Prediction of Response to Treatment in a Randomized Clinical Trial of Couple Therapy: A 2-Year Follow-Up

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Many studies have examined pretreatment predictors of immediate posttreatment outcome, but few studies have examined prediction of long-term treatment response to couple therapies. Four groups of predictors (demographic, intrapersonal, communication, and other interpersonal) and 2 moderators (pretreatment severity and type of therapy) were explored as predictors of clinically significant change measured 2 years after treatment termination. Results demonstrated that power processes and expressed emotional arousal were the strongest predictors of 2-year response to treatment. Moderation analyses showed that these variables predicted differential treatment response to traditional versus integrative behavioral couple therapy and that more variables predicted 2-year response for couples who were less distressed when beginning treatment. Findings are discussed with regard to existing work on prediction of treatment response, and directions for further study are offered.

Keywords: couple therapy, long-term treatment response, arousal, power

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Substantial empirical research has documented the effectiveness of behavioral couple therapies for improving couple functioning over the course of treatment (Baucom, Shoham, Mueser, Daiuto, & Stickle, 1998; Christensen et al., 2004; Snyder, Castellani, & Whisman, 2006). Although some studies have found significant declines in treatment gains over time after treatment termination (Jacobson, Schmaling, & Holtzworth-Munroe, 1987; Snyder, Wills, & Grady-Fletcher, 1991), recent work (Christensen, Atkins, Yi, Baucom, & George, 2006) has documented the ability of integrative behavioral couple therapy (IBCT; Jacobson & Chris-

tensen, 1998) and traditional behavioral couple therapy (TBCT; Jacobson & Margolin, 1979) to create improvement in couple functioning over the course of therapy that is largely maintained over a 2-year period after treatment termination. However, little research has examined what might predict successful 2-year outcomes in couple therapy. It is important to know not only what predicts success at the end of treatment (e.g., Atkins et al., 2005) but also what predicts 2-year, posttherapy adjustment of couples. We addressed this issue in the current study by examining predictors of treatment response 2 years after treatment termination.

There has been a large number of short-term randomized clinical trials of couple therapies, but to date only one study has examined predictors of treatment response 2 years or longer after treatment termination. Snyder, Mangrum, and Wills (1993) found that couples were more likely to be intact but maritally distressed or divorced 4 years after treatment termination if (a) they reported higher levels of depressive symptomatology, lower psychological resilience, lower emotional responsiveness, poorer problem-solving skills, or higher levels of marital distress or (b) neither spouse was employed at a semiskilled or higher level position prior to beginning insight-oriented marital therapy (Snyder & Wills, 1989) or behavioral marital therapy (as cited in Snyder & Wills, 1989).

Most studies that have examined predictors of treatment response have focused on prediction of couple functioning at treatment termination, largely because most empirical studies of response to couple therapy have not assessed posttermination outcome at intervals of 2 years or more. Atkins et al. (2005) synthesized and organized existing work on pretreatment predictors of response to therapy at termination into three categories—

demographic variables, interpersonal variables, and intrapersonal variables—that were used to predict treatment response to IBCT and TBCT over the course of therapy.[1] TBCT couples (relative to IBCT couples), men (relative to women), and couples who had been married for a longer period of time (relative to couples who had been married for a shorter period of time) all experienced greater gains in relationship satisfaction early in treatment, but their rate of improvement slowed more rapidly later in therapy than did that of their counterparts. Severely distressed couples (relative to moderately distressed couples) experienced greater deceleration in their rate of improvement of relationship satisfaction toward the end of their course of therapy. Very sexually dissatisfied IBCT couples improved more slowly in the beginning of treatment but continued to improve over the course of therapy, whereas very sexually dissatisfied TBCT couples improved rapidly in the beginning of therapy and then began to lose some of their early improvement toward the end of therapy. Our primary aim in the current study was to examine whether the predictors used in Atkins et al. (2005), with some important additions, were associated with treatment response in the same set of couples 2 years after treatment termination.

Given the paucity of studies that have examined pretreatment predictors of long-term posttermination treatment response, we used all of the pretreatment variables that were used to predict treatment response at termination in Atkins et al. (2005) but added some pretreatment variables (parental divorce, power, demand/withdraw, and encoded arousal) to ensure that a wide range of indices of couple functioning were included. The first of these variables, parental divorce, is clearly related to later relationship functioning. Empirical findings suggest that parental divorce may shape children's relationship schema, so children view relationships as arrangements that are fragile, temporary, and best resolved by dissolution when significant conflict occurs (e.g., Amato, 1996; Amato & DeBoer, 2001). Though this mechanism of intergenerational transmission of divorce is relevant to therapeutic intervention, it has not been considered in previous research on couple therapy outcomes.

Power bases, or desired resources that spouses bring to or hold within a relationship (e.g., age, education, income; Cromwell & Olson, 1975), have been linked to treatment response in couple therapy. For example, Freeman, Leavens, and McCulloch (1969) found that a greater absolute discrepancy in education was associated with significantly greater improvement in a study of general marital counseling. An array of power base indices (difference in age, education, and income) was included in the current study.

Power processes, or methods that partners use to exert power within the context of an interaction (Cromwell & Olson, 1975), have been empirically linked to response to couple therapy. Spouses who are more similar in the degree to which they determined the content of an interaction, either by setting the topic and doing all of the talking or by refusing to talk about or changing the topic, have been found to respond more favorably to behavioral marital therapy at treatment termination and at a 6-month follow-up (Whisman & Jacobson, 1990). The current study conceptualized power processes in terms of influence tactics, defined as the amount of freedom spouses leave each other to respond to a request for change. Couples who allowed large amounts of freedom were referred to as using soft influence tactics, whereas couples who allowed minimal amounts of freedom were referred

to as using hard influence tactics (Kipnis, Schmidt, & Wilkinson, 1980).

The demand/withdraw interaction pattern occurs when one partner requests change by nagging, criticizing or complaining and the other partner avoids the request or withdraws from the discussion in response (Christensen, 1988). Higher levels of demand/withdraw have been consistently linked to lower levels of relationship satisfaction (Eldridge & Christensen, 2002) and have been linked to response to couple therapy, though in conflicting directions. Studies have found demand/withdraw to be associated with negative outcomes (Shoham, Rohrbaugh, Stickle, & Jacob, 1998) and with positive outcomes (Whisman & Jacobson, 1990). The current study examined wife demand/husband withdraw and husband demand/wife withdraw in an attempt to resolve these conflicting findings.

