relaxation and imagery exercises were transferred to participants' personal mobile devices. Participants were encouraged to read the information at their own pace and to use the coping skills whenever they were feeling distressed by uncertainty, particularly when they encountered uncertainty triggers, such as preparing for a computed tomography scan, waiting for an appointment, or seeing a news report about patients with cancer.

Measures

Demographic information was self-reported by participants. Patients' medical information was obtained from the electronic health record.

Feasibility and acceptability: To assess recruitment feasibility, the number of dyads screened for eligibility and enrolled (recruitment rate), as well as how many participants were trained, completed the study activities (retention rate), and withdrew from the study, were logged. Reasons for declining participation and withdrawal were also recorded. A priori, feasibility was defined as the ability to recruit 30 dyads within one year, with a recruitment rate of 25% or higher, an in-person training session completion rate of 75% or higher, a retention rate of 70% or higher, and a missing data rate of 15% or lower (Trivedi et al., 2013). Participants rated acceptability, including enjoyment and satisfaction, acceptability of the study procedures and flow, and perceived helpfulness, during the last follow-up visit. Adverse events and comments were ascertained through open-ended questions during each patient contact.

Process evaluation: The PI completed a nine-item process evaluation of the in-person training that recorded the session setting, the number of participants, interruptions, the length of each training component, the perception of each participant's engagement during training, requests for reinforcement from participants, interactions between dyad members, and overall subjective impression of training quality (on a scale ranging from 1 [excellent] to 4 [poor]).

Intervention fidelity and uptake: With participants' permission, training sessions were recorded and reviewed by a research assistant using a checklist of essential steps and components to evaluate the fidelity of the intervention's delivery. Participants recorded their use of information and coping strategies from the UMI using weekly logs.

Outcomes: Patients' uncertainty was measured using Mishel's Uncertainty in Illness Scale for Adults (MUIS-A), which has a Cronbach alpha ranging from 0.67 to 0.85. Partners' uncertainty was measured using a modified version of the Parents' Perception of Uncertainty in Illness Scale (PPUS) for family members by changing the word "child" to "partner" throughout. The PPUS has a Cronbach alpha ranging from 0.42 to 0.72 (Mishel & Epstein, 1997). Perceptions of dyadic coping for patients and partners were measured using the Dyadic Coping Inventory, which has a Cronbach alpha ranging from 0.92 to 0.97 in patients and 0.91 to 0.96 in partners (Ledermann et al., 2010). Family functioning was assessed using the general functioning scale of the McMaster family assessment device, which has a Cronbach alpha ranging from 0.58 to 0.9 in patients and 0.85 to 0.96 in partners (Miller et al., 1985). The validity of the MUIS-A, PPUS, Dyadic Coping Inventory, and McMaster family assessment device has been demonstrated in previous studies (Ledermann et al., 2010; Miller et al., 1985; Mishel & Epstein, 1997). For each scale, higher scores indicate higher levels of uncertainty and dyadic coping and lower levels of family functioning.

Procedures

Clinical staff from the UWCCC breast center referred patients to the PI, who met with patients and partners during a clinic visit, explained the study, and obtained written informed consent. If partners were not present during the clinic visit, patients were instructed to take home the study brochure, consent form, and recruitment and baseline questionnaires to share and consider with their partner. The PI called the dyads within seven days to discuss study participation and answer any questions. Demographic information and the tailored investigator-developed checklist were collected in person at recruitment. Participants completed the questionnaires at home at baseline (before training) and the day before each of the four treatment cycles. Dyads completed joint in-person training with the PI 3–14 days before the next treatment cycle at a location convenient to the dyad, which allowed dyads to familiarize themselves with the intervention before their next treatment cycle. During the study, the PI

