ONLINE EXCLUSIVE

The Effects of Concrete Objective Information and Relaxation on Maintaining Usual Activity During Radiation Therapy

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Purpose/Objectives: To examine the effects of concrete objective information (COI) and relaxation instruction (RI) on patients undergoing radiation therapy, as well as the contribution of symptom uncertainty and body awareness to the intervention effects.

Design: Three-group randomized trial. Assignment was stratified by cancer site. Data collectors were blinded to group assignments.

Setting: University medical center radiation therapy department serving both urban and rural communities in the southeastern United States.

Sample: 76 adults having radiation with curative intent for gynecologic, head and neck, or lung cancer. Most were Caucasian and had in situ to stage II disease. Mean age was 55 years.

Methods: COI and RI were delivered by tape recordings. Outcome measures were indicators of usual activities and emotions at treatment week 3 and two and four weeks post-treatment.

Main Research Variables: Intervention group; social, household, and recreational activities; anxiety, depression, and anger; body awareness; and symptom uncertainty.

Findings: Participants receiving either intervention reported more social activity during treatment. Those given RI who were high in body awareness reported more household activity during treatment. No effects were found regarding emotion. Symptom uncertainty partially explained COI effects.

Conclusions: The findings provide additional support for the effectiveness of COI in helping patients to maintain more of their usual activities during radiation therapy. Instruction in progressive muscle relaxation also may help in maintaining activities.

Implications for Nursing: COI helps patients to cope with treatment by reducing their uncertainty about symptoms. RI effects may vary by activity type and awareness of usual body sensations.

Key Points . . .

➤ Receiving either concrete objective information or relaxation instruction can help patients to maintain more of their usual activities during radiation therapy for cancer.

➤ Concrete objective information can help patients to cope with the effects of radiation therapy by reducing their uncertainty about treatment-related symptoms.

➤ Understanding why interventions are effective and why some patients may benefit more than others may aid decisions about their use in practice.

about use of interventions in practice (Conn, Rantz, Wipke-Tevis, & Maas, 2001).

Individual characteristics, such as a tendency to use certain coping strategies more than others (Miller & Mangan, 1983; Watkins, Weaver, & Odegaard, 1986; Wilson, 1981), the extent to which one wants information (Auerbach, Martelli, & Mercuri, 1983), the level of anxiety prior to an anticipated event (Sime & Libera, 1985), and the degree of optimism (Johnson, 1996), have been reported to modify responses to COI. Yet other researchers have reported no differences in intervention effects by variation in individual characteristics (Rainey, 1985), or the intervention effects by individual characteristic variations differed by outcome measure (Auerbach et al.; Miller & Mangan; Shipley, Butt, Horwitz, & Farbry, 1978).

Concrete objective information (COI), guided by self-regulation theory (Johnson, 1999) and varied relaxation strategies (Hyman, Feldman, Harris, Levin, & Malloy, 1989), has been found to be effective in a variety of patient populations, including those with cancer. Knowing that an intervention is effective is important, as is understanding why it is effective and whether some groups of patients benefit more than others. Information that provides explanations for intervention effects may be helpful when making decisions

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In addition, limited evidence supports hypotheses about why COI is an effective intervention. Johnson (1973) proposed that COI increases the congruence between patients' expectations and experiences because they are assisted in forming accurate images of the experiences and use these images during events to validate their experiences and guide their behaviors (Johnson, Rice, Fuller, & Endress, 1978; Leventhal & Johnson, 1983). Although this interpretation is consistent with the parallel response model of coping, which is a part of self-regulation theory (Johnson, 1996, 1999), evidence supporting the congruence hypothesis is limited to self-report of expectations and experiences as more similar for patients given COI than for those not given the information (Johnson, Christman, & Stitt, 1985; Johnson, Lauver, & Nail, 1989). Perhaps COI induces the processing of more specific information rather than a general comparison of what is expected and experienced. The congruence between expected and experienced physical sensations may be particularly important in producing the beneficial effects of COI. A more direct test of the congruence hypothesis may be achieved by determining whether perceived uncertainty (Mishel, 1999), specifically that associated with sensory or symptom experiences, helps to explain why COI is effective. Uncertainty about sensory experiences may disrupt regulation of coping behavior. COI, which includes the typical sensory experiences, their causes, and how they change over time, may reduce symptom uncertainty, thereby enhancing coping outcomes.