Pretreatment emotional arousal during problem-solving discussions has yet to be studied in terms of response to couple therapies. However, results from several converging lines of research suggest that it may be an important avenue for investigation. Numerous studies have documented associations from problematic communication and relationship distress to poorer therapy outcomes (e.g., Atkins et al., 2005; Shoham et al., 1998). Both higher levels of problematic communication and higher levels of relationship distress are known to be associated with higher levels of physiological arousal (see Kiecolt-Glaser & Newton, 2001, for review). Finally, higher levels of physiological arousal have been shown to be stronger predictors of long-term relationship functioning than are interpersonal and intrapersonal variables (Gottman & Levenson, 1992).

With procedures consistent with those used by Atkins et al. (2005), the current study examined whether four categories of variables predicted response to two behaviorally based couple therapies 2 years after treatment termination. The categories of predictors included demographic variables (age, education, income, parental marital status, length of marriage, and whether the couple has children or not); intrapersonal variables (overall mental health, presence or absence of diagnoses from the *Diagnostic and Statistical Manual of Mental Disorders* [4th ed.; *DSM–IV*; American Psychiatric Association, 1994], neuroticism, and family history of distress); communication (demand/withdraw, affective communication, constructive communication, encoded arousal, and power processes); and other interpersonal variables (commitment, influence in decision making, desired closeness, sexual satisfaction, and power bases). Our primary aim in the current study was to determine significant predictors of treatment outcome within each of the four categories of variables. Additionally, the current study explored whether the predictive ability of any of

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[1] Both IBCT and TBCT are behaviorally based couples therapy; however, there are distinct differences in the primary foci and interventions of each therapy. TBCT uses behavioral exchange and communication skills training to resolve conflict and increase relationship quality. In contrast, IBCT employs a number of acceptance-based techniques to help couples better understand and cope with their differences and to increase empathy and support between partners. IBCT includes communication skills training similar to that used in TBCT but does not emphasize this training as much. Interested readers are referred to Jacobson and Christensen (1998) and Jacobson and Margolin (1979) for more detailed information about IBCT and TBCT, respectively.

these variables differs across gender, treatment condition, and initial distress level.

Method

Participants

Participants ($N = 130$ couples) were a subsample of 134 significantly and stably distressed married, heterosexual couples who were recruited for participation in a two-site study of couple therapy conducted at the University of California at Los Angeles and the University of Washington. Participants were required to be legally married, to be living together, and to be seriously and consistently distressed (i.e., to have tested in the significantly distressed range on three separate measures of marital distress completed during three consecutive screening assessments conducted prior to participation in this study). Participants were not allowed to receive any other forms of psychotherapy while they were in the active treatment phase of this study, and individuals who were taking psychotropic medications were required to be at a stable dosage prior to beginning participation in this study. All participants were given a diagnostic psychiatric interview (the Structured Clinical Interviews for *DSM–IV* for Axis I and II; SCID; First, Spitzer, Gibbon, & Williams, 1994). Participants who met diagnostic criteria for current Axis I disorders of substance abuse or dependence, schizophrenia, bipolar disorder, or current Axis II disorders of borderline, schizotypal, or antisocial personality disorder were excluded from the study. Finally, couples characterized by moderate-to-severe husband-to-wife physical aggression were excluded from participation. The subsample of participants completed all relevant measures, and final marital status (married vs. separated/divorced) was known for all couples. See Christensen et al. (2004) for a complete description of recruitment procedures, inclusion criteria, and study protocol and Atkins et al. (2005) for the CONSORT flowchart for this study.

Participants in this sample ranged from 22 to 72 years of age at pretreatment; the median age was 43 years ($SD = 8.8$) for men and 42 years ($SD = 8.7$) for women. Participants were, on average, college educated (median level of education for both men and women was 17 years, $SD = 3.2$). Median annual income was $48,000 for the men and $36,000 for the women. Couples had been married an average of 10.0 years ($SD = 7.7$). The sample was 77% Caucasian, 8% African American, 5% Asian or Pacific Islander, 5% Latino/Latina, 1% Native American, and 4% other ethnicity.

Procedures

All couples participated in two assessments that were analyzed for the current study. In the first of these assessments, conducted prior to beginning therapy, couples completed a battery of self-report questionnaires and participated in four 10-min videotaped discussions. All measures of predictors were taken from this assessment. Two of the interactions focused on a relationship problem (problem-solving discussions), and the other two focused on an individual problem that was not a source of relationship distress (social support discussions). Each spouse determined the topic for one interaction of each type of discussion. The second assessment occurred approximately 2 years after treatment termination and

was very similar to the pretherapy assessment in structure and content.

Couples were classified as being either moderately distressed (66 couples) or severely distressed (68 couples) prior to treatment on the basis of a median split of a combined score on the Dyadic Adjustment Scale (DAS; Spanier, 1976) and the Global Distress Scale of the Marital Satisfaction Inventory—Revised (MSI–R; Snyder, 1997). They were randomly assigned within these categories to receive up to 26 sessions of one of two behavioral therapies, either TBCT (68 couples) or IBCT (66 couples). Details regarding the procedure used for random assignment to therapy are presented in Christensen et al. (2004). After completing treatment, couples were not allowed to receive treatment from their study therapist for a period of 2 years. We discouraged them from seeking couple therapy elsewhere to prevent influences on posttreatment outcomes by unknown or unspecified interventions and to allow them to consolidate the gains they had made in treatment.

Measures

Demographic variables. Scores on all demographic variables (age, education, income, presence of children, parental marital status, years married, and gender) were obtained with a demographic questionnaire. Age and education were measured in years. Income was measured in thousands of dollars of pretax monthly income. Presence of children, parental marital status, and gender were scored as dichotomous items. When there were discrepancies between partners in the number of years married, wives' reports were used.

Intrapersonal Variables

Neuroticism. Neuroticism was assessed with the NEO Five-Factor Inventory (NEO–FFI; Costa & McCrae, 1989). The NEO–FFI is a widely used and well-validated, 60-item, short form of the NEO Personality Inventory (NEO–PI; Costa & McCrae, 1985). Cronbach's alphas for men and women were .88 and .85, respectively.

Mental Health Index. Overall mental health was assessed with the Compass Outpatient Treatment Assessment System (COMPASS; Sperry, Brill, Howard, & Grissom, 1996). The Mental Health Index is a summary measure of the three subscales of the COMPASS: Subjective Well-Being, Current Symptoms, and Current Life Functioning. Higher scores indicate better mental health. Cronbach's alphas for men and women were .86 and .88, respectively.

Psychological diagnoses. Presence of a psychological diagnosis was assessed with a dichotomous score that indicates whether or not spouses met criteria for a current psychological disorder as defined by the *DSM–IV* (American Psychiatric Association, 1994) and determined by the SCID (First et al., 1994; Spitzer, Williams, Gibbon, & First, 1994). See Christensen et al. (2004) for details regarding interinterviewer reliability of this measure. Of the 130 couples in the current study, 1 spouse had a current, diagnosable disorder in 31 couples (24%) and both spouses had a current, diagnosable disorder in 2 couples (2%). In these couples, 8 husbands (6%) and 9 wives (7%) met criteria for a mood disorder; 1 husband (1%) met criteria for a substance abuse

disorder;[2] 9 husbands (7%) and 6 wives (5%) met criteria for an anxiety disorder; and 2 wives (2%) met criteria for an adjustment disorder. Of the 18 husbands and 17 wives who met criteria for a current diagnosable disorder, 4 husbands and 9 wives met criteria for a comorbid psychiatric disorder.

