Health Psychology
2000, Vol. 19, No. 6, 568–575

0278-6133/00/$5.00 DOI: 10.1037//0278-6133.19.6.568

The Impact of Group Psychological Interventions on Distress in Infertile Women

Alice D. Domar
Beth Israel Deaconess Medical Center and Harvard Medical School

Diane Clapp
Beth Israel Deaconess Medical Center

Ellen Slawsby and Bruce Kessel
Beth Israel Deaconess Medical Center and Harvard Medical School

John Orav
Brigham and Woman's Hospital and Harvard Medical School

Melissa Freizinger
Beth Israel Deaconess Medical Center

Infertile women express higher levels of distress than fertile women, with distress peaking between the 2nd and 3rd year. The purpose of this study was to determine whether group psychological interventions could prevent this surge. One hundred eighty-four women who had been trying to conceive between 1 and 2 years were randomized into either a cognitive–behavioral group, a support group, or a control group. All experimental participants attended a 10-session group program. Participants completed psychological questionnaires at intake and again at 6 and 12 months. Substantial attrition occurred, particularly in the control group. The cognitive–behavioral and support participants experienced significant psychological improvement at 6 and 12 months compared with the control participants, with the cognitive–behavioral participants experiencing the greatest positive change.

Key words: female infertility, group psychological interventions, support groups, cognitive–behavioral therapy, mind/body

It has been assumed since biblical times that infertility is associated with heightened levels of anxiety and depression. In the Book of Samuel, the story of Hannah illustrates the psychological impact of infertility (Schiff & Schiff, 1998). Hannah failed to conceive "year by year," which tormented her to the point where she exhibited symptoms of a clinical depression, including constant weeping, anorexia, and overwhelming feelings of sadness.

The psychological impact of infertility has been well documented. In a prospective, longitudinal study of 59 women presenting for infertility treatment (Downey et al., 1989), 9% of the infertility patients met the criteria for a major depressive episode, in contrast to 3% of the control group. In addition, half of the infertility patients reported changes in their sexual functioning, and 75% reported changes in their mood. In a similar study of infertile women, 11% of the infertile sample met the criteria for a major depressive episode, compared with 4% of the fertile sample (Downey & McKinney, 1992). Wright, Allard, Lecours, and Sabourin (1989) reported that infertile women were significantly more distressed than control participants on the majority of psychological parameters studied. Garner, Arnold, and Gray (1984) found that depressive symptoms, as measured by the Beck Depression Inventory (BDI; Beck & Steer, 1987), were present in 34% of the women prior to an in vitro fertilization cycle (IVF) and in 64% after the cycle was determined to be unsuccessful. Freeman, Garcia, and Rickels (1983) reported that 16% of women preparing for an IVF cycle had scores of 70 or more on one or more subscales of the Minnesota Multiphasic Personality Inventory (Hathaway & McKinley, 1989). Bell (1981) using the Schedule for Affective Disorders and Schizophrenia (Endicott & Spitzer, 1978), found that 40% of infertile women had mild to moderate symptoms of depression and 7% had severe symptoms. When compared with women with heart disease, cancer, chronic pain, or HIV+ status, infertile women reported equivalent levels of anxiety and depression to all but the chronic pain patients (Domar, Zuttermeister, & Friedman, 1993). It should be noted that findings regarding the prevalence of distress and depressive symptoms in infertile women

Alice D. Domar and Ellen Slawsby, Mind/Body Medical Institute, Beth Israel Deaconess Medical Center and Harvard Medical School; Diane Clapp and Melissa Freizinger, Mind/Body Medical Institute, Beth Israel Deaconess Medical Center; Bruce Kessel, Department of Obstetrics and Gynecology, Beth Israel Deaconess Medical Center and Harvard Medical School; John Orav, Division of General Medicine, Brigham and Woman's Hospital and Harvard Medical School.

This research was supported by National Institute of Mental Health Grant MH50024. This article is dedicated to the memory of two coinvestigators, Richard Friedman and Joseph Mortola. We thank the following individuals for their support of this project: Michael Alper, Robert Barbieri, Stephen Bayer, Catherine Bell, Vito Cardone, Jeffery Dusek, Joseph Hill, Sara DeLong, Ian Hardy, Patricia Hibberd, Susan Lobel, Selwyn Oskowitz, Sharon Steinberg, and Patricia Zuttermeister.

Correspondence concerning this article should be addressed to Alice D. Domar, 110 Francis Street, Suite 1A, Boston, Massachusetts 02215. Electronic mail may be sent to adomar@caregroup.harvard.edu.

are not entirely consistent (see Stanton & Danoff-Burg, 1995, for a review). However, the several studies described previously suggest that at least some women who confront infertility are at risk for heightened distress and depressive symptoms.

When depressive symptoms do occur in infertile women, they appear to peak between the second to third year of infertility (Domar, Broome, Zuttermeister, Seibel, & Friedman, 1992). Three hundred thirty-eight infertile women and 39 healthy women completed the BDI and the Center for Epidemiological Studies Depression Scale (Spitzer et al., 1992). The infertile women had significantly higher depression scores and twice the prevalence of depressive symptoms than the controls. Women with a two- to three-year history of infertility had higher depression scores than all other infertile women and significantly higher when compared with women with infertility durations of less than 1 year or more than 6 years.

