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Mediators of a Coping and Communication-Enhancing Intervention and a Supportive Counseling Intervention among Women Diagnosed with Gynecological Cancers

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Abstract

We evaluated mechanisms of change for a Coping and Communication-enhancing Intervention (CCI) and Supportive Counseling (SC). We proposed that the effects of CCI on depressive symptoms would be mediated by psychological processes targeted by CCI: increased positive reappraisal, acceptance, planful problem solving, attempts to understand emotional reactions to cancer, increased emotional expression, increased seeking of emotional and instrumental support, and improved self-esteem. We hypothesized that the effects of SC on depressive symptoms would be mediated by the processes encouraged by SC: increasing the expression of emotions, attempts to understand emotional reactions to cancer, and self-esteem. Three hundred and fifty three women were randomized to CCI, SC, or a usual care control and completed measures at pre-intervention, 3, 6, and 9 months later. The effects of CCI were fully mediated by positive reappraisal, problem solving, and self-esteem, and partially

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mediated by emotional expression. The effects of SC were partially mediated by positive reappraisal. These findings provide support for hypothesized mediators for CCI. We were less able to identify of mediators for SC. Future research might benefit from identifying SC mediators.

Keywords

psychological interventions; gynecological cancer; mediators; cognitive-affective-social processing theory

Potential psychological processes that are responsible for the reduction in distress experienced by individuals with cancer who participate in psychological interventions designed to reduce their distress have not been studied extensively. The identification of mechanisms which mediate the effects of psychological interventions on psychological outcomes has potential benefits. First, by identifying active and inactive therapeutic ingredients, treatments can be refined and made more effective. Effective psychological processes could be enhanced and inactive and/or harmful ingredients could be eliminated (Kazdin, 2007; Kazdin & Nock, 2003). Second, the identification of treatment mechanisms can inform theoretical underpinnings of psychological treatments and thereby provide refinements to underlying theory (Kazdin, 2007). For example, if changes in thought content predict improvements in depressive symptoms after cognitive behavior therapy (CBT) for depressive symptoms or vice versa, this informs the underlying cognitive theory of depression (Jarrett, Vittengl, Doyle, & Clark, 2007).

A variety of psychological mechanisms such as significant reductions in negative cognitive content and increases in perceived social support have been identified in CBT for a wide range of psychological and physical challenges. Mechanisms have been identified for CBT for the treatment of bulimia nervosa (Stice, Presnell, Gau, & Shaw, 2007), CBT for chronic pain (Turner, Holtzman, & Mancl, 2007), CBT for anxiety disorders (Hofmann et al., 2007; Moskovitch, Hofmann, Suvak, & In-Albon, 2005), response expectancies for CBT for pain (Milling, Reardon, & Carosella, 2006) and support-enhancing interventions for caregivers to persons with Alzheimer's disease (Roth, Mittelman, Clay, Madan, & Haley, 2005).

Although the importance of identifying change mechanisms in psychological interventions delivered to individuals with cancer is clear, this topic has received relatively little attention in the psycho-oncology literature. Four studies have evaluated mediators of change for psychological interventions. In their landmark study evaluating the impact of an education and peer discussion group on quality of life outcomes for women diagnosed with early stage breast cancer, Helgeson, Cohen, Schulz and Yasko (1999) reported that improvements in self-esteem, enhancements in positive body image, and reductions in intrusive thoughts about cancer mediated the effects of the peer education group intervention on quality of life. Mediators were not identified for peer discussion as this intervention did not have significant effects on quality of life. Penedo and colleagues (2004) evaluated the impact of a 10 week cognitive behavioral stress management group intervention for men diagnosed with early stage prostate cancer. Results indicated that perceived stress management skills mediated the effects of the group intervention on quality of life. Antoni and colleagues (2001) evaluated the role of stress management skills in the efficacy of a cognitive-behavioral stress management group intervention for women diagnosed with breast cancer, and found that confidence in the ability to relax at will mediated changes in quality of life. Finally, Andersen and colleagues (2007) studied group process and skill utilization as mechanisms for a behavioral and health behavior group intervention for women diagnosed with early stage breast cancer. Their results suggested that group cohesion and the utilization of relaxation skills was a mechanism for reductions in distress or improvements in well-being.

The main goal of the present study was to evaluate mediators of change for two psychological interventions for women diagnosed with gynecological cancers. The first intervention was a Coping and Communication-Enhancing Intervention (CCI). The CCI focused on identifying support needs and improving support solicitation skills, evaluating and altering life priorities, and identifying and managing emotional reactions to cancer, and coping with challenges associated with cancer by teaching problem-solving and cognitive restructuring techniques, and by enhancing stress management skills. The second intervention was Supportive Counseling (SC). The goal of SC was to enhance adaptation by encouraging emotional expression and by supporting existing coping behaviors. We have previously published results of a randomized clinical trial examining the impact of CCI versus SC and a Usual Care (UC) control on depressive symptoms and cancer-specific distress experienced by 353 women diagnosed with gynecological cancers (Manne et al., 2007). Results indicated that both CCI and SC reduced depressive symptoms with significant effects noted at the six and nine month follow-up time points. However, there was no significant difference between the interventions' effects: both reduced depressive symptoms. SC evidenced stronger effects on depressive symptoms than CCI and UC among women who evidenced increases in physician-rated physical symptoms and among women who began SC with higher levels of positive emotional expressiveness. Contrary to predictions, there was no impact of either CCI or SC on cancer-specific distress.

In the present study, we evaluated psychological mechanisms for the effects of both CCI and SC effects on depressive symptoms. We selected possible mechanisms based upon the therapeutic approaches adopted. CCI is a skill-based, structured intervention that targeted increasing benefit-finding and developing a positive attitude, increasing acceptance when dealing with uncontrollable problems, increasing use of planful problem solving when dealing with controllable problems, increasing comfort with seeking appropriate sources of emotional and instrumental support, attempting to understand one's emotional reactions to cancer, and increasing the ability to comfortably express vulnerable emotions to close others. SC is a non-directive, unstructured treatment where the therapist's goal is to enhance adaptation by encouraging emotional expression and supporting existing coping behaviors.