Family history of distress. Family history of distress was assessed with the Family History of Distress Scale of the MSI–R (Snyder, 1997). This scale assesses the level of distress in relationships within the family of origin; higher scores indicate more distressed relationships. Cronbach's alphas for men and women were .76 and .79, respectively.

Communication

Affective communication. Affective communication was assessed with the Affective Communication Scale from the MSI–R (Snyder, 1997). The scale comprises 13 true/false items that indicate the respondent's degree of dissatisfaction with the amount of affection and understanding expressed by his or her partner; higher scores indicate greater dissatisfaction. Cronbach's alphas for men and women were .76 and .77, respectively.

Constructive communication. Constructive communication was assessed with 7 Likert scale items (3 assessing constructive behaviors and 4 assessing destructive behaviors) from the 35-item Communication Patterns Questionnaire (CPQ; Christensen & Sullaway, 1984). The 4 destructive items are reverse scored and added to the 3 constructive items to create a single index; higher scores indicate higher levels of positive communication. Cronbach's alphas for men and women were .69 and .67, respectively.

Demand/withdraw. Christensen & Sullaway, 1984): husband demand/wife withdraw (HDWW) and wife demand/husband withdraw (WDHW). Each subscale comprises 3 Likert scale items from the 35-item CPQ. These 3 items index the likelihood of one partner demanding and the other partner withdrawing across a number of situations. Higher scores on both subscales indicate greater engagement in the demand/withdraw interaction pattern when discussing a problem. Husband and wife reports of both subscales were highly correlated (HDWW, $r = .43$, $p < .01$; WDHW, $r = .44$, $p < .01$); therefore, husband and wife reports were averaged to create a single HDWW and WDHW score for each couple. Cronbach's alpha was .62 for HDWW and .54 for WDHW.

Encoded arousal. Encoded arousal was assessed with range of f_0 (maximum f_0 − minimum f_0, measured in hertz) and was generated by analyzing audiotaped pretreatment problem-solving interactions with the Praat computer program (Boersma & Weenink, 2005). One problem with the inclusion of arousal as a predictor of treatment response is that many measures of arousal are complicated, expensive, time consuming, and invasive. Fundamental frequency (f_0) is a noninvasive, alternative measure of encoded arousal that is less expensive and complicated to capture than are standard physiological measures of arousal. Fundamental frequency refers to the pattern of vibration created by the vocal folds during phonation, when the larynx regulates the outward flow of air from the lungs and produces quasi-periodic vibrations with the vocal folds (Kappas, Hess, & Scherer, 1990). Fundamental frequency is very highly correlated (up to $r = .9$) with perceived pitch (Kappas et al., 1990); higher fundamental frequency values correspond to higher pitch. Recent reviews agree that f_0 measures are

robust and reliable indicators of encoded arousal (e.g., Juslin & Sherer, 2005). Scores were averaged across both interactions for a couple to generate one score for each spouse. Higher f_0 scores indicate higher levels of encoded arousal.

Power processes. We assessed power processes with latent semantic analysis (LSA; Landauer & Dumais, 1997) in order to analyze transcriptions of pretreatment interactions separately for the amount of hard and soft influence tactic language. LSA is a quantitative method for assessing semantic content of text; in the present study, we used it to assess the amount of hard and soft influence tactics during couple discussions (see Baucom, 2008, for a detailed description of the process of generating these scores). We analyzed the language of both partners simultaneously, because LSA provides a more accurate index with larger amounts of text. Some spouses did not generate enough content during a topic to result in a reliable LSA score, so the decision was made to analyze language at the level of the couple in order to maximize sample size. Scores were averaged across both interactions for a couple to generate one score for each couple.

Higher hard tactic scores indicate that partners used more manipulative language that allowed for less freedom in response to their statements, and higher soft influence scores indicate that partners used more collaborative language that allowed for more freedom in response to their statements. For example, a request for more time spent together could be made with hard language ("Don't you want to spend more time with me? You know it is what I want and that it will be good for us") or with soft language ("I would really like it if we could find a way to spend more time together. Would you be open to that?").

Other Interpersonal Variables

Closeness/independence. Closeness/independence was assessed with the Closeness and Independence Inventory (Heavey & Christensen, 1991). This measure is a 9-item Likert scale of each spouse's desired level of closeness in the marital relationship. Higher scores indicate a desire for greater closeness. Cronbach's alphas for men and women were .76 and .75, respectively.

Commitment. Commitment was assessed with the Marital Status Inventory (MSI; Weiss & Cerreto, 1980). The MSI is a 14-item, true/false response scale measure of steps taken toward separation or divorce. Higher scores indicate lower commitment. Cronbach's alpha was .80 for both men and women.

Sexual satisfaction. Sexual satisfaction was assessed with the Sexual Dissatisfaction Scale of the MSI–R (Snyder, 1997). The scale measures the level of discontent with the frequency and

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[2] During the pilot study (see Christensen et al., 2004, for details of the study design), we excluded potential participants for substance dependence but not for substance abuse. In 1 couple, the husband met criteria for substance abuse. We used the internal consistency of the DAS to calculate the Reliable Change Index in creating the clinically significant change categories. As noted by Bauer, Lambert, and Nielsen (2004), in clinical samples, test–retest coefficients are deflated by actual individual differences in change. Bauer et al. and others (Martinovich, Saunders, & Howard, 1996; Tingey, Lambert, Burlingame, & Hansen, 1996) have concluded that internal consistency is a better measure of the psychometric qualities of the outcome scale because of the deflation of test–retest coefficients and because outcome scales are designed to test characteristics that will change over time, rather than stable traits.