Cognitive therapy is increasingly accepted as being effective in the treatment of depression with advantages over other forms of counseling, especially with infertile women (Hunt & Monach, 1997). Several studies with cancer patients combined support with cognitive–behavioral techniques, and benefits included decreased psychological distress, longer life span, and decreased mortality (Helgeson & Cohen, 1996). In a recent study with multiple sclerosis patients (Schwartz, 1999), a group intervention that emphasized coping-skills training provided greater advantages in well-being and coping than a peer telephone support group. Cognitive–behavioral approaches have been effective in reducing symptoms and decreasing health costs in patients with a wide variety of conditions (e.g., heart disease, hypertension, chronic and acute pain), including cardiac, abdominal, orthopedic, and dental surgery and invasive diagnostic procedures (Mandle, Jacobs, Arcari, & Domar, 1996).

Although support groups are the most common psychological intervention offered to infertile women in this country, there is a paucity of research on their efficacy. However, evidence suggests that the application of cognitive–behavior therapy (CBT) to infertile women in group format contributes to significant psychological improvement. In three separate nonrandomized, uncontrolled studies (Domar, Seibel, & Benson, 1990; Domar, Zuttermeister, Seibel, & Benson, 1992; Domar, Zuttermeister, & Friedman, 1999), infertile women who attended a 10-session CBT program experienced significant improvement pre- to postprogram on all assessments of distress, including depressive symptoms, anxiety, and anger. Published randomized, controlled, prospective studies are needed to determine the efficacy of psychological interventions in decreasing distress. In addition, there have been no attempts to intervene with infertile women early in the treatment process, to try to prevent the development of depression and other symptoms as treatment progresses. The following study is part of a preventive intervention trial to determine the impact of group psychological interventions on several factors, including viable pregnancy rates and psychological status. The viable pregnancy data have been reported elsewhere (Domar et al., 2000).

The goal of this study was to determine if group psychological interventions could prevent the anticipated increase in psychological distress as duration of infertility increases. Because the two most common group interventions currently offered to infertile women are support groups or cognitive–behavioral groups (also known as mind/body; Domar et al., 1990; Domar, Zuttermeister, et al., 1992), these were the two interventions chosen to investigate. It was hypothesized that women who participated in a cognitive–behavioral group would experience the least amount of psychological distress during the study period, followed by women who participated in a support group, followed by the control participants.

Method

Participants

Women who had been trying to conceive for between 1 and 2 years were recruited for this study from a variety of sources. Brochures were placed in the waiting rooms of infertility specialists' offices, and mailings were sent to appropriate patients from collaborating physicians' practices. In addition, public service announcements, paid advertisements, and local television stories were used to enhance recruitment.

Eligible participants met the following criteria: English-speaking, not currently practicing any relaxation technique, not participating in any individual or group psychological treatment, not currently taking psychotropic medication, and not being clinically depressed. The absence of clinical depression was a condition of the funding agency and the Beth Israel Deaconess Medical Center internal review board. Women who were clinically depressed prior to randomization were referred for appropriate psychiatric care rather than facing the possibility of being randomized to the control group.

This study was approved by the ethics review board at the Beth Israel Deaconess Medical Center. All participants who came in for the Time 1 interview read and signed the informed consent form.

Over 2,000 women responded to the recruiting effort, but more than 90% had been trying to conceive for more than 2 years. They were referred to the clinical infertility mind/body program; the local chapter of Resolve, a national educational and support organization, for information on support groups; and/or to individual psychotherapists specializing in infertility.

Of the 212 women who came in for the Time 1 visit, 28 met our criteria for potential clinical depression: a score above 15 on the BDI, a score above 11 on the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1967) or criteria for clinical depression on the Structured Clinical Interview for the DSM-III-R (SCID; Spitzer, Williams, Gibbon, & First, 1992). These women were referred to the Department of Psychiatry for assessment.

One hundred eighty-four women were randomized, according to a computer-generated random-numbers table, into one of three groups: cognitive–behavioral (CB), support (S), or a routine-care control group (C). There were two randomization procedures. When recruitment was active, participants were randomized into one of the three groups. However, when fewer participants were enrolling, participants were randomized into the C group versus the intervention group, with the intervention group randomly alternating between CB and S to initiate intervention groups of adequate size. Thus, during active recruitment, after approximately 36 participants were recruited, there were enough participants so that the intervention groups could begin (approximately 12 participants in each group). By randomizing to control versus intervention, only approximately 24 participants had to be recruited prior to proceeding. Ninety-nine percent of the study participants were Caucasian women. Information regarding the income status of the study participants was not gathered.

During the second year of the study, the randomization procedure again had to be altered because of the difficulty in recruiting appropriate participants. To commence intervention groups in a timely fashion, there were 15 participants who were randomized to one of the two intervention groups but were switched to the other intervention before that group began. The reason for this alteration was that each group intervention required 8 to 12 participants per group. Thus, it was possible that several women were randomized to a particular group but the other members needed to begin

that group had not yet been enrolled. Rather than have participants wait 6 or more months for their group to start and risk having them discontinue participation, participants were switched. A total of 10 S and 5 CB participants were moved to the other intervention group after randomization but prior to the beginning of the group. There were never any participants switched between intervention and control groups. Because participants were aware of their original group assignment, all statistical analyses were conducted with participants' original assignment (intent-to-treat analysis).