Considerable evidence shows that cognitive interpretation of physical sensations guides behavior during illness and treatment experiences (Leventhal et al., 1997). People monitor their physical sensations or symptoms, assign meaning to them, and act based on their interpretations. For example, symptom experiences influenced decisions to take medication in people with hypertension (Meyer, Leventhal, & Gutmann, 1985), patients receiving chemotherapy were more distressed by ambiguous symptoms (Nerenz, Leventhal, & Love, 1982), and older adults were more likely to attribute vague symptoms to age than to illness (Leventhal & Diefenbach, 1991).

Variations in the tendency to focus on the self also may help to explain the effects of sensory information. Carver and Scheier (1981) suggested that people vary in the degree to which they attend to the public and private aspects of the self and that such differences influence behavioral responses. People also vary in their disposition to attend to internal bodily sensations (Miller, Murphy, & Buss, 1981), which is an aspect of the private self. These notions, combined with the findings of Pennebaker (1982) and others who indicated a link between an internal attentional focus and symptom reports (Bekker, Croon, & Vermaas, 2002; Ferguson & Ahles, 1998; Higgins, 1995), suggest that people who tend to be more aware of their internal bodily sensations may be more responsive to unanticipated changes in the sensations. Thus, people who tend to be more aware of internal physical sensations and changes in sensations may benefit more from COI than those who tend to be less aware of their internal sensations. Variation in attention to internal bodily sensations also may influence responses to relaxation techniques.

Positive effects of relaxation on symptoms such as nausea (Burish & Lyles, 1981), pain (Stam, McGrath, & Brooke, 1984), and emotional distress (Lyles, Burish, Krozely, & Oldham, 1982; Wells, 1982) have been demonstrated in a variety of populations (Devine & Westlake, 1995; Hyman et al., 1989; Johnston & Vögele, 1993). Generally, the relaxation literature is silent with regard to the effects of individual differences (Hillenberg & Collins, 1983; Tarler-Benlolo, 1978). Yet some findings suggest that not all people respond positively to relaxation strategies (Benson, Alexander, & Feldman, 1975) and that some may, at least initially, respond negatively (Heide & Borkovec, 1983). Negative effects were postulated as related to self-focused attention or increased awareness of bodily experience that was aversive for some people (Heide & Borkovec, 1984). A tendency to be more or less aware of normal internal bodily sensations, such as heart beat and hunger pangs (Miller et al., 1981), may explain differential effects of relaxation. When required to attend to their bodies with relaxation instruction (RI), people less aware of normal bodily sensations may respond less positively, and those who are more aware of such sensations may respond more positively.

In this study, the following hypotheses were tested.
1. Patients receiving COI will report maintaining more of their usual activities than those not receiving the information.
2. Patients receiving RI will report less emotional distress than those not receiving instruction.
3. The effects of both interventions will be greater in patients reporting more awareness of bodily sensations than those reporting less awareness.
4. Uncertainty about symptom experiences will help to explain why COI is effective.