Table 1
Means, Standard Deviations, and Correlations for Predictors

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Age (years)	42.6	8.3	—										
2. Education (years)	17.0	2.6	−0.03	—									
3. Income	3.8	3.2	0.03	0.25	—								
4. Parental marital status	0.4	0.4	−0.12	−0.21	0.01	—							
5. Presence of children in marriage	0.7	0.5	−0.16	−0.09	0.02	0.19	—						
6. Years married	10.1	7.6	0.61	−0.08	0.01	−0.06	0.09	—					
7. Difference in age	4.2	3.7	0.10	−0.05	0.13	0.09	0.18	−0.04	—				
8. Difference in education	2.8	2.6	0.14	0.19	0.21	−0.02	0.13	0.02	0.10	—			
9. Difference in income	3.2	3.7	0.12	0.05	0.53	0.01	−0.03	0.18	0.27	0.04	—		
10. Neuroticism	51.5	8.4	−0.17	0.04	−0.02	0.03	−0.08	−0.15	−0.05	−0.14	−0.06	—	
11. Mental Health Index	61.5	6.4	0.03	0.16	0.07	0.00	0.11	0.03	−0.06	0.10	−0.01	−0.55	—
12. Current *DSM–IV* diagnosis	0.2	0.3	−0.06	−0.07	0.15	−0.09	−0.12	−0.02	−0.01	−0.09	0.01	0.45	−0.57
13. Family history of distress	55.8	6.1	−0.01	0.02	0.00	0.27	0.04	−0.11	−0.05	0.03	0.08	0.17	−0.09
14. Closeness/independence	31.0	4.6	−0.01	−0.14	−0.02	−0.03	0.12	0.03	0.03	0.14	−0.07	−0.07	0.06
15. Sexual Dissatisfaction Scale	60.3	7.9	0.17	−0.05	−0.16	−0.02	0.03	0.14	0.18	−0.01	0.03	−0.06	−0.07
16. MSI–R	4.0	2.4	−0.17	−0.11	0.00	0.14	0.10	−0.07	−0.01	−0.10	0.00	0.14	−0.25
17. Influence in decision making	40.4	6.4	−0.15	0.02	0.14	0.05	−0.03	−0.10	−0.04	0.21	−0.15	0.14	0.04
18. Constructive communication	−2.5	7.4	0.01	0.07	−0.09	−0.15	−0.18	−0.06	−0.06	0.02	−0.13	−0.12	0.06
19. Affective communication	63.4	5.0	0.16	−0.06	−0.05	−0.11	0.23	0.20	−0.06	0.06	−0.08	−0.10	0.08
20. Husband demand/wife withdraw	12.8	4.9	−0.10	0.04	−0.07	0.05	−0.01	−0.07	0.06	−0.21	−0.10	0.10	−0.01
21. Wife demand/husband withdraw	17.9	4.4	−0.01	−0.07	0.05	0.09	0.05	0.11	−0.09	0.04	0.17	0.18	−0.25
22. Encoded arousal	431.1	15.8	−0.25	0.02	−0.06	−0.09	0.08	−0.13	−0.06	−0.01	0.14	0.15	−0.02
23. Soft influence tactics	0.0	1.0	0.20	0.22	0.04	0.00	0.03	0.08	0.04	−0.02	−0.08	−0.06	0.03
24. Hard influence tactics	0.0	1.0	0.29	0.10	−0.01	0.01	−0.13	0.10	0.00	−0.06	−0.03	0.01	−0.13
25. Pretreatment severity	0.5	0.5	0.04	0.03	−0.05	0.09	0.21	0.02	0.07	0.04	−0.06	0.13	−0.18
26. Therapy	0.5	0.5	−0.04	0.00	0.02	−0.08	0.03	0.00	−0.10	−0.04	−0.07	0.08	0.00

Note. *DSM–IV* = *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., American Psychiatric Association, 1994); MSI–R = Marital Satisfaction Inventory—Revised.

quality of sexual activities. Higher scores indicate higher levels of dissatisfaction with sexual activity in the relationship. Cronbach's alpha was .84 for both men and women.

Influence in decision making. Influence in decision making was assessed with the Influence in Decision Making Questionnaire (IDM; Kollock, Blumstein, & Schwartz, 1985). The IDM is an 8-item, Likert scale measure of perceptions by partners of their relative influence over decisions across a number of categories (e.g., how to spend money, where to go on vacation). All items are summed to create a single index that indicates the overall amount of influence that the responding spouse perceives himself or herself to have over the spouse. Higher scores indicate greater perceived influence. Cronbach's alphas for men and women were .73 and .78, respectively.

Power bases. We used individual reports of age, education, and income to calculate absolute difference scores on all three power bases. Higher scores indicate a greater absolute discrepancy between partners in a given area of power.

Distress severity and treatment condition. Distress severity was a dichotomous variable indicating either moderate or severe marital dissatisfaction. (See Christensen et al., 2004, for a description of assignment to moderate and severe categories.) Treatment condition was a dichotomous variable indicating assignment to IBCT (Jacobson & Christensen, 1998) or TBCT (Jacobson & Margolin, 1979). Both distress and treatment were used as potential moderating variables.

Clinical significance. The dependent variable was clinically significant change category, which we assessed with an ordinal variable that indicated four categories of change: deterioration (reliable change in the direction of greater dissatisfaction), no change, improvement (reliable change in the direction of greater satisfaction), or recovery (reliable improvement and movement into the nondistressed range) between pretreatment and the 2-year follow-up. We calculated clinical significance with the procedures outlined by Jacobson and Truax (1991) and used DAS scores averaged across spouses.[3] The use of this index is a departure from Atkins et al. (2005), who used trajectories of change on the DAS as the treatment response index. Clinically significant change categories were chosen as the index of treatment response in the current study for three main reasons. First, there were a significant number of divorces (*n* = 24, 18% of the total sample) in the 2-year period after treatment termination. It is not possible to collect satisfaction data from a divorced couple; however, a divorced couple clearly falls within the deteriorated relationship category. Second, clinically significant change categories provide a more stringent test of prediction. A measure may predict minor changes in distress level but not in change categories. Finally, the use of clinically significant change categories provides a more readily

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[3] We used the internal consistency of the DAS to calculate the Reliable Change Index in creating the clinically significant change categories. As noted by Bauer, Lambert, and Nielsen (2004), in clinical samples, test–retest coefficients are deflated by actual individual differences in change. Bauer et al. and others (Martinovich, Saunders, & Howard, 1996; Tingey, Lambert, Burlingame, & Hansen, 1996) have concluded that internal consistency is a better measure of the psychometric qualities of the outcome scale because of the deflation of test–retest coefficients and because outcome scales are designed to test characteristics that will change over time, rather than stable traits.

12	13	14	15	16	17	18	19	20	21	22	23	24	25
—													
0.10	—												
−0.06	−0.09	—											
−0.08	0.01	0.00	—										
0.23	0.04	−0.29	0.15	—									
−0.10	−0.09	0.14	−0.09	−0.11	—								
−0.13	−0.08	−0.10	0.00	−0.30	−0.17	—							
−0.02	−0.13	−0.07	0.29	0.40	−0.11	−0.40	—						
0.05	0.02	−0.20	−0.05	0.09	0.05	−0.20	0.08	—					
0.14	0.11	0.16	0.04	0.00	0.09	−0.28	0.02	−0.50	—				
0.02	−0.08	−0.04	0.01	−0.03	0.05	0.03	−0.04	0.13	0.03	—			
0.05	0.03	−0.07	0.04	0.10	−0.05	0.03	0.06	−0.02	0.06	−0.08	—		
0.16	0.09	−0.12	0.20	0.13	−0.07	−0.15	0.25	−0.01	0.17	−0.07	0.70	—	
0.04	0.05	−0.14	0.13	0.50	−0.11	−0.40	0.52	0.05	0.15	−0.05	0.05	0.13	—
0.22	0.15	−0.06	−0.14	−0.11	0.16	0.14	−0.09	0.00	0.01	0.10	0.12	0.10	−0.13

interpretable metric for therapists, as it indicates the overall success or failure in addition to improvement or decline.