Of the 184 participants, 63 were randomized into the C group; 65 to the S group; and 56 to the CB group. Thirty-eight of the C participants discontinued participation during the first year because of dissatisfaction with group assignment. Fourteen joined a clinical CB program, 6 joined a Resolve group, 2 entered psychotherapy, 1 did biofeedback therapy, 3 did not like being part of a clinical trial, and 12 provided no reason for their withdrawal. Seventeen of the S participants did not participate in the study, because of dissatisfaction with group assignment or disliking being part of a clinical trial. Nine CB participants discontinued from the study, because of various reasons, including low interest in being in a group intervention.

All participants were informed that they would come in every 6 months for psychological testing until they achieved a pregnancy or until they reached an infertility duration of 4 years. In addition, participants were told that if they joined any external psychological intervention (individual, couples, or group), began taking psychotropic medication or stopped trying to conceive, they would no longer be followed for the study. In addition, S and C participants were advised that participation in any type of relaxation practice would render them ineligible for continuation. Although this may have sounded coercive, participants were reassured that should they feel the need to pursue outside treatment, they would be encouraged to do so. The subsequent attrition rates demonstrate that participants, especially the controls, did indeed feel free to discontinue participation.

A total of 63 C, 55 CB, and 65 S participants completed the Time 1 psychological assessment. For an undetermined reason, psychological data from 1 CB participant are missing. Because of the exceptionally high pregnancy rates, especially in the intervention participants (as well as the above-mentioned dropouts and discontinuation criteria), 14 C, 20 CB, and 29 S participants completed the Time 2 assessment 6 months later, and only 2 C, 7 CB, and 11 S participants completed the Time 3 visit 12 months after recruitment. All cited group assignments reflect the original assignment, not actual group attendance.

Psychological Measures

Each psychological testing session was conducted by one of two clinical psychologists who remained blind to participant assignment and included the completion of six psychological scales and two psychiatric interviews. Measures included the Profile of Mood Scale (POMS; McNair, 1971), the State–Trait Anxiety Inventory (STAI; Spielberger, 1988), the BDI, the HRSD, the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1972), the Marital Distress Scale (MDS; Pearlin & Schooler, 1978), the Health-Promoting Lifestyle Profile (HPLP; Walker, Sechrist, & Pender, 1987), and the SCID. In addition, each participant completed an information form at the Time 1 visit, which included questions on demographics, duration of infertility, and current medical treatment.

Chosen to assess general psychological functioning, the POMS was designed to assess affective states within the past week and yields six mood scales and a total mood disturbance score. In a normative sample, the alpha coefficients for internal consistency range from .84 to .95, and the test–retest reliability is somewhat lower, ranging from .65 to .74, which is expected because the test was designed to assess fluctuating mood states. Content, factorial, predictive, and construct validity have all been supported.

The STAI is a 40-item self-report scale consisting of 20 state and 20 trait statements. As expected, the test–retest reliability is higher for the Trait scale, ranging from .65 to .86, and for the State scale it is .16 to .62 (Spielberger, 1988).

Three measures assessed depressive symptoms. The BDI has been used both for detecting possible depression in the general population and for assessing the intensity of depression in psychiatric patients. Alpha coefficients for internal consistency range from .79 to .90 (Beck & Steer, 1987). Assessments of the validity of the BDI demonstrate satisfactory content, discriminant, construct, and concurrent validity. The HRSD is a structured assessment of depressive symptoms designed to be administered by a trained professional. It is not designed for diagnostic purposes but instead for assessing the severity of a patient's condition. It has been recommended that both depression scales be used when multiple outcome measures are needed (Lambert, Christensen, & DeJulio, 1983). The SCID was chosen as the clinically based interview because it is widely used in studies on depression and anxiety. This study included two skilled interviewers and one specific patient population. For this study, the SCID was used to clarify the status of high scores on the BDI and HRSD and was administered at the first testing session to screen out any participants with preexisting depressive symptoms.

The RSES, a measure of self-esteem, is a widely used instrument with both adult and adolescent populations. The test–retest reliability is .93 (Rosenberg, 1972). Positively and negatively worded statements are presented alternatively.

Marital distress was assessed because the impact of psychological interventions on this construct have never been assessed in infertile samples. The MDS is a nine-item self-report questionnaire with item factor loadings ranging from .66 to .83 (Pearlin & Schooler, 1978).

The HPLP is designed to measure patterns and determinants of health-promoting behaviors, as well as the effects of interventions on these behaviors. The seven subscales are Self-Actualization ("am enthusiastic and optimistic about life"), Health Responsibility ("report any unusual signs or symptoms to a physician"), Exercise ("exercise vigorously for 20–30 minutes at least 3 times per week"), Nutrition ("choose foods without preservatives or other additives"), Interpersonal support ("discuss personal problems and concerns with persons close to me"), Stress Management ("am aware of the sources of stress in my life"), and Overall Health-Promoting Style (the mean of all the other scores). Alpha reliability coefficients are .92 for the total score and a range of .70 to .90 for the subscales (Walker, Sechrist, & Pender, 1987).