The main goal of this study was to evaluate the role of potential mechanisms of change for two psychological interventions, CCI and SC. We proposed that the effects of CCI on depressive symptoms would be significantly mediated by psychological processes which were targeted by CCI: increased positive reappraisal, acceptance, planful problem solving, attempts to understand emotional reactions to cancer (emotional processing), the expression of emotions, the seeking of emotional and instrumental support, and self-esteem. We hypothesized that the effects of SC on depressive symptoms would be primarily mediated by the processes that were encouraged by SC: increasing the expression of emotions, increasing attempts to understand emotional reactions to cancer, and improvements in self-esteem. As can be seen, we did not predict that all mechanisms were unique to CCI; emotional expression, emotional processing, and self-esteem were also proposed as possible mechanisms for SC.

The analyses were designed to test hypotheses about the variables that might account for the significant intervention effects of CCI and SC compared to UC on depressive symptoms. The decision to examine possible mediation effects for the CCI and SC conditions compared to UC separately was based on the following rationale. It was assumed that, at study entry, participants already possessed a repertory of coping strategies and that there would be individual differences among the women in the extent to which they employed these strategies. The major difference between the SC and the CCI treatments was that, in SC, the therapists support existing adaptive coping, encourage emotional expression, and provide support and empathy but therapists did not provide instruction or education in coping skills to deal with cancer. However, the CCI intervention went further in that it was designed to assist women in learning and employing

adaptive strategies to deal with cancer-related problems through the use of skills training and focused therapeutic suggestions. Because the CCI interventionists trained women to use specific coping strategies, the effects of CCI on depressive symptoms would be more likely to be mediated by coping strategies that were targeted in CCI sessions than would be the case for women in SC. Since there were no differences between the CCI and SC on depressive symptoms, it was believed that the first step in understanding possible mediation effects should use the UC as the comparison group.

Method

Participants and Procedures

The sample for the current study consisted of women who participated in a randomized clinical trial evaluating the efficacy of a Coping and Communication-Enhancing Intervention versus a Supportive Counseling Intervention (SC) and Usual Care (UC). The results of the clinical trial are described in greater detail in Manne and colleagues (2007). In brief, participants were women undergoing active medical treatment at ten hospitals in the northeastern US who were diagnosed with primary gynecological cancer (ovarian, endometrial, cervical, vulvar, fallopian tube, or uterine cancer). Study inclusion criteria were: age 18 years or older; a Karnofsky Performance Status of 80 or above or an Eastern Cooperative Oncology Group (ECOG) (Zubrod et al., 1960) score of 0 or 1; lived within a two-hour commuting distance from the recruitment center; English speaking, and; no hearing impairment.

Eligible women were identified and called by the research assistant after a letter describing the study was sent. The study was described in detail during this contact. Participants were sent a written informed consent and the study questionnaire to complete on their own and return by mail. The average time between verbal assent and survey completion was 3 weeks (range = 0 days – 3 months). All participants signed an informed consent approved by an Institutional Review Board. After informed consent and pre-intervention surveys were received, the research study assistant assigned participants randomly to CCI, SC, or to the usual care control condition (UC) using a schema generated by the main center's statistician. Randomization was stratified by baseline Beck Depression Inventory (BDI) score (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The study research assistant, participants, and interventionists were not blinded to study condition. The projected sample size was determined using minimal detectable differences for the primary outcome variable (BDI) which was 3 units.

CCI and SC both consisted of six hour-long individual sessions and one telephone booster session that took place one week after the sixth session.. CCI session content focused on enhancing coping and support-solicitation skills, evaluating and altering life priorities, and identifying and dealing with emotional reactions to cancer. Sessions contained didactic content, in session skill practice, and home practice assignments. Techniques were drawn from cognitive-behavioral interventions (e.g., cognitive restructuring, training in coping skills, behavioral tasks for home assignments). Other content was educational in nature (educational material regarding the impact of gynecological cancer on sexual functioning) or focused on identification and understanding of emotional needs and feelings about cancer. Treatment components included those commonly used in this treatment modality (Novalis, Rojcewicz, & Peele, 1993; Pinksner & Rosenthal, 1988). The goal of supportive counseling was to enhance adaptation by encouraging emotional expression, supporting existing coping behaviors, and enhancing self-esteem and autonomy. Supportive psychotherapy was conversational in style and used supportive techniques such as reflection, empathy, encouragement, reassurance, validation, clarification, and exploration. The therapist was active but non-directive and non-interpretive. CCI skills were not presented in SC. Participants were encouraged to discuss reactions to their cancer rather than other topics. The CCI and SC manuals are available from the study's first author (SLM). UC participants received standard psychosocial care. At all

study sites, usual care was the same: Social Work consultations were routinely provided for all women. If indicated, a referral to a psychiatrist or psychologist was provided by physicians. All participants received medical treatment as usual in their respective medical settings.

Surveys were administered at four time points: pre-intervention (baseline), three, six, and nine months post-baseline. Participants were paid \$25 for each questionnaire returned, and participants assigned to the two active intervention arms were paid \$25 for each session attended to cover travel and parking expenses. Recruitment began in August 2000 and ended in December 2005. Follow-ups were completed in August 2006.

Of the 353 participants, 297 completed three month follow-up surveys (84.1%), 263 completed six month follow-up surveys (74.5%), and 225 completed nine month follow-up surveys (63%). The study flow is shown in Figure 1. By the nine month follow-up assessment, 23 (6.7%) participants died. Participants who were assigned to an intervention condition but did not attend sessions were asked to complete follow-up surveys. More details regarding the study acceptance rate, comparisons between study refusers and participants, and study flow are contained in Manne and colleagues (2007).

Briefly, results indicated that the CCI, SC, and UC groups did not differ significantly in terms of demographic or medical variables or hospital site (Manne et al., 2007). There were no differences in session attendance between CCI and SC. There were significant differences in survey completion rates across study conditions at the three month follow-up assessment. At this time point, there was a significantly higher return rate among participants in UC (84.6%) compared with the other two conditions (79.1% SC, 76.2% CCI) ($p < .01$). Results indicated that both CCI and SC had a beneficial effect on depressive symptoms with significant effects noted at the six and nine month follow-up time points. However, there was no significant difference between the interventions' effects: both reduced depressive symptoms and prevented an increase in depressive symptoms over time that was noted among women in the UC group. SC evidenced stronger effects on depressive symptoms than CCI and UC among women with temporal changes in ECOG status and among women who began the intervention with higher levels of positive emotional expressiveness. Contrary to predictions, there was no impact of either CCI or SC on cancer-specific distress.