Data Analyses

Predictors of response to treatment were identified with a series of ordinal logistic regressions (Harrell, 2001). Groups of predictors were analyzed in the following blocks: demographic, intrapersonal, communication, and other interpersonal variables. Each block of variables included (a) main effects for treatment condition, pretreatment severity, and all predictors; (b) two-way interactions between treatment condition and pretreatment severity as well as between each predictor and treatment condition and pretreatment severity separately; and; (c) three-way interactions between each predictor, treatment condition, and pretreatment severity. All continuous predictors were centered prior to analysis and calculation of interactions.

For each block, we used an automatic variable selection procedure based on the Bayesian information criterion (BIC; Raftery, 1995) to identify optimal subsets of predictors. In choosing predictors, BIC weights the decision by sample size and number of predictors; previous research has shown that typical stepwise procedures maximize prediction in the sample, whereas BIC maximizes prediction out of sample (Raftery, 1995). We analyzed plots of predicted probabilities of membership in the four treatment response categories, so we could interpret significant interactions identified with the automated BIC algorithm. Given the data requirements of ordinal logistic regression,[4] the relatively large number of predictors,[5] and the modest number of data points, we

also conducted bootstrapped BIC analyses using 1,000 bootstrap resamples to test the stability of the findings generated using the entire sample (i.e., 1,000 pseudo-samples were generated via sampling with replacement, and BIC model selection was conducted on each sample; see Austin & Tu, 2004). Thus, in addition to confidence intervals, we report the percentage of bootstrap samples in which a given predictor was selected. It is important to note

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[4] An important assumption of proportional odds logistic regression (POLR) models is that the predictors demonstrate a linear association with the categories of the dependent variables. To test this assumption, we examined means of predictors across treatment response categories. This examination revealed that several of the predictors did not show a strictly linear pattern of increasing means across increasing levels of the dependent variable. In order to test the appropriateness of using a POLR model with this data, we ran continuation ratio and extended continuation ratio models (see Harrell, 2001). These alternative models relax the POLR assumptions by (a) allowing for nonlinearity in the patterns of means and (b) allowing for different patterns of association between the predictor and the dependent variable across different categories of the dependent variable. Neither model provided a fit to the data superior to that of the POLR model, and thus we report the POLR results.

[5] Empirical studies have shown that one consequence of fitting complex models to smaller data sets is that coefficients can be larger than what would be found in the population (i.e., the coefficients are too optimistic; Harrell, 2001). Several approaches exist to "shrink" coefficients toward the population values. Examination of two such methods—Bayesian POLR with diffuse priors (Gelman, Jakulin, Pittau, & Su, 2008) and penalized maximum likelihood (Harrell, 2001)—revealed little optimism in the coefficients; therefore, the coefficient estimates reported below appear to be reasonable and are unadjusted.

that this statistic is different than statistical significance. Austin and Tu (2004) noted, "One would expect that variables that truly were independent predictors of the outcome would be identified as predictors in a majority of the bootstrap samples, whereas noise variables would be identified as predictors in only a minority of samples" (p. 132). All analyses were conducted with R Version 2.6.0 (R Development Core Team, 2007).

Results

Means, standard deviations, and correlations for predictors, moderators, and treatment response category are presented in Table 1. In our examination of demographic predictors, the number of years that a couple had been married was significantly associated with a positive response to treatment ($B = 0.13$, $p < .01$; see Table 2). For each additional year of marriage, the odds of being in a better outcome category went up by 1.13. Bootstrap analyses revealed that numbers of years married was a highly reliable predictor of treatment response category, as it was selected in 98% of the resamples. None of the other demographic variables (age, education, income, presence of children, and parental marital status) or any of the two- or three-way interactions involving any of the demographic variables (including years married) emerged as significant predictors of response to treatment.

None of the intrapersonal variables (overall mental health, presence or absence of *DSM–IV* diagnoses, neuroticism, and family of origin environment), the other interpersonal variables (commitment, influence in decision making, desired closeness, sexual satisfaction, and power bases), or the self-reported communication variables (demand/withdraw, affective communication, constructive communication) emerged as significant predictors of response to treatment. In addition, none of the two- or three-way interactions involving intrapersonal, other interpersonal, or self-reported communication variables emerged as significant predictors of response to treatment.

There were, however, several interactions involving behaviorally based communication variables that emerged as significant predictors of response to treatment (see Table 2). The interactions of use of soft influence tactics with type of treatment ($B = 1.46$,

$p < .001$) and wife's encoded arousal with type of treatment ($B = 0.07$, $p < .001$) were significantly associated with treatment response category. Use of soft influence tactics was significantly associated with treatment response only for couples who received IBCT, and the greatest differentiation was seen between couples who were classified as recovered relative to couples who were classified as deteriorated 2 years after treatment termination (see Figure 1). In particular, higher levels of soft influence tactic use were associated with a greater likelihood of being in a higher treatment response category and lower levels of soft influence tactic use were associated with a greater likelihood of being in a lower treatment response category for couples who had received IBCT (odds ratio [OR] = 4.29). Bootstrap analyses revealed this interaction to be a reliable predictor of treatment response category, as it was selected in 76% of the resamples.

Wife's encoded arousal was significantly associated with treatment response for couples who had received both IBCT and TBCT (OR = 1.07); however, stronger effects were seen for couples who had received TBCT than for couples who had received IBCT. In particular, couples in which the wife had high encoded arousal prior to beginning therapy were much more likely to be classified as deteriorated relative to all other treatment response groups 2 years after treatment termination if they had received TBCT; if they had received IBCT, they were marginally more likely to be classified as recovered or improved than as unchanged or deteriorated. Couples in which the wife had low encoded arousal were much more likely to be classified as recovered 2 years after treatment termination regardless of whether they had received IBCT or TBCT (see Figure 2). Bootstrap analyses revealed this interaction to be a reliable predictor of treatment response category, as it was selected in 70% of the resamples.