Psychological Interventions

Participants randomized into either of the two intervention groups met on an individual basis with the group leader prior to the group starting. The participant's medical and psychosocial history were reviewed during this session. In addition, the schedule and format of the group were presented. Alice D. Domar and Diane Clapp alternated leading both types of groups to eliminate the possibility of leader bias. Because Alice D. Domar had experience leading cognitive–behavioral groups and Diane Clapp was experienced in leading support groups, each leader was thoroughly trained by the other in the skills needed to run the other type of group. The control participants received no psychological intervention.

Intervention groups met for 2 hr on a weekly basis for 10 weeks on a weekday evening. All sessions were tape-recorded, and a random sample of 5% was reviewed by an experienced clinical psychologist to ensure that the group leaders maintained the integrity of the intervention contents (for example, that stress-management strategies were not introduced in the support group). Group leaders were scored on a 7-point scale ranging from 1 (*complete deviance from the session content*) to 7 (*strict adherence to session content*). Compliance with session content was 100%, reflecting the fact that the group leaders maintained program integrity during all monitored sessions.

The CB group was modeled after the group mind/body programs that have been offered in the Division of Behavioral Medicine at Beth Israel

Deaconess Medical Center since 1987 (Domar et al., 1990; Domar, Zuttermeister, et al., 1992). Participants in the CB group were introduced to a wide variety of techniques, including relaxation-response training, cognitive restructuring, emotional expression, and nutrition and exercise information relevant to infertility. The cognitive–behavioral intervention was modified from the clinical model for this study so that the format of the two groups were identical and only the actual content of the sessions themselves differed. Thus, components offered in the clinical program (Domar et al., 1999), such as sharing and/or support time, husbands attending three of the sessions, and guest speakers, were omitted for this research study.

The support groups were modeled after groups offered through Resolve, an organization that offers standardized support groups in every state. The support group was designed to be representative of groups offered throughout the United States, not a minimal-treatment or quasicontrol group. Support group participants spent the 1st hr of each session "checking in" with each other on infertility treatments or issues that may have arisen since the previous week. The 2nd hr was spent on a different topic each week, including the impact of infertility on self-esteem, their marriage, family and friends, spirituality, and job.

Statistical Analysis

The following characteristics were compared between the three groups: age, highest level of education, months of attempted conception, current medical treatment, and type of current medical treatment. The three groups were compared on demographic and background characteristics (i.e., age, education, months of attempted conception, current use of medical treatment, type of medical treatment) using analysis of variance (ANOVA) or chi-square tests. Baseline psychological tests were compared by ANOVAs between patients who remained in the study at 6 months and those who left the study because of pregnancy or loss to follow-up. A 3 × 2 ANOVA of study group (C, S, CB) by attrition (retained, attrited) was performed on baseline assessments on each of the psychological scales. The group comparisons of psychological outcomes at 6 and 12 months were performed using analyses of covariance, adjusting for each baseline psychological measure. The results are presented for each group as adjusted mean changes from baseline.

Results

Sample Characteristics

The demographic characteristics of the study sample are summarized in Table 1. There were no statistically significant differences in age, education, months of infertility, whether or not participants were receiving medical treatment or type of medical treatment at the time of randomization. Table 2 shows that there were also no significant differences on any of the baseline psychological questionnaires.

Of the initial 55 CB participants, 20 became pregnant by 6 months and thus did not return for the Time 2 interview and 15 CB participants declined to come in for the interview. Similarly, 12 of the 65 S participants became pregnant by 6 months and 24 dropped from the study. Of the 63 C participants, 5 became pregnant and 44 dropped from the study. The analyses below are based on the remaining 63 participants who completed the 6-month interview. At baseline, these 63 participants were less depressed, as rated by the HRSD (M = 7.9, SD = 4.6), $F(1, 177) = 5.27$, $p = .02$, and by the POMS Depression (M = 9.7, SD = 10.5), $F(1, 178) = 5.18$, $p = .02$, than the patients who left the study (HRSD: M = 9.7, SD = 5.0; POMS Depression: M = 14.0, SD = 11.1). The patients who remained in the study also had less fatigue as rated by the POMS (M = 7.3, SD = 5.5), $F(1, 179) = 6.06$, $p = .01$, lower overall POMS Total Mood Disturbance (M = 21.4, SD = 34.2), $F(1, 178) = 4.02$, $p = .045$, and lower Marital Distress scores (M = 16.6, SD = 6.0), $F(1, 175) = 4.27$, $p = .04$, than those who left the study (Marital Distress: M = 18.3, SD = 5.8; POMS Fatigue: M = 9.5, SD = 6.4; Total Mood Disturbance: M = 31.0, SD = 35.3). In the 20 baseline psychological measures, there was only one instance, POMS anxiety, where the impact of attrition was different in the three study arms, $F(2, 176) = 3.31$, $p = .04$. In the C group (M = 3.7, SD = 3.5) and S group (M = 5.1, SD = 6.4), the participants who remained in the study had lower anxiety at baseline than the participants who left the study (M = 7.3, SD = 6.6, and M = 8.7, SD = 7.5, respectively), whereas in the CB group, the participants who remained in the study (M = 8.1, SD = 7.4) had higher levels of anxiety at baseline than those who stopped participation (M = 6.0, SD = 5.9).