Measures

Outcome Measure—Depressive symptoms were assessed using the BDI (Beck et al., 1961). The BDI is a 21-item scale which has been widely used in studies incorporating cognitive-behavioral intervention (scale range, 0–63). Cronbach's alphas were .86, .86, .86, .87, at Times 1–4, respectively.

Intervention Mediators

Positive reappraisal, acceptance, planful problem-solving, seeking support for emotional reasons, seeking support for instrumental reasons, and emotional processing—The positive reappraisal (e.g., “I learn something from the experience”), planning (e.g., “I made a plan of action”), seeking emotional support for emotional reasons (e.g., “I tried to get emotional support from friends or relatives”), seeking support for instrumental reasons (e.g., “I talked to someone who could do something concrete about the problem”), and acceptance (e.g., “I got used to the idea that it happened”) subscales of the COPE (Carver et al., 1993) were administered. Stanton and colleagues' (2000) emotional processing (e.g., “I acknowledged my emotions”) scale was administered. Each scale consisted of four items. Participants rated how they dealt with the most stressful aspect of the cancer experience in the past month, and the scales were administered at Times 1 to 4. *Cronbach's alphas at each time point are shown in the right panel of Table 2. Reliability estimates ranged*

from .67 (emotional processing, 9 month follow-up) to .87 (playful problem solving, 9 month follow-up, seek emotional support, 6 and 9 month follow-ups).

Emotional expression—Two measures of emotional expression were administered. One measure assessed general expressivity and one measure assessed cancer-specific expression. General emotional expressivity was assessed using the Emotional Expressivity Questionnaire which is a 16-item measuring the level of comfort with expressing both positive and negative emotions (EEQ; King & Emmons, 1990). Items are responded to on a 7-point Likert scale, with 1 indicating the participant did not agree with the item at all, and 7 indicating the participant agreed with the item. The scale has three subscales: *expression of positive emotion* (7 items) (sample item, “I often laugh so hard that my eyes water or my sides ache.”), *expression of intimacy* (5 items) (sample item, “I often tell people that I love them”), and *expression of negative emotion* (4 items) (sample item, “When I am angry people around me usually know.”). Internal consistency of expression of negative emotion subscales was unsatisfactory ($\alpha = .42 - .53$ over the 4 assessments), and therefore this subscale was excluded from further analyses. *Internal consistencies of the expression of positive emotion and expression of intimacy scales are shown in Table 2. Cronbach’s alphas for the expression of positive emotion scale across the four time points the scale was administered ranged from .76 to .80, and cronbach’s alphas for the expression of intimacy scale ranged from .61 to .68.*

Cancer-related emotional expression—was assessed using Stanton and colleagues’ (2000) emotional expression scale (e.g., “I acknowledged my emotions”) which consisted of four items. *Cronbach’s alphas for the four time points the measure was administered ranged from .77 to .81.*

Self-esteem—The Rosenberg Self-Esteem Inventory was used (Rosenberg, 1962). This scale measures self-acceptance and has 10 items on a Guttman scale. Items are measured on a 4-point continuum from “strongly agree” to “strongly disagree.” Cronbach’s alphas *for the four time points this measure was administered* were excellent.

Statistical Approach

As noted in the Introduction to this paper, the decision was made to separately examine possible mediation effects for the CCI and SC conditions compared to UC. The conceptual approach to mediation employed in the present study is based on the criteria originally formulated by Baron and Kenny (1986) and expanded by Kenny, Kashy, and Bolger (2003). Mediation is established by meeting four criteria which are evaluated by the following four models:

Model 1. The variable to be mediated (in this case, the intervention condition) must be significantly related to the outcome of interest (BDI); ¹

Model 2. The variable to be mediated must be significantly related to the hypothesized mediator; Model 3a. When the hypothesized mediator is included in the Model 1 equation, it must be significantly related to the outcome

Model 3b. With the inclusion of the hypothesized mediator in Model 1, the strength of the relationship between the intervention condition and the outcome should decline.

The present study employed repeated measurements for both the outcome of interest (BDI) as well as the conceptually relevant mediators. Because of the repeated measures, the data in the present study possess a nested structure. The repeated measures represent what are called the

¹It should be noted that there has been some disagreement in the literature regarding the necessity of meeting the first criterion to establish mediation (Collins et al., 1998; Shrout & Bolger, 2002). Nonetheless, in the present analyses, this criterion was assessed.

Level 1 model and the repeated measures are nested under the research participants (the Level 2 model) and can be analyzed as a hierarchic linear or multilevel model (Raudenbush & Bryk, 2002).

In addition to the assessment of the average change in the outcome over time, multilevel models also provide for the possibility that, compared to the average change, there are significant individual differences around the average change trajectory (a growth curve model). This possibility was examined using the mixed linear model procedure implemented in the SAS procedure, MIXED. There are two advantages associated with the use of a multilevel model for change. Aside from the ability to examine individual differences in trajectories of change over time, multilevel models employ maximum likelihood estimation of the parameters meaning that they can readily accommodate missing data in most situations (Singer & Willett, 2003). Despite these two advantages, these models do not have an immediately obvious measure of effect size as is the case in OLS regression (i.e. R-Square). To deal with this situation, it is possible to use the partial correlation for the explanatory variables which can be computed from their associated t-statistics and error degrees of freedom.²

The parameters in Models 1 and 2 were estimated by the following composite multilevel growth curve models: Model 1:

$$Y_{ij} = \left[\gamma_{001} + \gamma_{101} (\text{Time}_{ij}) + \gamma_{011} \text{Group}_i + \gamma_{111} (\text{Group}_i \text{ by } \text{Time}_{ij}) \right] + \left[\zeta_{0i1} + \zeta_{1i1} \text{ by } \text{Time}_{ij} + r_{ij1} \right]$$

Model 2:

$$Y_{ij} = \left[\gamma_{002} + \gamma_{102} (\text{Time}_{ij}) + \gamma_{012} \text{Group}_i + \gamma_{112} (\text{Group}_i \text{ by } \text{Time}_{ij}) \right] + \left[\zeta_{0i2} + \zeta_{1i2} \text{ by } \text{Time}_{ij} + r_{ij} \right]$$

where $i = 1$ to N , $j = 1$ to T (Time), and the third subscript refers to the equation number. In the case of Model 1, Y_{ij} represents the BDI score for each patient and, in the case of Model 2, Y_{ij} represents each patient's score on each of the hypothesized mediators both as functions of the treatment effects.