Two interactions with pretreatment severity emerged: hard influence tactics with pretreatment severity and wife's encoded arousal with pretreatment severity ($B = 1.55$, $p < .01$; $B = 0.11$, $p < .001$, respectively). Use of hard influence tactics was significantly associated with treatment response category only for couples categorized as moderately distressed prior to treatment, and the greatest differentiation was seen between couples who were classified as recovered relative to couples who were classified as deteriorated 2 years after treatment termination (see Figure 3). In particular, using lower levels of hard influence tactics was associated with a greater likelihood of being in a higher treatment response category for couples who were classified as moderately distressed prior to treatment (OR = 4.70). Bootstrap analyses revealed that this interaction was a reliable predictor of treatment response category, as it was selected in 82% of the resamples. Wife's encoded arousal was associated with treatment response category mainly for couples who were classified as moderately distressed prior to treatment, and the greatest differentiation was seen between couples who were classified as improved or recovered relative to all other treatment response categories 2 years after treatment termination (see Figure 4). In particular, lower levels of wife's encoded arousal were associated with a greater likelihood of being in a higher response category for couples who were classified as moderately distressed prior to treatment (OR = 1.12). Bootstrap analyses revealed that this interaction is a reliable predictor of treatment response category, as it was selected in 92% of the resamples. There is some evidence that is suggestive of a crossover effect for wife's encoded arousal across pretreatment

Table 2
Parameters for Significant Predictors of Treatment Response Category

Variable	B	SE	OR	95% CI for OR
Therapy	0.24	0.39	1.28	0.61, 2.82
Pretreatment severity	−1.04	0.40	0.35	0.15, 0.74
Years married	0.13	0.03	1.13	1.07, 1.21
Soft influence tactics	0.65	0.30	1.92	1.14, 3.64
Hard influence tactics	−0.78	0.30	0.46	0.25, 0.81
Wife's encoded arousal	−0.01	0.01	0.99	0.96, 1.01
Soft Influence Tactics × Therapy	1.46	0.50	4.29	1.75, 12.47
Hard Influence Tactics × Pretreatment Severity	1.55	0.48	4.70	1.86, 12.33
Wife's Encoded Arousal × Pretreatment Severity	0.11	0.03	1.12	1.06, 1.19
Wife's Encoded Arousal × Therapy	0.07	0.03	1.07	1.02, 1.14

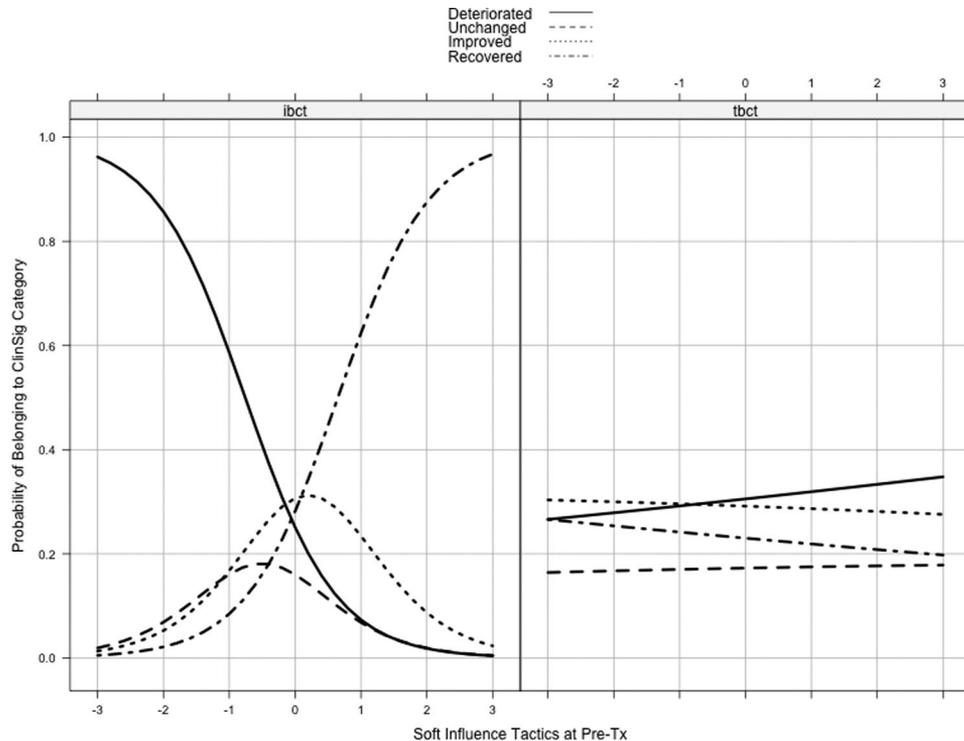*Note.* OR = odds ratio; CI = confidence interval.

Figure 1. Plot of predicted probability of treatment response (ClinSig) category for interaction between soft influence tactic use by the couple and treatment. Pre-Tx = pretreatment.

distress categories. Severely distressed couples appeared to be more likely to respond more favorably to treatment when wife's display of encoded arousal was higher.

Discussion

This study examined a broad spectrum of variables measured prior to treatment (demographic, intrapersonal, communication, and other interpersonal variables) as predictors of categories of response (deteriorated, no change, improved, and recovered) to two couple therapies (IBCT and TBCT) 2 years after treatment termination. Few studies have examined long-term response to couple therapy using pretreatment predictors, so no specific hypotheses were made and potential predictors were identified largely from studies of prediction of treatment response to couple therapy at treatment termination. Several communication variables and one demographic variable emerged as significant predictors of treatment response category; a number of these variables interacted with pretreatment severity or treatment type to differentially predict outcome. It is noteworthy that three of the four significant predictors of 2-year outcome were not self-report measures and that almost all predictors focus on dynamic processes (emotional arousal and influence tactics) rather than stable individual or couple characteristics.

A number of communication variables emerged as significant predictors of treatment response. This finding is in contrast to the single demographic predictor (i.e., years married) and the lack of intrapersonal variables that emerged as significant predictors of treatment response. A considerable amount of empirical work has

documented the importance of demographic and intrapersonal factors for overall marital functioning. For example, neuroticism has been found to be one of the most robust and reliable cross-sectional and longitudinal predictors of marital stability and quality (Karney & Bradbury, 1995; Kelly & Conley, 1987). However, this study, as well as the Atkins et al. (2005) study of prediction of treatment response at therapy termination, failed to find any evidence that neuroticism predicts response to couple therapy. It is unlikely that this null finding is a result of sample characteristics, as the means and standard deviations for both spouses' neuroticism t scores were consistent with normative data for the NEO (husbands, $M = 52.6$, $SD = 11.3$; wives, $M = 50.3$, $SD = 10.7$). However, it is also important to consider that exclusionary criteria included several psychological diagnoses. Though there is no direct evidence of a restriction of range or inconsistency with what would be expected from a random sample, it is possible that exclusionary criteria impacted the possibility that neuroticism would have predicted treatment response in the current study. This lack of findings may be good news for couple therapy. Individual psychological disturbance (at least within the current study of relatively high-functioning participants) does not condemn couples to treatment failure, though it may put them at risk for needing couple therapy in the first place.