Table 1
Demographic Characteristics for All Randomized Participants

Variable	Study group: Cognitive–behavioral (n = 56)	Support (n = 65)	Control (n = 63)	F/χ^2	p
Age (in years)					
M	33.96	33.71	35.19	1.86	.16
SD	4.32	4.65	4.84		
Years of education					
M	16.91	16.29	16.98	2.23	.11
SD	2.02	1.63	2.38		
Months of infertility					
M	18.68	17.99	17.44	1.63	.20
SD	3.66	4.11	3.36		
Receiving medical treatment	50%	60%	57%	1.27	.53

Note. df = 2 and 181 for age, education, and infertility duration. Chi-square analyses were performed on 184 participants.

Psychological Improvement at 6 Months

Table 3 shows that significant between-group differences emerged on the following variables: HPLP subscales of Stress-Management Skills and Style, STAI State Anxiety, Marital Distress, and the POMS subscales of Anxiety, Vigor, Confusion, and Total Mood Disturbance. For all significant analyses, inspections of adjusted mean change scores revealed an improvement for CB and S group participants and a deterioration for C participants in Stress Management Skills, Style, Anxiety (STAI State subscale and POMS), Marital Distress, Vigor, Confusion, and POMS Total Mood Disturbance. When the two intervention groups were compared, the CB participants had significantly better, or psychologically healthier, scores on the HPLP Stress-Management Skills, $F(1, 46) = 19.90$, $p = .0001$, and Style, $F(1, 46) = 7.10$, $p = .011$, the POMS Vigor subscale, $F(1, 46) = 6.60$, $p = .014$, the BDI, $F(1, 46) = 4.10$, $p = .049$, and RSES, $F(1, 46) = 4.78$, $p = .034$.

When the data analysis was performed on actual group attendance, rather than using the intent-to-treat design, the results did not change (see Table 3). All between-group significant differences remained, with several differences being stronger. Actual attendance included a total of 24 CB and 25 S participants.

Table 2
Psychological Measures at Baseline

	Study group							
	CB (n = 55)		S (n = 65)		C (n = 63)			
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2, 180)	*p*
BDI	8.1	5.8	10.2	6.9	9.3	6.1	1.80	.17
HRSD	9.3	5.4	8.5	4.3	9.5	5.2	0.77	.46
HPLP								
Self-Act	3.0	0.4	3.0	0.6	2.9	0.5	0.76	.47
Health Res	2.3	0.5	2.3	0.5	2.3	0.5	0.06	.94
Exercise	2.2	0.7	2.2	0.8	2.2	0.7	0.02	.98
Nutrition	3.0	0.5	2.9	0.6	3.0	0.7	1.43	.24
IS	3.2	0.5	3.2	0.6	3.1	0.6	0.87	.42
SMS	2.1	0.5	2.2	0.5	2.1	0.4	0.93	.40
Style	2.7	0.3	2.7	0.4	2.6	0.4	0.08	.92
STAI								
State	40.5	11.7	41.3	12.8	40.2	8.4	0.17	.84
Trait	39.6	9.2	40.9	11.3	41.3	8.5	0.44	.64
RSES	33.5	4.6	32.7	5.6	31.6	4.9	2.01	.14
MDS	18.4	6.8	17.6	5.9	17.2	5.1	0.58	.56
POMS								
Anxiety	6.7	6.5	7.1	7.2	6.5	6.3	0.11	.90
Depression	13.2	11.4	14.1	12.3	11.5	9.0	0.93	.40
Anger	9.4	7.5	9.6	7.2	8.1	6.9	0.79	.46
Vigor	12.9	6.7	13.3	6.2	13.4	6.4	0.09	.91
Fatigue	9.2	5.8	9.0	6.7	8.1	5.9	0.55	.58
Confusion	3.5	4.1	3.7	4.9	3.1	4.8	0.24	.79
Total	29.1	35.0	30.1	37.8	23.9	32.6	0.56	.57

Note. BDI = Beck Depression Inventory; HRSD = Hamilton Rating Scale for Depression; HPLP = Health-Promoting Lifestyle Profile; Self-Act = Self-Actualization; Health Res = Health Responsibility; IS = Interpersonal Support; SMS = Stress-Management Skills; STAI = State Trait Anxiety Inventory; RSES = Rosenberg Self-Esteem Scale; MDS = Marital Distress Scale; POMS = Profile of Mood Scale.

Psychological Improvement at 12 months

Very few participants remained in the study at 12 months, because of pregnancy or dropping out. There were a total of 7 CB participants, 11 S participants, and 2 C participants. However, four significant differences emerged. The CB participants (M = 1.4, SD = 1.4) and C participants (M = 5.0, SD = 5.7) had significantly lower scores on the HRSD than did the support group (M = 8.4, SD = 5.0), $F(2, 16) = 6.13$, $p = .011$. The CB participants had higher scores on the HPLP subscales of Stress-Management Skills (M = 2.9, SD = 0.6), $F(2, 16) = 4.20$, $p = .034$, Interpersonal Support (M = 2.9, SD = 0.3), $F(2, 16) = 4.64$, $p = .026$, and Style (M = 3.4, SD = 0.4), $F(2, 16) = 5.04$, $p = .02$, than did the C participants (Stress-Management Skills: M = 1.9, SD = 0.7; Interpersonal Support: M = 2.9, SD = 0.2; Style: M = 2.3, SD = 0.5) and S participants (Stress-Management Skills: M = 2.4, SD = 0.3; Interpersonal Support: M = 3.3, SD = 0.4; Style: M = 2.8, SD = 0.2).