The parameters of Model 3A were estimated using the following composite multilevel model:

$$Y_{ij} = \left[\gamma_{003} + \gamma_{103} (\text{Time}_{ij}) + \gamma_{013} \text{Group}_i + \gamma_{113} (\text{Group}_i \text{ by } \text{Time}_{ij}) + \gamma_{203} \text{Mediator}_{ij} \right] + \left[\zeta_{0i3} + \zeta_{1i3} \text{ by } \text{Time}_{ij} + r_{ij3} \right]$$

where the subscripts are as before and the outcome is each patient's BDI score. Thus, in the composite multilevel model testing the effect of the mediating variable, both the intervention condition and the hypothesized mediators were treated as upper level (i.e. Level 2) variables while the BDI scores of individual patients (Level 1) represented the outcome. Within the framework proposed by Krull and MacKinnon (1998), the analyses involved an upper level mediation model.

²It should be noted that these partial correlations are only approximations since the t-statistics reported or fixed effects in multilevel models are themselves approximations whose justification depends on asymptotic properties.

A number of different tests of the viability of the mediation hypothesis have been proposed (for a review, see MacKinnon, Lockwood, Hoffman, West & Sheets, 2002). Because the Type I and Type II error rates for tests of mediation vary as a function of whether the path from the variable to be mediated to the mediator as well as whether the path from the mediator to the outcome are either equal or unequal to 0 in the population (MacKinnon et al., 2002), three of the tests showing relatively good Type I and Type II properties will be reported below: the z' measure (MacKinnon et al., 2002), the product of coefficients measure, P (MacKinnon et al., 2002), and the t-test of the difference between γ_{111} and γ_{113} using Freedman and Schatzman's (1992) formula for the standard error of the differences. The critical value for significance of the z' measure at $\alpha = 0.05$ is 0.97 and, for P, the critical value is 2.18 (MacKinnon et al., 2002: p. 90). The z' and P measures test the significance of the product of the path from the treatment to the mediator by the path from the mediator to the outcome $\gamma_{112} * \gamma_{023}$.

It should be noted that each mediator was entered separately into the model. This approach was selected since it was expected that the intervention effect would amplify the correlations among the mediators thus creating problems with multicollinearity if mediators were entered simultaneously in each equation. It should also be noted that covariates that were included in the original model testing intervention effects were included in each model (e.g., participant age and functional impairment).

Results

Preliminary Analyses

Table 1 contains demographic and medical information about the study sample. The sample was primarily Caucasian, married, and diagnosed with ovarian cancer. More than half of the sample was diagnosed with stage III or IV disease. The majority of patients were either not employed outside the home or on leave from their job.

Analyses were conducted to evaluate distribution properties, skewness, and kurtosis of all study measures prior to conducting the main study analyses. There was no evidence of significant skew or kurtosis.

Since the original assessments of intervention effects employed a growth curve model, preliminary analyses of the hypothesized mediators examined the question of whether a growth curve model was appropriate for them as well (i.e. significant individual differences in both intercepts and slopes). These analyses confirmed the appropriateness of the growth curve approach for all the hypothesized mediators except expression of intimacy and expression of positive emotion. Descriptive information for the mediator variables and depressive symptoms are shown in Table 2.

Coping and Communication Skills Intervention Mediation Effects

Table 3 contains the results for models testing mediation effects for the CCI condition. There it can be seen that there was a significant intervention effect on BDI for those in the CCI condition compared to those in UC (Model 1) thus meeting the first criterion for mediation.

The results for Model 2 indicated that the CCI was significantly associated with positive increases over time in emotional processing, positive reappraisal, planful problem-solving, seeking emotional support, seeking instrumental support, self-esteem, expression of intimacy, and expression of positive emotion. There was a marginally significant increase in cancer-related emotional expression. CCI was not associated with significant change in acceptance. The CCI condition showed the strongest impact on expression of intimacy, expression of positive emotion, self-esteem, emotional processing, planning, and seeking emotional support,

followed by seeking instrumental support. CCI had weaker effects on positive reappraisal and cancer-related emotional expression.

In Model 3A, higher levels of acceptance, cancer-related emotional expression, positive reappraisal, self-esteem, expression of intimacy, expression of positive emotion, and planful problem solving were significantly associated with reduced depressive symptoms as was emotional processing although the effect was marginally significant. However, neither seeking emotional support nor seeking instrumental support was significantly associated with depressive symptoms.

In Model 3B, it will be seen that the effect of CCI on depressive symptoms was no longer significant at $p < 0.05$ when either acceptance, emotional processing, positive reappraisal, planful problem-solving, self-esteem, or expression of intimacy was incorporated into the model. When cancer-related emotional expression was included, the parameter estimate for CCI predicting depressive symptoms was reduced although still significant as was the case for seeking emotional support, seeking instrumental support, or expression of positive emotion.

Of the hypothesized mediators, positive reappraisal, planful problem solving, self-esteem, and expression of intimacy met all Kenny and Kashy's (2003) criteria for mediation. Expression of positive emotion met three of four of Kenny and Kashy's (2003) criteria in that the effect of CCI condition continued to be significant after the introduction of expression of positive emotion into the equation.

The significance levels for these mediators (using the z' , P , and the Freedman/Schatzman tests) can be found in the bottom panels of Table 2. There it can be seen that positive reappraisal, planful problem solving, and self-esteem were significant according to all three mediation tests while expression of intimacy and cancer-related emotional expression met two of these three mediation tests. These results suggest that the effect of the CCI on depressive symptoms was fully mediated by positive reappraisal, planful problem solving, and self-esteem while partially mediated by expression of positive emotion or expression of intimacy.

The Supportive Counseling Intervention

Table 3 contains the results for the models testing mediation effects for the SC condition. There was a significant effect of the SC intervention on depressive symptoms compared to the UC condition (Model 1), thus meeting the first mediation criterion. The results for Model 2 indicated that the SC condition was significantly associated with higher levels of cancer-related emotional expression, emotional processing, positive reappraisal, and seeking instrumental support. There was a marginally significant increase in planful problem-solving. SC was not associated with significant change in acceptance, seeking emotional support, self-esteem, expression of intimacy, or expression of positive emotion.