TABLE 1. Sample Characteristics by Group

Characteristic	Patients (N = 15)			Partners (N = 15)		
	\bar{X}	SD	Range	\bar{X}	SD	Range
Age (years)	53	13.37	30-74	53	12.58	27-69
Number of children	2	-	0-6	2	-	0-6
Length of relationship (years) ^a	-	-	-	29	13	1-49
Time since diagnosis (months)	2.07	1.28	1-6	-	-	-
Characteristic			n			n
Religious belief						
Yes			14			12
No			1			3
Employment status						
Full-time			8			8
Part-time			2			3
Retired			3			3
Other			2			1
Education level						
Some college or less			5			4
Associate degree			2			1
Bachelor's degree or more			8			10
Family income (\$)						
Less than 50,000			4			3
50,000-99,000			5			5
More than 99,000			6			7
Cancer stage						
I			3			-
II			9			-
III			3			-
Treatment						
Chemotherapy			11			-
Hormonal therapy			3			-
Combination			1			-
Treatment cycle						
Every 4 weeks			9			-
Every 3 weeks			6			-
Timing of training						
Before first treatment cycle			14			-
Before third treatment cycle			1			-
Comorbidities						
None			6			-
1			1			-
2			3			-
3 or more			5			-

^a Only asked in the partner's questionnaire

Note. 16 dyads consented to participate in the study, but 1 withdrew before providing data.

delivered a scripted 15-minute telephone booster training session with the dyads one to two weeks before the third treatment cycle, which was focused on reinforcing the selected information and coping strategies. The PI called at least one dyad member one to three days before the following treatment cycle to remind the dyad to complete their questionnaires; answer any questions related to the information, coping strategies, and study procedures; and inquire about negative effects of the intervention. If patients asked questions related to diagnosis or treatment, the PI referred them to their medical team. The dyads were instructed to complete their questionnaires at home separately.

Data Analyses

Sample characteristics, feasibility and acceptability, process evaluation, fidelity, intervention uptake, and characterized changes in outcome variables over time were all summarized using descriptive statistics. Person-mean imputation was used to replace missing questionnaire items. Because there was very little missing data (fewer than 1%), patterns or variability in missing item subsets based on participant or time point were not evaluated. Effect sizes (Cohen's *d*) were calculated based on differences between outcome measures at baseline and each of the four follow-up time points. Changes in outcomes over time were not formally tested because this was not an aim, and the study was limited in the ability to do so. Data were analyzed using IBM® SPSS Software, version 24.0.

Results

Sample Characteristics

Sixteen dyads were recruited for the study; one withdrew after providing consent and did not provide data. Based on their preferences, all patients received all cognitive-behavioral coping strategies. Thirteen partners received all cognitive-behavioral coping strategies, one received all strategies except distraction, and one received distraction only. Sample characteristics are presented in Table 1. The information topics that were selected most often for each dyad member are presented in Table 2.

Aim 1: Feasibility and Acceptability

The flow of participants through the study is shown in Figure 3. One hundred eighty-four patients were referred for the study. Sixty-five patients did not meet the eligibility criteria (35 had a history of cancer, 10 had no treatment planned, 9 had only received

TABLE 2. Most Requested Information Topics

Patient topic	n
Self-care nutrition	13
Facing cancer with partner	12
Chemotherapy side effects and self-management	10
Lifestyle change	10
Sex and hormonal therapy	9
Partner topic	n
Facing cancer with partner	11
Caregiving experience	10
Communication tips	9
Survival rate	9
Emotional coping	9

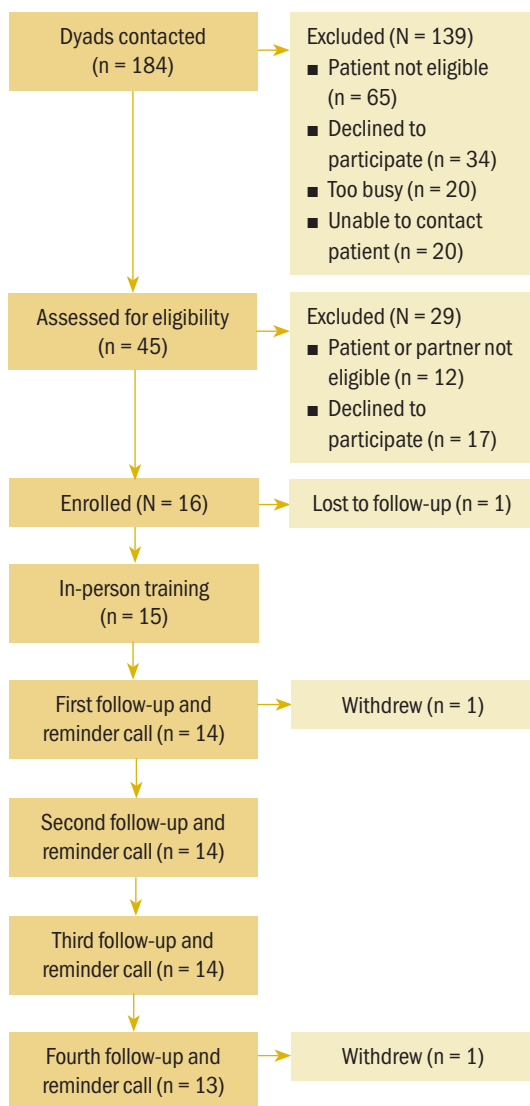
Note. Data based on responses from 15 dyads. Participants could select more than 1 topic.