Predictors of Treatment Response for All Couples

Length of marriage predicted treatment response for all couples, with spouses being more likely to respond favorably to therapy if they had been married for longer periods of time. This finding is
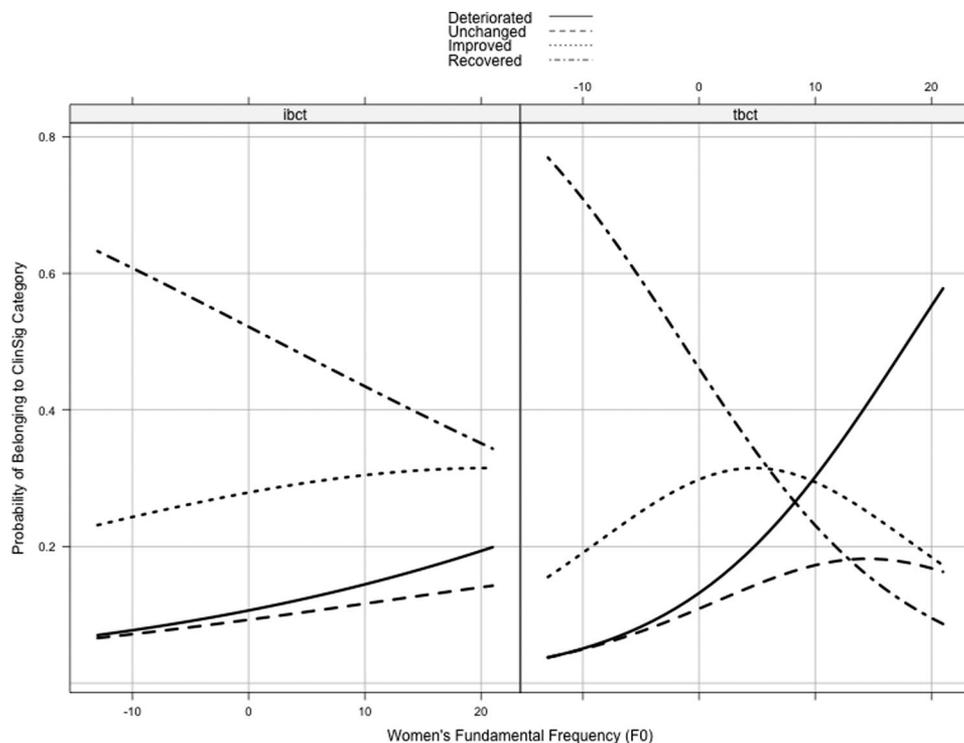
Figure 2.   Plot of predicted probability of treatment response (ClinSig) category for interaction between wife's encoded arousal and treatment.

in contrast to those of several previous studies and requires explanation. Though relationship duration has not been linked to response to couple therapy in prior studies, younger couples have been found to benefit more from couple therapy than do older couples (Baucom & Aiken, 1984; Bennun, 1985; Hahlweg, Schindler, Revenstorf, & Brangelmann, 1984; O'Leary & Turkewitz, 1981). Age and relationship duration are clearly not the same variable, but it is reasonable to think that younger couples have shorter relationship durations. On the basis of this logic, greater relationship duration predicting better treatment response is the opposite of what would reasonably be hypothesized. It is important to note that this study specifically recruited seriously and stably distressed couples; prior studies have included a larger proportion of mildly and moderately distressed couples. It may be that spouses who are seriously and stably distressed but who have been together for longer periods of time are more committed and have already passed through or sorted out more problematic issues (Atkins et al., 2005). A measure of behavioral commitment (the MSI) was included as a predictor in the current study but was not found to be a significant predictor of treatment response. However, this measure is somewhat limited in that it indexes steps taken toward divorce, or the bottom end of the range of commitment. In addition, although it is logical to assume that younger couples will have been married for a shorter period of time, it may not be appropriate to assume that older spouses have longer relationship durations. The average age of marriage has increased since the publication of studies that linked younger age to more positive response to treatment (United Nations, 2000). This societal trend may have impacted the association between age of spouses and

relationship duration and thus have made them less viable proxies for one another.

Pretreatment Distress × Predictor Interactions

Hard influence tactics and wife's encoded arousal were found to predict response to treatment but only for couples who were classified as moderately distressed prior to beginning treatment. Other studies have found pretreatment satisfaction level to be predictive of response to treatment (Snyder et al., 1993), as was found in the current study, but this study is the first that we are aware of that has found an interaction between pretreatment satisfaction level and predictors of outcome. Why is it more difficult to predict treatment response for more distressed couples? There are two likely reasons. The first reason is that more distressed couples have higher scores on multiple variables known to be associated with relationship distress. For highly distressed couples, the high scores on several of these risk factors may combine to represent higher cumulative risk. Though individual risk factors contribute to this cumulative risk, it is likely that individual variables become secondary to the overall gestalt they combine to create. It is possible that this cumulative risk is why pretreatment severity emerged as a significant risk factor and why fewer individual variables predicted treatment response for severely distressed couples. The second related reason is that more severely distressed couples' scores tend to fall within a restricted range and therefore have less statistical predictive power.

No specific hypotheses were made regarding hard influence tactics and encoded arousal, though it is logical that lower levels of
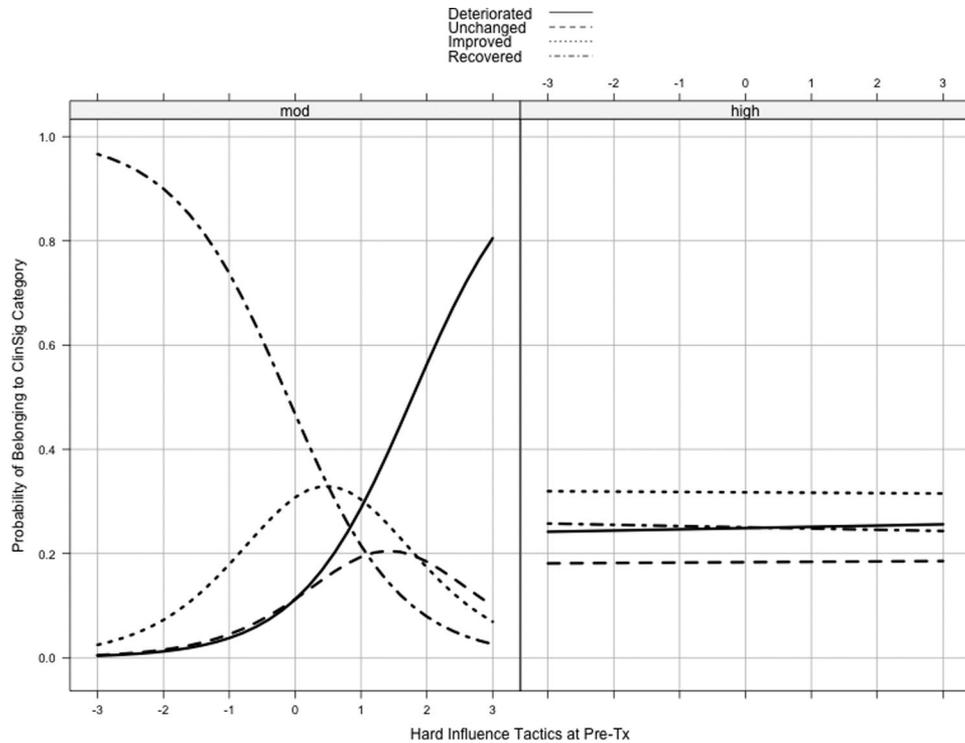
Figure 3. Plot of predicted probability of treatment response (ClinSig) category for interaction between hard influence tactic use by the couple and pretreatment (Pre-Tx) severity.