Methods

Participants

Eligibility criteria included receiving radiation therapy (RT) with curative intent for uterine, cervical, head and neck, or lung cancer; being at least 21 years of age, having no concurrent psychiatric diagnosis or medical conditions that limited functional ability; having no concurrent chemotherapy or prior RT; and being able to read and understand English. Eligible patients were provided with verbal and written explanations of the study and had an opportunity to ask and receive answers to any questions. Those agreeing to participate gave written consent after the verbal explanation of study participation and the opportunity for questions and answers. A total of 161 patients met the eligibility criteria, and 91 (57%) consented. The majority (70%) of those declining participation cited travel time, time involved, and lack of interest. Among those who gave consent, 6 withdrew from the study and 9 were excluded from data analysis because of change in treatment plan (chemotherapy [n = 1], a second cancer diagnosis [n = 2], discovery of advanced disease [n = 3], refusal of further treatment [n = 1], or not meeting inclusion criteria [history of psychiatric disorder, n = 1; prior RT, n = 1]). Those who withdrew or were excluded from analysis were distributed across the experimental groups.

Interventions

For women having RT for gynecologic cancer, the COI messages describing what patients typically see, hear, and feel during RT incorporated symptom descriptors from a prior study of women having RT for gynecologic cancer

(Christman, Oakley, & Cronin, 2001). Because the symptom descriptors varied by operative status, separate messages were developed for women at the pre- and postoperative stages. For patients with lung or head and neck cancer, symptom reports described by King, Nail, Kreamer, Strohl, and Johnson (1985) and congruent with those more recently described by Johnson, Fieler, Jones, Wlasowicz, and Mitchell (1997) were incorporated into the COI messages. Each COI message included the changes in symptoms over the course of therapy, explained how they were related to the effects of RT, and described symptoms as "the typical symptoms most people experience while having RT" for a condition like theirs. Two messages were used for each patient group. The first described the typical experiences during treatment and was provided during the first treatment week; the second described the changing pattern of experiences after treatment completion and was given during the last treatment week. All messages were professionally recorded onto audiotape and accompanied by written summaries of the information.

RI was adapted from the progressive relaxation technique used by Wilson (1981) and Wilson, Moore, Randolph, and Hanson (1982) and professionally recorded onto audiotape. The first tape, which was given to participants during the first treatment week, included an introduction to relaxation and focused practice in progressive and systematic relaxation of all muscle groups. The second message, given during the last treatment week, was a shortened version of the initial tape and included the suggestion that relaxation also might be helpful in dealing with daily life events. Participants were provided with copies of these recordings and tape players with earphones to take home with them.

To control for the attention given to participants in the experimental groups by the researchers, those assigned to the control group also received professionally recorded messages and written summaries of the messages. Information from the National Institutes of Health booklet *Radiation Therapy and You* (National Institutes of Health, 1985/2001) was incorporated as appropriate to the treatment and post-treatment phases. The first message focused on general information about RT, how it works, its benefits, and skin markings. The second message included general information about follow-up care.

Measures

Usual activities: Measures of household, recreation and pastime, and social activities were selected from the 18 visual analog scales (VAS) derived by Selby, Chapman, Etazadi-Amoli, Dalley, and Boyd (1984) from the Sickness Impact Profile (SIP) (Bergner, Bobbitt, Carter, & Gilson, 1981). Test-retest reliability coefficients ranged from 0.63–1.00, and the split half reliability coefficient was 0.91 for the 18 VAS in a sample of women with breast cancer. Correlations between the VAS and SIP subscale scores were more than 0.60 for 9 of the 16 scales; the correlation between total scores of the two measures was 0.70. The VAS method also distinguished clinically different patient groups as expected (Selby et al.). In an earlier study of patients receiving RT for a variety of cancer diagnoses (Christman, 1995), the correlations between the original SIP subscales and the VAS were moderately strong: household, 0.60 (N = 87); recreation and pastime, 0.62 (N = 88); and social, 0.57 (N = 88). The stability of the VAS mea-

sures was moderate as expected and ranged from 0.30 for social activity to 0.54 for household activity. Unlike the SIP, higher scores indicate higher function. To decrease error variance, all scales were converted from the VAS format to 10-point scales ranging from 0 (unable to do because of my health) to 10 (normal for me).