hormonal therapy before the eligibility requirements were modified, 6 had metastatic cancer, 3 had noninvasive disease, and 2 had cognitive impairment), 34 declined to speak with the research nurse, 20 did not have time to participate, and 20 were lost to follow-up contact. The remaining 45 dyads were assessed for eligibility during face-to-face screening; 12 did not meet the eligibility criteria because of a previous cancer diagnosis, an inability to work with the study timeline, or having not initiated treatment before the end of the study. Seventeen dyads declined to participate because of feeling overwhelmed by the diagnosis ($n = 4$) or a lack of interest ($n = 5$), additional contact ($n = 6$), or time ($n = 2$). Sixteen dyads provided consent and were enrolled in the study (recruitment rate of 49%) from November 2016 to December 2017. Fifteen dyads received in-person training, and 13 completed all study activities (retention rate of 81%). Dyads withdrew because of being too busy ($n = 2$) or a loss of interest ($n = 1$). The rate of missing data was less than 1%. Despite the challenges of data collection and scheduling training, most data were collected on time, with the exception of one dyad who returned their questionnaires late, and three dyads who discontinued participation before weeks 10–12.

Based on reports from 13 patients, more than 90% ($n = 12$) were satisfied with the information provided, and 11 were satisfied with the coping strategies. Nearly 70% of patients ($n = 9$) reported enjoying the UMI, and two perceived the UMI to be helpful for themselves and their partners. No patients reported trouble reviewing the information, although two patients reported difficulty using the coping strategies. Issues

included difficulty transferring audio recordings to MacOS, which was resolved by the PI, and not having time to implement the strategies. One patient reported difficulty with the questionnaires because of redundancy in positively and negatively worded items. No patients reported adverse reactions to or issues with the follow-up telephone calls or visits.

FIGURE 3. Flow Diagram for Sample



Note. The period from baseline to in-person training was 1–3 days. The period from in-person training to the first follow-up survey and telephone reminder was 3–14 days. The period from the telephone booster session to the third follow-up survey was 1–2 weeks. The follow-up surveys and reminder telephone calls were completed 1–3 days prior to each of the 4 treatment cycles.

All 13 partners who completed the study were satisfied with the information provided, and 12 were satisfied with the coping strategies. Nearly half (n = 6) reported enjoying the UMI; one reported that they did not enjoy the intervention, and six were unsure. More than 90% of partners (n = 12) perceived the UMI to be helpful for themselves and the patients. No partners reported adverse reactions to or difficulty with the information or coping strategies or the follow-up telephone calls or study visits. Two partners had difficulty with questionnaire items, specifically confusion with items that were scaled in opposite directions.

Aim 2: Process Evaluation and Intervention Fidelity and Uptake

The in-person training sessions were performed in participants’ homes (n = 9), at UW–Madison (n = 2), in a public location (n = 2), in a clinic examination room (n = 1), or at a participant’s office (n = 1). Most dyads (n = 14) were trained alone; one dyad was trained while two children were present. Most training sessions (n = 13) were uninterrupted; two were interrupted by a personal telephone call. The mean duration for training was 33 minutes (SD = 7.3, range = 22–47 minutes). Most patients (n = 12) and partners (n = 11) were attentive to the training, with 11 dyads asking for information reinforcement. The majority of dyads (n = 14) had some to a lot of interaction with each other during the training. The PI perceived the quality of training to be good for six dyads and excellent for nine.