Discussion

Women who participated in one of two group psychological interventions experienced significant improvements on a number of psychological measures as they continued to attempt conception. These differences were not due to any initial group differences on demographic or medical treatment parameters.

The C participants, as expected, showed increases in psychological distress over time. This is consistent with research showing that distress reported by infertile women increases over time (Berg & Wilson, 1991). The intervention participants in contrast, not only did not get worse over time but actually showed improvements on several psychological parameters. Thus, the hypothesis that it is possible to prevent worsening of distress through psychological interventions was supported.

This study had a number of methodological limitations. The first was the high level of attrition in all groups (mostly due to pregnancy in CB and S participants), and the disproportionate number of dropouts in the control group. Most of the C participants dropped out at the beginning of the study because of dissatisfaction with group assignment, and several dropped later because of a need to pursue some psychological intervention. Numerous C participants reported to the research assistant that as the study progressed, they felt unable to cope without some sort of psychological support. Because the S and CB participants were receiving help, high levels of distress were not noted as reasons for discontinuing participation. However, if the most distressed C participants dropped out of the study, this would indicate that controls who remained were less distressed. The fact that a number of significant differences remained between the intervention and control groups at Time 2 suggests a powerful treatment effect.

Table 3
Six-Month Changes in Psychological Measures (Follow-Up Minus Baseline)

	Study group							
	CB (n = 20)		S (n = 29)		C (n = 14)			
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2, 59)	*p*
BDI	−3.8	1.2	−0.5	1.0	0.3	1.5	2.85	.066 (.089)
HRSD	−2.4	1.1	−0.6	0.9	−0.2	1.3	0.99	.38 (.37)
HPLP								
Self-Act	0.20	0.09	0.08	0.07	−0.06	0.10	1.75	.18 (.30)
Health Res	0.23	0.07	0.10	0.06	0.16	0.09	0.88	.42 (.33)
Exercise	0.03	0.12	0.001	0.10	0.13	0.14	0.29	.75 (.71)
Nutrition	0.11	0.09	0.06	0.08	−0.05	0.11	0.61	.55 (.59)
IS	0.21	0.09	0.08	0.07	−0.12	0.11	2.76	.07 (.11)
SMS	0.85_a	0.10	0.26_b	0.08	0.03_b	0.11	16.83	.0001 (.0001)
Style	0.29_a	0.06	$0.09_{a,b}$	0.05	0.01_b	0.07	4.86	.011 (.032)
STAI								
State	-7.4_a	2.4	-3.8_c	2.0	$6.1_{a,c}$	2.8	6.82	.002 (.002)
Trait	−6.2	1.9	−4.1	1.5	−1.6	2.6	1.10	.34 (.42)
RSES	3.2	0.76	1.2	0.63	0.8	0.9	2.62	.082 (.12)
MDS	-2.9_a	1.2	$-0.3_{a,b}$	1.0	2.0_b	1.4	3.58	.034 (.007)
POMS								
Anxiety	-2.7_a	1.3	-1.8_a	1.0	2.9_b	1.5	4.45	.016 (.018)
Depression	−4.8	1.9	−1.9	1.6	1.4	2.3	2.17	.12 (.07)
Anger	−2.4	1.5	−1.7	1.2	1.2	1.8	1.28	.28 (.24)
Vigor	5.7_a	1.2	1.4_b	1.0	−2.0	1.5	8.09	.001 (.006)
Fatigue	−1.5	1.1	−0.4	0.9	2.8_b	1.4	2.89	.06 (.04)
Confusion	-2.4_a	0.9	-1.2_a	0.07	2.3_b	1.0	6.16	.004 (.005)
Total	-19.3_a	6.8	$-8.4_{a,b}$	5.5	12.5_b	8.1	4.44	.016 (.017)

Note. Means with different subscripts differ significantly after Bonferroni adjustment for pairwise comparisons. p values in parentheses reflect group differences when analysis was based on actual group attendance rather than on original group assignment. BDI = Beck Depression Inventory; HRSD = Hamilton Rating Scale for Depression; HPLP = Health-Promoting Lifestyle Profile; Self-Act = Self-Actualization; Health Res = Health Responsibility; IS = Interpersonal Support; SMS = Stress-Management Skills; STAI = State Trait Anxiety Inventory; RSES = Rosenberg Self-Esteem Scale; MDS = Marital Distress Scale; POMS = Profile of Mood Scale.

The second issue was the problem with randomization. The randomization schedule was altered midstudy from a three-group randomization to a two-group randomization. In addition, 15 intervention participants were switched from one group to another before the intervention group began. This issue does not affect the significant differences between the two intervention groups and the C group but it does interfere with the interpretation of data comparing the two intervention groups. It was hypothesized that the CB participants would experience significant improvement when compared with the S participants. Using the conservative but appropriate intent-to-treat analysis, on several measures the CB participants did indeed experience significant improvements over the S participants. However, this issue does interfere with recommendations for clinical applications.