As can be seen in Model 3A, acceptance, positive reappraisal, self-esteem, cancer-related emotional expression, and expression of positive emotion were significantly related to depressive symptoms. Furthermore, the effect of SC on depressive symptoms continued to be significant after each of the hypothesized mediators was incorporated into the model (Model 3B). Of all the hypothesized mediators, only positive reappraisal met three of the four Kenny and Kashy (2003) criteria. The mediating effect of positive reappraisal was confirmed by the z' measure (-1.74 ; $p < 0.05$), the P measure (-7.31 ; $p < 0.01$), and the Freedman/Schatzman t -value ($t(150) = -2.48$; $p = 0.01$). However, the parameter estimate for SC as a predictor of depressive symptoms continued to be significant after positive reappraisal was incorporated into the model indicating that the SC condition was only partially mediated by positive reappraisal.

Discussion

The identification of mechanisms which are responsible for the effects of psychological interventions for individuals diagnosed with cancer is an important topic that has received little empirical attention. In this study, we examined potential mechanisms for the beneficial effects of CCI and SC on the depressive symptoms experienced by women diagnosed with gynecological cancers, and we were able to identify mechanisms of change for both CCI and SC. Mediators for CCI were more easily identified. The effect of CCI on depressive symptoms was fully mediated by positive reappraisal, planful problem-solving, and self-esteem, and partially mediated by expression of intimacy and expression of positive emotion. The effect of SC on depressive symptoms was mediated only by positive reappraisal. Contrary to our predictions, emotional expression, emotional processing, and self-esteem were not responsible for the reductions in depressive symptoms associated with SC.

Our results support a mediational role for some of the specific strategies that CCI was designed to change – positive reappraisal, problem-solving, self-esteem, and, to a lesser extent, expression of vulnerable emotions. Both in-session and between session home practice assignments encouraged participants to examine and re-evaluate how cancer has affected their life priorities, goals, and self-schemas. Reframing maladaptive cognitions in a more positive manner was emphasized in cognitive restructuring training both in and between sessions. Therefore, the results suggesting that positive reappraisal mediated the effects of CCI are not surprising, and have been suggested as mediators of other CBT interventions for cancer patients (Antoni et al., 2001). Similarly, the fact that planful problem-solving mediated CCI's effects on depressive symptoms is consistent with both in-session skill content and home practice tasks. Interventionists encouraged participants to adopt a deliberate problem-solving process that included evaluating controllable and uncontrollable aspects of cancer-related problems, developing and putting into place a plan for dealing with controllable problems, evaluating the success of these efforts, and subsequently modifying one's approach if the efforts were not successful. Self-esteem has been a mechanism for the effects of other psychological interventions for cancer patients (Helgeson et al., 1999). Although not specifically targeted by CCI, the self-care and cognitive techniques could enhance self-regard. Finally, structured session content focused on helping participants identify emotional reactions and support needs, find adaptive ways of expressing these feelings to close others, and identifying ways of increasing support from close others. Our findings suggesting that the expression of positive emotions (e.g., affection, laughter) and intimacy (e.g., telling others they are loved, apologizing, expressing gratitude) were both impacted by CCI and a mediator of change in depressive symptoms is not surprising. Interventionists emphasized the importance of sharing vulnerable emotions with supportive family and friends, identifying support needs, and overcoming communication barriers.

However, it is interesting to note that, although the expression of positive emotion and of intimacy partially mediated CCI effects, cancer-related emotional expression did not mediate effects. One explanation for these findings is that increasing general levels of expression of positive feelings and intimacy with close others – by sharing feelings that may not be associated with cancer- was one way that participants found interpersonal benefit and enhanced closeness during the cancer experience. A second explanation is that the cancer-related emotional expression measure assessed the degree to which emotional reactions to cancer were shared, without considering whether the person was an available source of support. In CCI sessions, assessing whether the person being disclosed to was likely to provide needed support and understanding expectations of the disclosure was encouraged. It is possible that simply expressing cancer-related feelings did not result in the anticipated supportive responses from others. A third possible explanation is a possible weakness with the measure itself. Although the scale possesses satisfactory reliability and validity (Stanton et al, 2000), it is possible that

a lengthier measure would have been more sensitive to experimental effects. It is also possible that the instructional set, which asked participants to report how they coped with the most stressful cancer-related event in the past month, may have resulted in a measure that was less sensitive to experimental effects. It is surprising that a general expressivity measure was responsive to the cognitive-behavioral treatment, whereas the situation-specific expression measure was not. Our findings suggest that patients' general emotional expressivity may be affected by cognitive-behavioral interventions.

There were a number of hypothesized mediators which did not mediate CCI's effects. First, given the strong emphasis in CCI sessions on mobilizing existing support by facilitating participants' ability to identify their cancer-specific support needs, recognize internal and external barriers to obtaining effective support, and teaching strategies to obtain needed support, and well as the results of previous studies that have targeted support enhancement (e.g., Drentea et al., 2006), it is surprising that neither the seeking of instrumental nor emotional support constructs served as mediators of CCI's effects. One potential explanation for these findings is that our measure of social support evaluated the seeking of instrumental and emotional support rather than other support indicators which may have been more likely to mediate effects. These variables include increased satisfaction with support and perceived closeness with friends and family (e.g., Roth et al., 2005). Future studies evaluating possible mechanisms of change for CCI and other cognitive-behavioral interventions for individuals diagnosed with cancer may benefit from including a broader range of indicators of social support.

Acceptance did not mediate CCI's effects, and CCI did not have a significant impact on acceptance. This is particularly surprising as there was specific CCI content on identifying aspects of cancer-related losses that might need to be accepted and grieved, and previous studies have suggested that acceptance is associated with less distress among women diagnosed with breast cancer (Carver et al., 1993). It is possible that acceptance does not have the same beneficial impact on well-being among women diagnosed with gynecological cancers. However, it is difficult to explain why acceptance was not increased by CCI, and future studies might evaluate other measures of this construct.