Fidelity assessment indicated that all essential intervention components were delivered. In four sessions, the PI failed to solicit questions after introducing each intervention component.

Information materials were not used frequently, particularly among partners. Among the 14 dyads who provided weekly log data during the study period, four patients used the information seven times or more, five used it two to six times, and five only used it once. In comparison, only one partner used the information seven times or more, five used it two to six times, six used it once, and two did not read the information. Coping strategies were used as instructed, although patients practiced coping strategies more frequently than partners (see Table 3). More than 50% of patients reported using the coping strategies daily, whereas more than 50% of partners used the coping strategies two times or more per week. Weekly logs were largely complete; two patients and two partners did not complete the logs for weeks 9 and 12.

TABLE 3. Frequency of Coping Strategies: Usage Per Week by Group

Week	Patients (N = 14)					Partners (N = 14)				
	Never	Once	2-6	7	More Than Once Per Day	Never	Once	2-6	7	More Than Once Per Day
Before treatment	4	2	-	-	8	3	1	4	1	3
1	1	-	1	1	11	1	-	5	-	8
2	1	-	2	-	11	1	-	6	2	5
3	3	-	2	-	9	2	-	3	2	7
4	-	-	4	-	10	2	1	5	1	5
5	-	-	3	-	11	2	-	3	2	7
6	-	-	3	1	10	2	-	3	1	8
7	-	-	3	-	11	2	-	5	1	6
8	1	-	3	-	10	2	-	7	1	4
9	1	-	2	-	10	3	-	4	2	4
10	-	-	-	1	6	2	-	1	-	4
11	-	-	-	1	6	2	-	2	1	2
12	1	-	-	-	5	1	-	2	1	2

Note. One dyad withdrew from the study after completing training. Only 7 dyads completed the log for weeks 10-12.

Aim 3: Observed Intervention Effects

Differences in patient outcomes were small to medium in effect size ($d = 0.02-0.61$). Patients reported minimal fluctuations in uncertainty (less than or equal to 1-point change) and dyadic coping (less than or equal to 2-point change) ($d = 0.02-0.13$). Patients' perceptions of family functioning improved at follow-up compared to baseline ($d = 0.39-0.61$). Differences in partners' outcomes were small in effect size, and uncertainty increased throughout the study period ($d = 0.11-0.44$). Partners reported minimal fluctuations in dyadic coping (less than or equal to 3-point change) and family functioning ($d = 0.00-0.15$). Outcome statistics from baseline to the second follow-up are summarized in Table 4 and from the third follow-up to the final follow-up in Table 5.

Discussion

The results of this study of a tailored dyad-based UMI in the context of newly diagnosed breast cancer support the feasibility of the intervention and study procedures, with the exception of recruitment. Strategies to enhance intervention uptake need

refinement, particularly among partners. Additional development of the intervention is necessary to enhance its effects.

Enrolling patient-partner dyads who were recently diagnosed with cancer was challenging, and the target of recruiting 30 dyads in one year was not reached. Previous research has described barriers to enrolling dyads with cancer, such as needing both members to participate and frequent withdrawal because of deteriorating health (Northouse et al., 2006; Trivedi et al., 2013). The biggest recruitment barrier in this study was accessing patients; 54 potential participants did not speak with the PI. Involving breast physicians and other clinicians, as well as breast cancer survivors, in recruitment planning may have increased enrollment (Fredman et al., 2009).

Among dyads who spoke with the PI and who were invited to participate, the most common reasons for declining were a lack of time or interest—which has previously been reported as a reason for declining participation (Fredman et al., 2009)—and feeling overwhelmed by the new diagnosis. Addressing the

relationships between psychosocial and physical experiences may promote interest in psychosocial interventions at a time when dyads may be preoccupied with medical treatment. Participants' lack of time may be overcome by reducing the questionnaire burden (each time point required dyads to complete five questionnaires with a total of 87–90 items). Participants could also be accommodated by providing flexible training schedules using web-based sessions or prerecorded videos.