Finally, although experimental participants were treated in therapy groups, statistical analyses were carried out assuming independent responses from all participants. If the shared experience of a therapy group influenced the responses of group members in a common way, then this may have led to inflated Type I error rates.

Many studies have suggested that infertile women report heightened levels of negative psychological symptoms. In addition to the discomfort caused by psychological distress, there is increasing evidence that distress, most frequently identified as depressive symptoms, may actually impair conception. Lapane et al. (1995) showed that women with a history of depressive symptoms were twice as likely to experience infertility than women without such a history. Two recent studies on women undergoing IVF showed that depressed women are significantly less likely to conceive than women who are not depressed (Demyttenaere et al., 1998; Thiering et al., 1993). A third study indicated that depression hampers conception; depressed women who attended a CB program specifically designed to treat depression and anxiety subsequently experienced a 60% conception rate, in contrast to a 24% rate in women who were not depressed at program intake (Domar et al., 1999). The pregnancy data from the current study supported this hypothesis; participants from either intervention group experienced significantly increased viable pregnancy rates when compared with the C participants ($p < .0044$; Domar et al., 2000).

Increasing evidence suggests that cognitive–behavioral approaches lead to symptom reduction. Over the past two decades, this approach had been supported in research on cardiovascular disease, smoking cessation, weight loss, eating disorders, and chronic pain (Domar & Dreher, 1997). The use of CBT with women's health conditions is more recent, yet there is now research to support the efficacy of this approach in reducing both physical and psychological symptoms in premenstrual syndrome

(Goodale et al., 1990), menopausal symptoms (Irvin, Domar, Clark, Zuttermeister, & Friedman, 1996; Freedman & Woodward, 1992), ovarian cancer (Lekander, Furst, Rotstein, Hursti, & Fredrikson, 1997), and breast cancer (Domar, Irvin, & Mills, 1997; Spiegel, Bloom, Kraemer, & Gottheil, 1989). Findings of the present study add to this growing literature, although it should be noted that CBT was not uniformly superior to the support group.

The limitations of this study preclude making definitive recommendations regarding psychological treatment for infertility patients. However, the preventive intervention model appears to be supported by this study. Participants who received group interventions prior to exhibiting significant psychological distress showed improvement over time, in contrast to the C participants, who worsened. The CB participants experienced the greatest improvement.

Future research is needed to determine at which point during the infertility process psychological interventions are most effective; what kind of psychological intervention is most effective in treating, rather than preventing, distress; which specific component of CB is the most effective with infertile women; and finally, whether the successful treatment of distress is associated with increased pregnancy rates.

In summary, the results from this study provide preliminary evidence that it is possible to prevent psychological distress with group psychological interventions and that a cognitive–behavioral group intervention appears to be the most efficacious. Although definitive recommendations for psychological interventions for infertile women should be delayed until the results can be replicated, because of the noninvasive and inexpensive nature of these interventions, women in the early stages of infertility treatment should be advised that group interventions may lead to both improved psychological state as well as increased pregnancy rates.

References

Beck, A., & Steer, R. (1987). *Beck Depression Inventory Manual.* San Antonio, TX: The Psychological Corporation.

Bell, J. (1981). Psychological problems among patients attending an infertility clinic. *Journal of Psychosomatic Research, 25,* 1–3.

Berg, B., & Wilson, J. (1991). Psychological functioning across stages of treatment for infertility. *Journal of Behavioral Medicine, 14,* 11–26.

Demyttenaere, K., Bonte, L., Gheldorf, M., Veraeke, M., Meuleman, C., Vanderschuerem, D., & D'Hooghe, T. (1998). Coping style and depression level influence outcome in in vitro fertilization. *Fertility and Sterility, 69,* 1026–1033.

Domar, A., Broome, A., Zuttermeister, P., Seibel, M., & Friedman, R. (1992). The prevalence and predictability of depression in infertile women. *Fertility and Sterility, 6,* 1158–1163.

Domar, A., Clapp, D., Slawsby, E., Dusek, J., Kessel, B., & Freizinger, M. (2000). The impact of group psychological interventions on pregnancy rates in infertile women. *Fertility and Sterility, 73,* 805–811.

Domar, A., & Dreher, H. (1997). *Healing mind, healthy woman.* New York: Dell.

Domar, A., Irvin, J., & Mills, D. (1997). Use of relaxation training to reduce the frequency and intensity of tamoxifen-induced hot flashes. *Mind/Body Medicine, 2,* 82–86.

Domar, A., Seibel, M., & Benson, H. (1990). The mind/body program for infertility: A new behavioral treatment approach for women with infertility. *Fertility and Sterility, 53,* 246–249.

Domar, A., Zuttermeister, P., & Friedman, R. (1993). The psychological impact of infertility: A comparison to patients with other medical conditions. *Journal of Psychosomatic Obstetrics and Gynecology, 14,* 45–52.

Domar, A., Zuttermeister, P., & Friedman, R. (1999). The relationship between distress and conception in infertile women. *Journal of the American Women's Association, 54,* 196–198.

Domar, A., Zuttermeister, P., Seibel, M., & Benson, H. (1992). Psychological improvement in infertile women after behavioral treatment: A replication. *Fertility and Sterility, 58,* 144–147.