Emotional distress: The anxiety (9 items), depression (15 items), and anger (12 items) subscales of the **Profile of Mood States** (POMS) (McNair, Lorr, & Droppleman, 1992) were used. A 5-point Likert-type response format ranging from 0 (not at all) to 4 (extremely) with a "past week" time frame was used. Internal consistency estimates for the three subscales ranged from 0.90–0.95. Data support the factorial, construct, and predictive validity of the POMS (McNair et al.). The POMS also has been used widely with people who have cancer (Cassileth, Lusk, Brown, & Cross, 1985; McNair et al.).

Body awareness: The private body consciousness subscale of the **Body Consciousness Questionnaire** (Miller et al., 1981) was used to measure differences in awareness of internal body sensations. This 5-item scale uses a 5-point response format ranging from 0 (extremely uncharacteristic) to 4 (extremely characteristic) to assess the degree to which the respondent tends to be aware of internal sensations, such as hunger contractions of the stomach, temperature changes, and heart beat. Test-retest reliability was 0.69, and the scores were unrelated to social anxiety, hypochondriasis, and emotionality as predicted (Miller et al.). The alpha coefficient was 0.73 in a prior sample of 87 people having RT (Christman, 1995). In the present sample, the alpha coefficient was 0.80.

Symptom uncertainty: The **Symptom Uncertainty Scale** (SUS) was derived from Mishel's Uncertainty in Illness Scale (MUIS) (Mishel, 1981, 1984). Ten items that reflected symptom perception or could be reworded to specifically assess symptom experiences were selected from the MUIS. The 5-point Likert response format ranging from 1 (strongly disagree) to 5 (strongly agree) was retained from the MUIS. In the sample of 87 people having RT, the alpha coefficients were 0.69 during treatment week 3 and 0.81 four weeks after treatment completion. The relationship between the two scores was moderate (r = 0.63) as expected because of changing symptom experiences over time. One item was reworded based on examination of the item-total correlations and factor analysis (Christman, 1995). In the present sample, the alpha coefficient was 0.67 during treatment week 3. Also at treatment week 3, symptom uncertainty was unrelated to body awareness (r = 0.09) and negatively related to perceived predictability (r = –0.53, p < 0.01) and understanding (r = –0.48, p < 0.01) of treatment-related experiences, supporting the scale's discriminant and concurrent validity (Christman, Cain, Cronin, & Corley, 2002).

Symptom experiences: A symptom inventory adapted from the McCorkle and Young (1978) **Symptom Distress Scale** and similar to that used by Johnson et al. (1985) and Johnson, Nail, Lauver, King, and Keys (1988) was used to measure the number and severity of symptoms commonly associated with RT. The symptoms listed were those included in the RT consent form for the cancer site where the participant was being treated. Participants were asked to rate the severity of their symptoms on a 6-point scale ranging from 0 (have not had) to 6 (extremely bad).

Design and Procedures

A three-factor experimental design was used to test the hypotheses. The first factor was intervention group (COI, RI, or control). The second factor was body awareness with two levels using a median split. The third factor was time, using treatment week 3 and post-treatment weeks 2 and 4. Stratified random assignment by cancer site was used to achieve proportional distribution across the experimental groups.

Participants were enrolled in the study during the first treatment week. After informed consent and before the first intervention, participants completed the measures of body awareness and emotional distress. The SUS was completed one day after each intervention. Additional measures of emotional distress were obtained during treatment week 3 and two and four weeks after treatment completion, as were the measures of usual activities and symptom experiences. Research assistants who were blind to the participants' group assignments collected all postintervention data. Post-treatment data were obtained by mail with postcard reminders and follow-up telephone calls as necessary.

Results

The final sample included 76 patients, 25 in the COI group, 25 in the RI group, and 26 in the control group. Random assignment, stratified by cancer site, achieved proportional distribution of participants across the three groups (gynecologic cancer, 16%–18%; head and neck cancer, 9%–13%; and lung cancer, 5%). The sample included 52 (68%) women and 24 (32%) men; most were Caucasian (92%). Their mean age was 55 years (SD = 12.2). More than half of the participants were married (61%, n = 46), and 41% (n = 31) were employed outside the home. The others were either homemakers (n = 24, 32%) or retired or disabled (n = 21, 28%). Most were within one month of diagnosis (n = 63, 83%); all were less than one year from initial diagnosis. More than half of the sample had in situ to stage II disease (59%, n = 45); 36% had stage III or IV disease (n = 27). Staging data were unavailable for four participants. The mean number of RTs was 31.