Overall, patients used the intervention components slightly more than partners. Barriers to use may have included increased family or work commitments for partners while patients were undergoing treatment or feelings that, despite tailoring, the information and coping strategies did not meet their needs. For example, several patients requested information on age-appropriate cancer-related communication for children. Engaging couples in the design of future interventions, determining an acceptable time commitment, regularly reassessing needs, and modifying the intervention over time is critical to increasing

interest and acceptability and meeting dyads' needs. Text-message reminders to use the intervention may also facilitate uptake.

The observed effect sizes in this study were small to medium. On average, partners' uncertainty appeared to increase slightly throughout the study, which has been previously reported among patients with prostate cancer (Kazer et al., 2011). The intervention may have exposed partners to new information that was not previously understood, triggering greater uncertainty. Alternatively, partners' uncertainty may naturally increase whenever patients start treatment. Nurses should monitor for signs of significantly worsening uncertainty and refer partners to their own primary care providers or community resources (e.g., local support group). In addition, intervention components that address other sources of uncertainty, appraisal of uncertainty, and coping with uncertainty based on Mishel's theory may also increase the impact of UMIs (Mishel, 1988; Zhang et al., 2020). Cognitive reframing may help patients to cope with uncertainty in their daily

TABLE 4. Outcome Variable Statistics by Time Point From Baseline to T2 (N = 14)

Measure	Baseline			T1				T2			
	\bar{X}	SD	95% CI	\bar{X}	SD	95% CI	d	\bar{X}	SD	95% CI	d
Uncertainty											
MUIS-A	71.36	8.17	[66.64, 76.07]	72.3	8.04	[67.65, 76.94]	-0.12	70.29	11.47	[63.66, 76.91]	0.11
PPUS-FM	78.54	7.62	[74.15, 82.94]	79.51	9.62	[73.95, 85.06]	-0.11	80.61	6.74	[76.72, 84.5]	-0.29
Dyadic coping											
Patient DCI	132.9	15.95	[123.69, 142.1]	132.57	14.21	[124.37, 140.78]	0.02	134.21	23.02	[120.93, 147.5]	-0.07
Partner DCI	126.99	17.81	[116.71, 137.28]	127	18.11	[116.55, 137.45]	-	126.66	14.7	[118.17, 135.15]	0.02
Family functioning											
Patient GFS	1.7	0.27	[1.54, 1.85]	1.52	0.32	[1.34, 1.71]	0.59	1.56	0.41	[1.32, 1.8]	0.39
Partner GFS	1.68	0.46	[1.42, 1.95]	1.68	0.47	[1.4, 1.95]	0.01	1.68	0.42	[1.44, 1.92]	0.01

CI—confidence interval; DCI—Dyadic Coping Inventory; GFS—General Functioning Scale; MUIS-A—Mishel's Uncertainty in Illness Scale for Adults; PPUS-FM—Perception of Uncertainty in Illness Scale for Family Members; T1—first follow-up time point; T2—second follow-up time point

Note. The total possible range of scores for the MUIS-A is 28–140, with higher scores indicating greater uncertainty. The total possible range of scores for the PPUS-FM is 31–165, with higher scores indicating greater uncertainty. The total possible range of scores for the DCI is 35–175, with higher scores indicating greater dyadic coping. The total possible range of scores for the GFS is 1–4, with higher scores indicating lower levels of family functioning.

lives and appraise uncertainty positively (Germino et al., 2013). Adding a dyad-focused component, such as sharing areas of uncertainty and promoting dyadic coping efforts, may also improve dyad- and family-level outcomes.