Downey, J., & McKinney, M. (1992). The psychiatric status of women presenting for infertility evaluation. *American Journal of Orthopsychiatry, 62,* 196–205.

Downey, J., Yingling, S., McKinney, M., Husami, N., Jewelewicz, R., & Maidman, J. (1989). Mood disorders, psychiatric symptoms, and distress in women presenting for infertility evaluation. *Fertility and Sterility, 52,* 425–432.

Endicott, J., & Spitzer, R. L. (1978). A diagnostic interview: The Schedule for Affective Disorders and Schizophrenia. *Archives of General Psychiatry, 35,* 837–844.

Freedman, R. R., & Woodward, S. (1992). Behavioral treatment of menopausal hot flashes: Evaluation by ambulatory monitoring. *American Journal of Obstetrics and Gynecology, 167,* 436–439.

Freeman, E., Garcia, C., & Rickels, K. (1983). Behavioral and emotional factors: Comparison of anovulatory infertile women with fertile and other infertile women. *Fertility and Sterility, 40,* 195–201.

Garner, C., Arnold, E., & Gray, H. (1984). The psychological impact of in vitro fertilization. *Fertility and Sterility Abstract (Suppl), 41,* 28.

Goodale, I., Domar, A., & Benson, H. (1990). Alleviation of premenstrual syndrome symptoms with the relaxation response. *Obstetrics and Gynecology, 75,* 649–655.

Hamilton, M. (1967). Development of a rating scale for primary depressive illness. *British Journal of Social and Clinical Psychology, 6,* 278–296.

Hathaway, S. R., & McKinley, J. C. (1989). *Minnesota Multiphasic Personality Inventory.* Minneapolis: University of Minnesota Press.

Helgeson, V. S., & Cohen, S. (1996). Social support and adjustment to cancer: Reconciling descriptive, correlational, and intervention research. *Health Psychology, 15,* 135–148.

Hunt, J., & Monach, J. (1997). Beyond the bereavement model: The significance of depression for infertility counseling. *Human Reproduction, 12,* 188–194.

Irvin, J., Domar, A., Clark, C., Zuttermeister, P., & Friedman, R. (1996). The effects of relaxation response training on menopausal symptoms. *Journal of Psychosomatic Obstetrics and Gynecology, 17,* 202–207.

Lambert, M., Christensen, E., & DeJulio, S. (Eds.). (1983). *The assessment of psychotherapy outcome.* New York: Wiley.

Lapane, L., Zierler, S., Lasatar, T., Stein, M., Barbout, M., & Hume, A. (1995). Is a history of depressive symptoms associated with an increased risk of infertility in women? *Psychosomatic Medicine, 57,* 509–513.

Lekander, M., Furst, C., Rotstein, S., Hursti, T., & Fredrikson, M. (1997). Immune effects of relaxation during chemotherapy for ovarian cancer. *Psychotherapy Psychosomatics, 66,* 185–191.

Mandle, C. L., Jacobs, S., Arcari, P. M., & Domar, A. (1996). The efficacy of relaxation response interventions with adult patients: A review of the literature. *Journal of Cardiovascular Nursing, 10,* 4–26.

McNair, D. (1971). *Manual for the Profile of Mood States.* San Diego, CA: EDITS.

Pearlin, L., & Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior, 19,* 2–21.

Rosenberg, M. (1972). *Society and the adolescent self-image.* Princeton, NJ: Princeton University Press.

Schiff, I., & Schiff, M. (1998). The biblical diagnostician and the anorexic bride. *Fertility and Sterility, 69,* 8–10.

Schwartz, C. E. (1999). Teaching coping skills enhances quality of life

more than peer support: Results of a randomized trial with multiple sclerosis patients. *Health Psychology, 18,* 211–220.

Spiegel, D., Bloom, J., Kraemer, H., & Gottheil, E. (1989). Effect of psychosocial treatment on survival of patients with metastatic breast cancer. *Lancet, 10/14,* 888–891.

Spielberger, C. (1988). *Manual for the State–Trait Anxiety Inventory.* Palo Alto, CA: Consulting Psychological Assessment Resources.

Spitzer, R., Williams, J., Gibbon, M., & First, M. (1992). The Structured Clinical Interview for DSM-IIIR: I. History, rationale, and description. *Archives of General Psychiatry, 49,* 624–629.

Stanton, A., & Danoff-Burg, S. (1995). Selected issues in women's reproductive health: Psychological perspectives. In A. Stanton & S. Gallant (Eds.), *The psychology of women's health* (pp. 261–305). Washington, DC: American Psychological Association.

Thiering, P., Beaurepaire, J., Jones, M., Saunders, D., & Tennant, C. (1993). Mood state as a predictor of treatment outcome after in vitro fertilization/embryo transfer technology. *Journal of Psychosomatic Research, 37,* 481–491.

Walker, S., Sechrist, K., & Pender, N. (1987). The Health-Promoting Lifestyle Profile: Development and psychometric characteristics. *Nursing Research, 36,* 76–81.

Wright, J., Allard, M., Lecours, A., & Sabourin, S. (1989). Psychosocial distress and infertility: A review of controlled research. *International Journal of Infertility, 34,* 126–142.