Initially, the data were examined to assess the adequacy of randomization. The experimental groups did not vary significantly by gender ($X^2[2, N = 76] = 2.17$, not significant). The mean scores for body awareness did not differ by group ($F[2,73] = 0.58$, not significant). No systematic differences existed in usual activities or emotional distress by cancer site. As a manipulation check for the use of relaxation across the groups, participants were asked four weeks after treatment to indicate whether they had used any of a number of coping strategies since beginning RT. The proportion of patients reporting use of a relaxation strategy was greater in the RI group than in the other two groups ($X^2[2, N = 69] = 7.55$, $p < 0.03$).

Repeated measures analysis of covariance was used to test the hypothesized effects of COI, RI, and body awareness on usual activities and emotional distress. Number of reported symptoms at each time of measurement was the covariate for analyses of effects on usual activities; emotional distress prior to intervention was the covariate for analysis of effects on emotional distress.

The only effect on emotional distress was for the covariate preintervention distress ($F[1, 57] = 36.69$, $p < 0.001$). No significant effects on recreation and pastime activities were found. For social activity, with the effects of the covariates removed, the only other significant effect was a within-subjects group by time interaction (see Table 1). As shown in Figure 1, during treatment week 3, participants in both the COI (Newman-Keuls $q[7] = 4.59$, $p = 0.05$) and RI ($q[8] = 5.43$, $p = 0.05$) groups reported more social activity than did those in the control group. Neither group differed from the control group two and four weeks after treatment completion.

Analysis of effects on household activities produced a within-subjects group by body awareness by time interaction. For the people low in body awareness (see Figure 2), neither the COI nor RI groups differed from the control group across the measures of household activity. In the people high in body awareness, household activity was greater in the RI group than in the control group ($q[15] = 5.11$, $p = 0.05$) only during treatment week 3. Although the COI group also reported more household activity than the control group during treatment week 3, the difference was not significant. Neither of the experimental groups differed from the control group two and four weeks after treatment.

The hypothesized role of symptom uncertainty in explaining the effects of COI was examined with the social activity scores from treatment week 3. The researchers used the regression approach to testing mediation effects suggested by Baron and Kenny (1986). First, symptom uncertainty was regressed on the contrast between COI versus the control group means. Second, social activity was regressed on the group contrast. Lastly, social activity was regressed on both symptom uncertainty and group. Group explained 5.15% of the variance in symptom uncertainty (COI $\overline{X}$ = 30.44, control $\overline{X}$ = 33.15; $F[1, 74] = 4.02$, $p < 0.05$) and 8.41% of the variance in social activity ($F[1, 73] = 6.71$, $p < 0.02$). When social activity was regressed on symptom uncertainty (7.72%

### Table 1. Analysis of Variance for Usual Activity Scores

Source	df	F Social Activity	Household Activity
Between subjects			
Covariates	1	14.84***	7.78**
Group	2	1.42	0.12
Body awareness	1	1.37	1.49
Group x body awareness	2	0.76	1.49
Subject within group error	56 (55)	(12.61)	(15.24)
Within subjects			
Covariates	1	4.84*	0.66
Time	2	1.89	2.00
Time x group	4	3.90**	0.39
Time x body awareness	2	0.62	0.46
Time x group x body awareness	4	0.19	2.88**
Time x subject within group error	113 (111)	(6.09)	(6.50)

Note. Values in parentheses are df changes caused by missing data and mean square errors.