Limitations

All of the participants in this study were Caucasian and non-Hispanic. The scope and funding of the study did not allow for a more diverse multi-site study, which limited understanding of recruitment feasibility in other ethnicities. The lack of a control group limited the ability to make a general conclusion about the intervention's effects. Because only patients with breast cancer and their partners were included and because of the low recruitment rate that likely only included patients with a strong interest in the psychosocial UMI, generalizability was also limited. In addition, evaluation data did not include

KNOWLEDGE TRANSLATION

- An intervention that provides tailored information and coping skills is a feasible method to meet the needs of couples experiencing breast cancer.
- Clinician involvement in designing recruitment strategies may increase access to couples.
- To increase uptake among partners, intervention refinement, such as reassessing needs and modifying the intervention over time, is necessary.

participants who withdrew; therefore, acceptability may be positively biased. Tailoring data were collected prior to baseline, which could have potentially reduced baseline uncertainty because dyad members may have been reassured that their concerns would be addressed during the study. Future trials

TABLE 5. Outcome Variable Statistics by Time Point From T3 to T4 (N = 14)

Measure	T3				T4			
	\bar{X}	SD	95% CI	d	\bar{X}	SD	95% CI	d
Uncertainty								
MUIS-A	71.57	11.34	[65.02, 78.12]	-0.02	70.38	10.25	[64.46, 76.29]	0.11
PPUS-FM	81.96	8.97	[76.78, 87.14]	-0.41	82.48	10.12	[76.64, 88.32]	-0.44
Dyadic coping								
Patient DCI	133.39	17.05	[123.55, 143.24]	-0.03	134.99	17.08	[125.13, 144.85]	-0.13
Partner DCI	124.82	17.2	[114.89, 134.76]	0.12	129.43	20.56	[117.56, 141.29]	-0.13
Family functioning								
Patient GFS	1.51	0.36	[1.31, 1.72]	0.57	1.5	0.37	[1.28, 1.71]	0.61
Partner GFS	1.74	0.58	[1.4, 2.07]	-0.1	1.61	0.54	[1.3, 1.92]	0.15

CI—confidence interval; DCI—Dyadic Coping Inventory; GFS—General Functioning Scale; MUIS-A—Mishel's Uncertainty in Illness Scale for Adults; PPUS-FM—Perception of Uncertainty in Illness Scale for Family Members; T3—third follow-up time point; T4—fourth follow-up time point

Note. 13 dyads completed the last follow-up assessment. The total possible range of scores for the MUIS-A is 28–140, with higher scores indicating greater uncertainty. The total possible range of scores for the PPUS-FM is 31–165, with higher scores indicating greater uncertainty. The total possible range of scores for the DCI is 35–175, with higher scores indicating greater dyadic coping. The total possible range of scores for the GFS is 1–4, with higher scores indicating lower levels of family functioning.

should carefully consider the order in which measures are administered. Engaging couples during the early stages of study design could help to strengthen acceptability. The first author delivered the intervention, completed in-person training and booster sessions, and collected questionnaires as part of her PhD training. To improve validity in future studies, questionnaires should be collected by someone other than the PI. Lastly, the follow-up period was relatively short. Because benefits have been shown in uncertainty management among patients as many as 20 months postintervention (Gil et al., 2006), long-term effects should be evaluated more extensively.

Implications for Nursing

Nurses should acknowledge reciprocal influences among patients' and partners' experiences with cancer. This study highlights the need for nurses to help both patients and their partners to manage uncertainty related to new cancer treatment. Most dyads in this study found the UMI of selected information topics and coping strategies to be helpful; however, different topics were identified as a potential need to support partners throughout the treatment trajectory (e.g., age-appropriate child communication strategies). Nurses should validate dyads' psychosocial needs early in the treatment trajectory, which is a time when patients and partners may otherwise be overly concerned with anticipated physical effects.

This feasibility study provides a foundation for future refinement and testing of similar dyad-based UMIs. Researchers should engage patients and partners in designing recruitment strategies and determining when to deliver such interventions, identifying relevant topics and developing a comprehensive information library, and planning strategies to enhance intervention uptake. These approaches may improve participation rates and ultimately strengthen the effects of UMIs.

Conclusion

This study demonstrates partial feasibility, acceptability, and the small benefits of a dyad-based UMI in patients with breast cancer and their partners. Future research should focus on broadening enrollment, standardizing treatment protocols, and developing strategies to strengthen UMIs. The strategies used in this study may be useful to other researchers who are designing and testing dyad-based interventions, particularly in those individuals who are in high-stress situations such as facing a new cancer diagnosis and treatment.

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