We were not as successful in identifying mediators for SC. Although some aspects of emotional expression and emotional processing were impacted by SC, neither variable mediated SC's effects on depressive symptoms. One possible explanation for these findings is that the interventionists did not require participants to discuss emotional reactions or their meaning or ask them to link thoughts and feelings together. Therefore, if participants chose to discuss only facts and thoughts rather than feelings, emotional expression was not prompted by the interventionist and the interventionist did not interpret the lack of emotional content as might be done in other therapeutic approaches. If participants did not freely volunteer their feelings about events or attempt to understand the meaning of their feelings, SC interventionists did not offer encouragement to do so. Self-esteem also did not mediate SC effects. Contrary to our predictions, positive reappraisal partially mediated the effects of SC on depressive symptoms. A potential explanation of this finding is that, by airing issues and concerns and obtaining emotional support and encouragement by the SC therapists, participants may have been able to reflect upon the cancer experience and ultimately adopt a different perspective on their situations.

Future research might consider evaluating other possible mechanisms for SC. To select possible processes that may serve as mediators, it might be beneficial to evaluate of the topics that participants covered in sessions, examine participants' cognitive content (e.g., cancer-related worries and beliefs) using paper-and-pencil methods (e.g., Hofmann et al., 2007), analyze participants' level of emotional experiencing during sessions (e.g., Missirlian et al.,

2005), and an evaluate how emotional material is handled by the counselors during SC sessions (e.g., Critchfield, Henry, Castonguay, & Borkovec, 2007). For example, several studies have found that emotional experiencing that is coded during process-experiential therapy sessions is associated with improved outcomes (e.g., Watson & Bedard, 2006). Because supportive counseling is considered an experiential approach, it is possible that examining experienced emotion during the session and/or participant's interactions with the counselor during sessions may shed some light on proposed mechanisms for SC. These non-specific factors, which include therapeutic alliance, therapeutic realizations, emotional arousal, perceptual processing, and/or positive expectancies might serve as mediators for the effects of this non-directive, experiential, supportive therapy approach (Greenberg, Costantino, & Bruce, 2005; Horvath & Symonds, 1991; Kolden, 1991; Missirlian, et al., 2005; Stiles et al., 1998).

In the present study, we identified four variables that mediated the effects of the CCI. However, other mechanisms could be evaluated in future trials evaluating the effects of CCI. These processes include other coping strategies specifically targeted in CCI, such as relaxation skill, which has recently been identified as a key mechanism for the effects of another cognitive behavioral approach to facilitating psychological adjustment among cancer patients (Andersen et al., 2007; Antoni et al., 2006). Other possible mediators include increased assertiveness and better ability to manage affect. In addition, adherence to home assignments and practice of skills at home (e.g., Burns & Nolen-Hoeksma, 1991) may mediate changes in depressive symptoms and were not assessed in this study.

There are a number of limitations of the present study. First, we cannot rule out the possibility that changes in depressive symptoms pre-dated, or caused, changes in the mediators. Second, we did not assess mediators *during the six to nine week time period when participants were attending sessions*. A stronger case for mechanisms could be made if these variables were assessed during the time the six week period when the interventions were being delivered (Kazdin & Nock, 2003). Third, our sample was comprised primarily of Caucasian women. The mediators of both interventions may have had a different role among minority women. Unfortunately, the proportion of minority participants was too small to permit an independent evaluation of possible moderated mediation effects for minority status. Fourth, as was noted in the previous publication of the outcomes of these two therapies (Manne et al., 2007), we had a relatively high rate of study refusal (58%) and follow-up survey non-completion for reasons other than death (63%). Participants were significantly younger and more likely to be married than study refusers, and participants who completed more than one study survey were younger than participants who only completed one survey. These differences may have biased the results of this study. Finally, many of the measures, such as self-esteem, were not cancer-specific. It is possible that greater sensitivity to experimental effects would have been found if the measures were more specific to the illness (e.g., body image rather than self-esteem).

In conclusion, the present findings provide support for the hypothesis that changes in positive reappraisal, problem solving, and self-esteem mediate the effects of a Coping and Communication-Enhancing Intervention that we developed and found to significantly reduce depressive symptoms among women diagnosed with gynecological cancers. The ability to express intimacy emotions and express emotional reactions to cancer partially mediated CCI. It is possible that bolstering the cognitive restructuring, problem solving, and the ability to express vulnerable emotions may enhance or prolong the beneficial effects of CCI on depressive symptoms, and future studies might benefit from evaluating this possibility. While we have elucidated mechanisms for CCI and one mechanism for SC, future research should evaluate other potential mechanisms for both treatments. The discovery of additional mechanisms for CCI and SC might reveal aspects of this treatment which either are not necessary or could be bolstered. The identification of the reasons why SC worked has clinical implications as well, because this treatment approach is more broadly disseminable and

supportive techniques are more commonly used in the oncology setting. *Future research on these interventions should also examine possible moderators of change in addition to the moderators we have already discovered, positive emotional expressivity and change in physician-reported ECOG status (Manne et al., 2007), in order to identify subgroups of women for whom each intervention may be particularly effective in reducing depression. Finally, given the significant risk of sexual morbidity among women diagnosed with gynecological cancers (Andersen et al., 1997; Carmack Taylor et al., 2004; Gershenson et al., 2007; Sun et al., 2007), it will also be important that future psychological interventions have a greater emphasis on techniques to assist women in coping with sexual dysfunction.*

As Andersen and colleagues (2007) have recently noted, no single study would be able to address the ultimate question of why psychotherapy works. This effort begins to identify some reasons why one particular approach to intervening with women diagnosed with gynecological cancers may work. By identifying the strategies and therapy processes most responsible for change, we may be able to maximize intervention effects for patients with cancer.

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Figure 1.
Study Schema

Table 1

Baseline Characteristics of the Study Sample

Variable	<i>M</i>	<i>SD</i>	<i>N</i>	%
Age, years	55.0	11.4		
Race				
White			316	89.5
Non-white			37	10.5
Marital status				
Single, divorced, widowed			98	27.8
Married			255	72.2
Employment				
Unemployed/on leave			195	55.2
Part-time			58	16.4
Full-time			100	28.4
Education level				
Less than college degree			166	47.0
Completed college degree			52	14.7
Post-college education			135	38.2
Income level				
< \$39,999			64	18.1
\$40,000 – \$79,999			120	34.0
> \$80,000			169	47.9
Cancer site				
Ovarian cancer			287	81.3
Endometrial cancer			23	6.5
Primary Peritoneal cancer			22	6.2
Cervical cancer			11	3.1
Vaginal cancer			2	0.6
Vulvar cancer			2	0.6
Uterine cancer			4	1.1
Fallopian tube cancer			2	0.6
FIGO stage at time of diagnosis				
I			116	32.9
II			39	11.0
III			160	45.3
IV			38	10.8
Metastatic disease (yes)	121	34.3		
ECOG rating				
0	226	64.3		
1	127	35.7		

Note. ECOG = Eastern Cooperative Oncology Group. FIGO = International Federation of Gynecology and Obstetrics.