* p < 0.05

** p < 0.01

*** p < 0.001
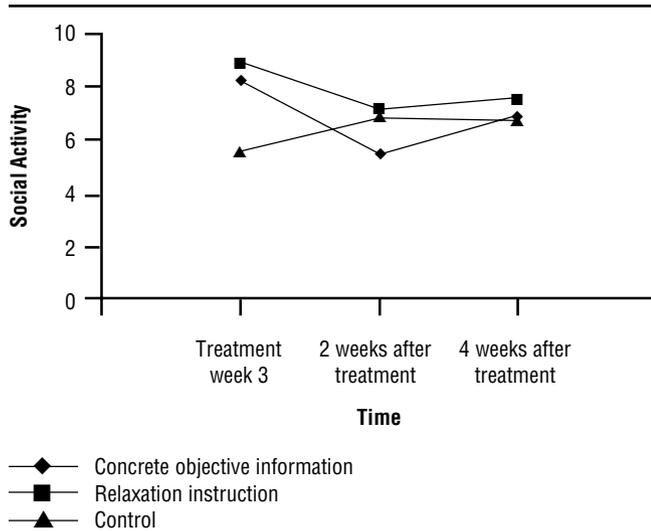
Figure 1. Mean Scores for Social Activity by Intervention Group and Time

of the variance, $F[1, 73] = 6.10$, $p < 0.02$) and group, the amount of variance explained by group decreased to 5.01% ($F[2, 72] = 4.14$, $p < 0.05$).

Discussion

As hypothesized, patients receiving COI reported maintaining higher levels of usual function than those not receiving this information but only for social activity during treatment. The effects of COI were explained partially by symptom uncertainty. Preparatory information describing typical experiences, including symptom experiences, helped patients form a mental schema that reduced uncertainty about their symptom experiences. Knowing what to expect and that the experiences were typical and resulted from treatment helped patients to focus on ways to deal with the experiences rather than on interpreting and giving meaning to them (Leventhal & Diefenbach, 1991). The information served as a resource for proactive coping (Aspinwall & Taylor, 1997) as the participants dealt with the effects of RT. Reducing symptom uncertainty may contribute to understanding the experience, which Johnson et al. (1989) found to explain the effects of COI in men having RT for prostate cancer.

Unlike the findings of Johnson et al. (1988), COI in the present study did not produce positive effects over time or consistent effects across the measures of usual function. Sample heterogeneity, particularly with respect to gender and cancer site, most likely contributed to the lack of post-treatment effects. Randomization may have failed to control for the post-treatment clinical course and gender-related variations in usual activities. The lack of effects over time also may be a result of reduced-dose effect. In contrast to prior studies, the researchers of the current study were unable to enroll participants prior to simulation and the first treatment. Thus, participants did not receive preparation for the simulation experience or the first treatment. Also, self-care strategies were not included in the messages, as done by Johnson, Fieler, Wlasowicz, Mitchell, and Jones (1997). Because of advances in treatment planning and delivery, the symptom

descriptors in the information messages for patients with head and neck or lung cancer might have influenced the findings. However, this is unlikely because the information did not include descriptions of side-effect severity, which most likely is influenced by treatment advances.

The effects of COI were not influenced by level of awareness of bodily sensations as predicted. Although patients less aware of bodily sensations reported engaging in more household activities two weeks after treatment than those who were more aware of such sensations, their level of activity did not differ from that reported by the highly aware people in the control group. Cioffi (1991) suggested that measures of somatic symptom perception do not capture degree of attention to the sensation but that they do capture the degree of negative interpretation generated by a person's awareness of the sensation. The effects of RI for those high in body consciousness may be interpreted in light of such understanding. Perhaps the use of relaxation short-circuited the patients' tendency to process their subjective experiences negatively, permitting more involvement in usual household activities. That level of body awareness influenced the effect of RI on household activity but
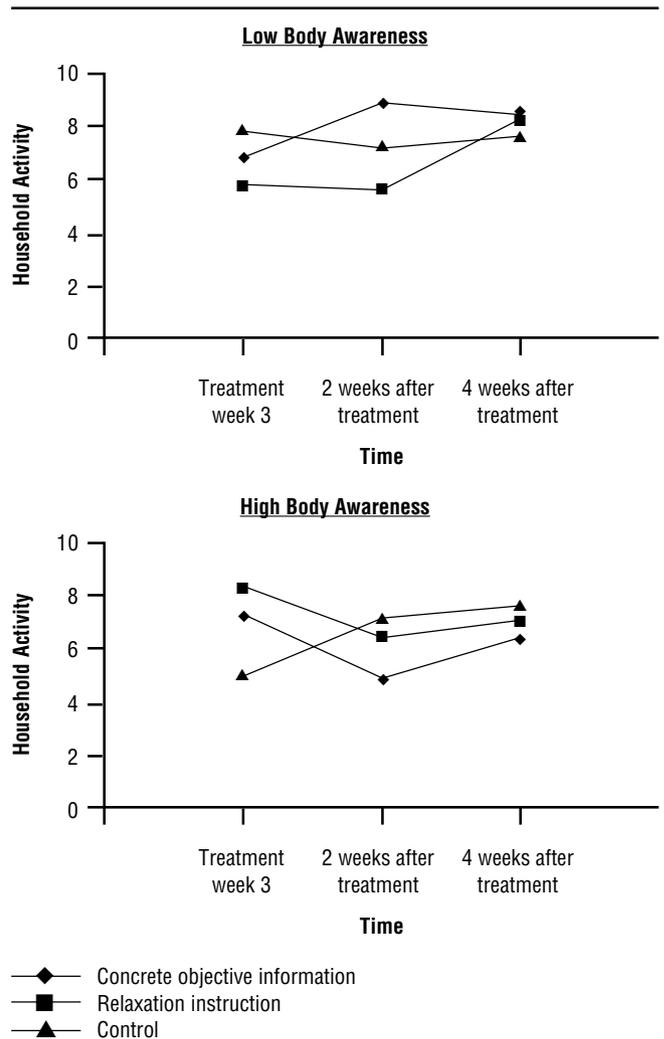
Figure 2. Mean Scores for Household Activity by Intervention and Time for Low and High Body Awareness Groups

not its effect on social activity may relate to the specific nature of these two activities and the potential differential effects of personality traits. Activities requiring greater physical energy expenditure, such as work around the house, may call into play a person's tendency to be more aware of bodily sensations. In this case, RI short-circuited the tendency to process subjective experiences negatively, permitting more involvement in usual household activities. For activities involving less physical energy expenditure that also distract attention from self, such as social activities, the tendency to interpret bodily sensations negatively may be less operative.

The findings of this study provide additional support for the positive effects of COI on functional status and suggest that RI also may enhance functional status during RT for cancer. Often overlooked is that, by increasing functional status, interventions may decrease the social costs of treatment for cancer. Further, these findings suggest specific processes by which COI and RI produce their effects on the outcomes of coping with stressful treatment for cancer. Greater understanding of the processes by which these interventions produce effects on patient outcomes increases the probability of identifying other interventions that may similarly affect the processes and, thus, patient outcomes. Most important to identifying new and innovative interventions is that symptom uncertainty helped to explain the effects of COI. Such findings may be useful in identifying other approaches for helping patients to deal with stressful healthcare events.

Implications for Nursing

The findings of this study provide further support for the use of COI in the care of patients undergoing RT. RI also may help these patients maintain more of their usual activities during treatment. In evaluating the effects of these interventions in practice, assessing various types of usual activities may be important. Both COI and RI helped patients maintain more of their usual social activities during treatment, whereas only RI was effective for household activity and only for those people more aware of normal physical sensations. Clinicians may consider assessing patients' tendency to pay attention to their physical sensations when evaluating the effects of these interventions. They also may find COI to be more effective when the intervention is started prior to simulation and combined with self-care information for dealing with the effects of RT.

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