Table 2

Means, Standard Deviations, and Reliability Estimates for the Mediators and Outcome at Each Assessment

Variable	CCI <i>M (SD)</i>	SC <i>M (SD)</i>	UC <i>M (SD)</i>	Coefficient Alpha
Positive Reappraisal				
Baseline	11.08 (3.35)	10.79 (3.49)	11.26 (3.21)	.78
Three months	11.39 (3.42)	11.05 (3.36)	11.11 (3.01)	.80
Six months	10.96 (3.47)	10.87 (3.30)	10.45 (3.15)	.80
Nine months	11.18 (3.74)	10.45 (3.50)	10.24 (3.42)	.84
Acceptance				
Baseline	12.51 (2.87)	11.85 (2.97)	12.41 (2.95)	.70
Three months	12.14 (2.78)	12.15 (2.99)	12.32 (3.05)	.76
Six months	11.66 (3.11)	11.54 (3.24)	12.04 (3.53)	.80
Nine months	12.02 (3.89)	11.42 (3.46)	11.60 (3.23)	.73
Planful problem-solving				
Baseline	11.23 (3.22)	10.69 (3.45)	11.96 (4.96)	.69
Three months	10.82 (3.45)	10.59 (3.54)	10.73 (3.15)	.83
Six months	11.01 (2.90)	9.62 (3.41)	9.95 (3.60)	.83
Nine months	10.75 (3.87)	9.67 (3.29)	9.68 (3.52)	.87
Seek emotional support				
Baseline	11.87 (3.35)	11.59 (3.46)	12.20 (4.89)	.71
Three months	11.95 (3.21)	11.15 (3.54)	11.02 (3.13)	.85
Six months	11.21 (3.10)	10.20 (3.56)	10.00 (3.43)	.87
Nine months	10.50 (3.51)	9.45 (3.44)	9.52 (3.64)	.87
Seek instrumental support				
Baseline	9.98 (3.57)	9.33 (3.20)	9.89 (3.19)	.73
Three months	9.59 (3.52)	8.97 (3.16)	9.48 (3.08)	.74
Six months	9.79 (3.28)	8.96 (3.52)	8.27 (3.47)	.81
Nine months	9.41 (3.77)	8.49 (3.37)	8.20 (3.29)	.82
Emotional Processing				
Baseline	5.46 (1.42)	5.11 (1.65)	5.36 (1.57)	.69
Three months	5.79 (1.56)	5.48 (1.70)	5.53 (1.67)	.70
Six months	5.62 (1.53)	5.21 (1.66)	5.04 (1.63)	.68
Nine months	5.46 (1.51)	5.04 (1.80)	4.94 (1.61)	.67
Expression of positive emotion				
Baseline	18.03 (4.23)	16.65 (3.85)	17.15 (4.16)	.76
Three months	18.41 (3.70)	16.98 (4.37)	17.09 (4.42)	.78
Six months	18.24 (3.91)	16.62 (4.08)	17.23 (4.46)	.80
Nine months	18.39 (4.15)	15.51 (4.33)	17.14 (4.26)	.77
Expression of intimacy				
Baseline	15.92 (2.73)	15.23 (2.68)	15.26 (2.50)	.61
Three months	15.99 (2.56)	15.30 (2.75)	15.40 (2.41)	.61
Six months	16.31 (2.57)	15.16 (2.65)	15.70 (2.83)	.67
Nine months	16.17 (2.68)	15.13 (2.78)	14.97 (2.66)	.68

Variable	CCI <i>M (SD)</i>	SC <i>M (SD)</i>	UC <i>M (SD)</i>	Coefficient Alpha
Cancer-related emotional expression				
Baseline	5.71 (1.69)	5.19 (1.75)	5.73 (1.52)	.77
Three months	5.69 (1.64)	5.42 (1.80)	5.31 (1.61)	.81
Six months	5.62 (1.45)	5.20 (1.81)	4.96 (1.71)	.80
Nine months	5.15 (1.73)	4.94 (1.80)	4.80 (1.70)	.79
Self-esteem				
Baseline	23.75 (4.85)	22.80 (5.20)	23.12 (4.88)	.87
Three months	24.36 (4.83)	23.38 (5.41)	23.24 (5.67)	.89
Six months	24.52 (4.57)	23.90 (5.04)	24.14 (5.78)	.89
Nine months	25.32 (4.56)	24.54 (5.03)	23.66 (5.09)	.89
Depressive symptoms				
Baseline	13.51 (7.70)	14.47 (9.06)	12.52 (7.86)	.86
Three months	9.65 (6.32)	9.96 (7.49)	11.04 (7.93)	.86
Six months	9.01 (6.81)	9.62 (6.91)	9.30 (7.79)	.87
Nine months	9.53 (7.17)	9.00 (6.87)	10.11 (8.36)	.87

Table 3

Results of Mediation Analyses for the CCI Condition

Model	Parameter Estimate	S.E.	t-value	p-value	pr
1. Effect of Intervention on Depressive Symptoms					
γ_{111}	-0.2894	0.1383	-2.09	0.0371	0.11
2. Effect of Treatment on Mediator					
γ_{112}					
Positive reappraisal	0.1251	0.0636	1.97	0.0500	0.09
Acceptance	0.0636	0.0663	0.96	0.3376	0.05
Planful problem-solving	0.1616	0.0643	2.51	0.0124	0.12
Seek emotional support	0.1468	0.0601	2.44	0.0149	0.12
Seek instrumental support	0.1423	0.0624	2.28	0.0229	0.11
Emotional processing	0.0719	0.0263	2.73	0.0065	0.12
Expression of positive emotions	1.1673	0.5263	2.22	0.0276	0.15
Expression of intimacy	0.8099	0.3064	2.64	0.0088	0.18
Cancer-related emotional expression	0.0527	0.0307	1.71	0.0872	0.08
Self-esteem	1.1612	0.5757	2.02	0.0449	0.13
3A. Effect of Mediator on Depressive Symptoms					
γ_{023}					
Positive reappraisal	-0.4890	0.0903	-5.41	<0.0001	0.28
Acceptance	-0.4486	0.0858	-5.23	<0.0001	0.27
Planful problem solving	-0.2209	0.0725	-3.05	0.0025	0.16
Seek emotional support	-0.0911	0.0901	-1.01	0.3128	0.05
Seek instrumental support	-0.1240	0.0753	-1.65	0.1004	0.09
Emotional processing	-0.2790	0.1504	-1.85	0.0645	0.10
Expression of positive emotion	-0.4662	0.0800	-5.82	<0.0001	0.29
Expression of intimacy	-0.5353	0.0961	-5.57	<0.0001	0.28
Cancer-related emotional expression	-0.3362	0.1484	-2.27	0.024	0.12
Self-esteem	-0.7059	0.0452	-13.03	<0.0001	0.57

Model	Parameter Estimate	S.E.	t-value	p-value	pr
3B. Effect of Treatment on Depressive Symptoms controlling for Mediator					
γ_{113}					
Positive reappraisal	-0.2359	0.1321	-1.79	0.0750	0.09
Acceptance	-0.2590	0.1329	-1.95	0.0521	0.10
Planful problem solving	-0.2608	0.1384	-1.88	0.0603	0.10
Seek Emotional Support	-0.2833	0.1388	-2.04	0.0419	0.11
Seek Instrumental Support	-0.2985	0.1398	-2.14	0.0334	0.11
Emotional processing	-0.2710	0.1399	-1.94	0.0535	0.10
Expression of positive emotion	-0.2700	0.1308	-2.06	0.0397	0.11
Expression of intimacy	-0.2638	0.1386	-1.90	0.0577	0.10
Cancer-related emotional expression	-0.2764	0.1378	-2.01	0.0455	0.10
Self-esteem	-0.2134	0.1264	-1.69	0.0923	0.09
3C. Tests of Mediation Effect					
(Path from Treatment to Mediator) $\times$ (Path from Mediator to Depressive Symptoms)					
$\gamma_{111} - \gamma_{113}$		z'		P	
Positive reappraisal	-1.85**	-10.64**			
Planful problem solving	-1.94**	-7.65**			
Self-esteem	-2.00**	-31.50**			
Expression of positive emotion	-2.07**	-12.92**			
Expression of intimacy	-2.39**	-14.72**			
(Path From Treatment to Depressive symptoms Without the Mediator) - (Path From Treatment to Depressive Symptoms With the Mediator)					
$\gamma_{112} - \gamma_{023}$		Freedman/Schatzman t-value			
Positive reappraisal	-3.77**				
Planful problem solving	-1.72*				
Self-esteem	-3.57**				
Expression of positive emotion	-0.9				

Model	Parameter Estimate	S.E.	t-value	p-value	pr
Expression of intimacy	−0.94				

Note. CCI = Coping and Communication-Enhancing Intervention; pr = partial correlation of predictor to outcome;

* $p < .05$

** $p < .01$.

Table 4

Results of Meditational Analyses for the SC Condition

Model	Parameter Estimate	S.E.	t-value	p-value	pr
1. Effect of Treatment on Depressive Symptoms γ_{111}	-0.3206	0.1336	-2.40	0.0169	0.12
2. Effect of Treatment on Mediator γ_{112}					
Positive reappraisal	0.1158	0.0589	1.97	0.0499	0.09
Acceptance	0.0667	0.0586	1.14	0.2559	0.05
Planful problem solving	0.1140	0.0607	1.88	0.0610	0.09
Seek emotional support	0.0554	0.0598	0.93	0.3548	0.04
Seek instrumental support	0.1131	0.0571	1.98	0.0481	0.09
Emotional processing	0.0644	0.0265	2.43	0.0155	0.11
Expression of positive emotion	-0.3028	0.5110	-0.59	0.5541	0.04
Expression of intimacy	-0.1194	0.3208	-0.37	0.7101	0.02
Cancer-related emotional expression	0.0778	0.0288	2.70	0.0072	0.12
Self-esteem	0.0665	0.0743	0.90	0.3712	0.04
3A. Effect of Mediator on Depressive Symptoms γ_{023}					
Positive reappraisal	-0.3387	0.0911	-3.72	0.0002	0.19
Acceptance	-0.3103	0.0939	-3.31	0.0010	0.17
Planful problem solving	-0.0879	0.0798	-1.10	0.2712	0.06
Seek emotional Support	0.0480	0.0925	0.52	0.6045	0.03
Seek instrumental Support	-0.0471	0.0891	-0.53	0.5970	0.03
Emotional processing	-0.0272	0.1630	-0.17	0.8677	0.01
Expression of positive emotion	-0.4591	0.0795	-5.77	<0.0001	0.30
Expression of intimacy	-0.4449	0.1197	-3.72	0.0002	0.10
Emotional expression	-0.1540	0.1653	-0.93	0.3522	0.05
Self-esteem	-0.6857	0.0626	-10.95	<0.0001	0.56

Model	Parameter Estimate	S.E.	t-value	p-value	pr
3B. Effect of Treatment on Depressive symptoms Controlling for Mediator γ_{113}					
Acceptance	-0.3231	0.1326	-2.44	0.0153	0.13
Emotional expression	-0.2997	0.1339	-2.24	0.0259	0.12
Emotional processing	-0.3218	0.1347	-2.39	0.0174	0.12
Positive reappraisal	-0.2894	0.1301	-2.22	0.0268	0.12
Planful problem solving	-0.2870	0.1319	-2.18	0.0302	0.11
Seek emotional support	-0.3272	0.1329	-2.46	0.0142	0.13
Seek instrumental support	-0.3301	0.1322	-2.50	0.0130	0.13
Self-esteem	-0.2365	0.1158	-2.04	0.0418	0.11
Expression of intimacy	-0.3137	0.1327	-2.36	0.0186	0.12
Expression of positive emotion	-0.2798	0.1233	-2.27	0.0236	0.12

Note. SC = Supportive Counseling; pr = partial correlation of predictor to outcome