hard influence tactics and lower levels of wife's encoded arousal are associated with positive response to treatment. Hard influence tactics are characterized by high levels of emotional manipulation and pressure and decreased room for spouses to discuss requests for change. This finding is in line with Jacobson and Christensen's (1998) suggestion that a collaborative set, which is a shared sense of investment in working on the relationship and a willingness to compromise in order to strengthen the relationship, is a crucial ingredient for successful couple therapy. To the best of our knowledge, our study is the first to link pretreatment arousal to outcome in couple therapy. This finding is consistent with those of studies that have documented long-term associations between higher levels of conflict related to arousal and an increased likelihood of divorce (e.g., Gottman & Levenson, 1992) and with recent empirical work documenting the importance of emotion regulation for overall relationship functioning (Snyder, Simpson, & Hughes, 2006).

Though emotion regulation was not directly assessed, it is likely that high levels of emotional arousal were indicative of intra- and/or interpersonal difficulties with emotion regulation. Although the pathways that link arousal to treatment outcome are currently unknown, it may be that when spouses are highly aroused by their own sources of distress, they are unable to join effectively with their partners in processing old wounds or in problem solving current conflicts during therapy sessions. The emotional and cognitive demands of therapy may be too great when spouses are already using all of their available coping skills to handle being in a highly aroused emotional state. There was a minor suggestion in the data that higher levels of arousal were associated with better

response to treatment for severely distressed couples. This effect was small and unexpected; however, it may be that higher levels of arousal are associated with more positive treatment response for severely distressed couples because arousal is in part an index of continued engagement of the relationship. Severely distressed couples who are unaroused during discussion of the problems in that relationship may have disengaged beyond the point of repair. Future studies should seek to replicate and further explore this finding.

Therapy × Predictor Interactions

Identification of prescriptive variables has long been one of the aims of treatment outcome research on couple therapy. Uncovering these variables has been difficult, and currently little is known about what qualities of a couple or spouses would recommend that they receive one couple therapy over another (see Snyder, Castellani, & Whisman, 2006, for a review). Soft influence tactics and wife's encoded arousal emerged as two such variables in the current study. Couples who used higher levels of soft influence tactics were significantly more likely to respond well to treatment if they received IBCT, whereas couples who used low levels of soft influence tactics were significantly more likely to respond poorly to treatment if they received IBCT. Soft influence tactics were unrelated to treatment response for couples that received TBCT. One of the primary interventions in IBCT is empathic joining, a technique that aims to get spouses to share vulnerable emotions related to ongoing distress (Jacobson & Christensen, 1998). Use of higher levels of soft influence tactics, which are characterized by collaboration,
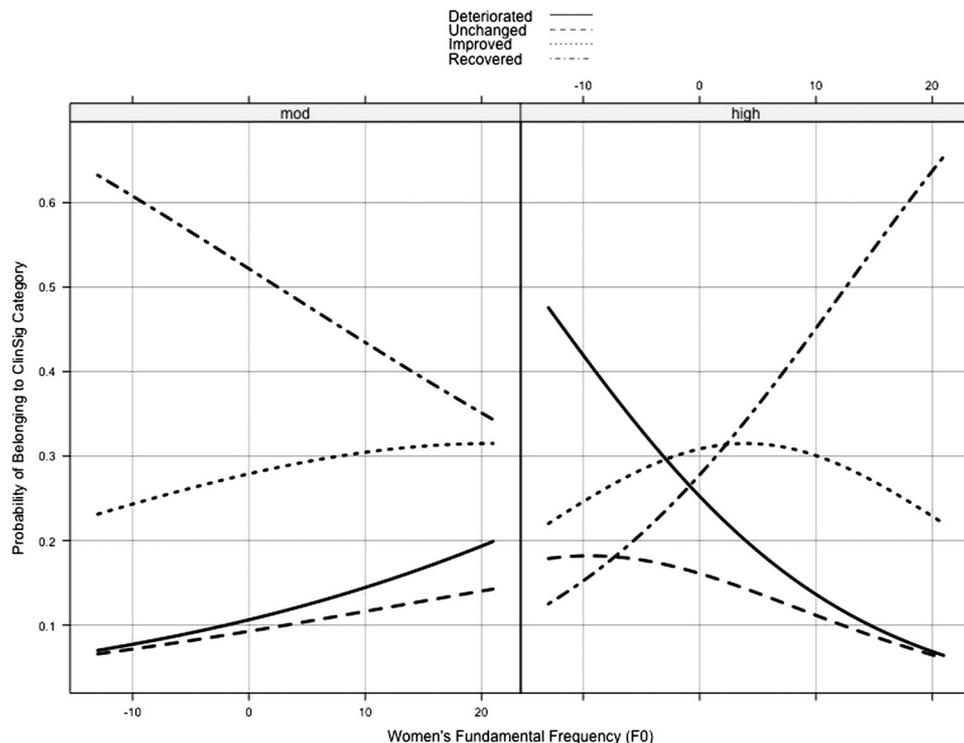
Figure 4. Plot of predicted probability of treatment response (ClinSig) category for interaction between wife's encoded arousal and pretreatment severity.

connection, and shared power, likely makes it easier for couples to engage in empathic joining and thus to be more responsive to IBCT. These findings suggest that couples that use high levels of soft influence tactics may already be more responsive to IBCT, whereas couples that use low levels of soft influence tactics would benefit from a more skills-based treatment.

Couples in which the wife had higher levels of pretreatment encoded arousal were more clearly at risk for being classified as deteriorated 2 years after treatment termination if they had received TBCT than if they had received IBCT. It is possible that much of the encoded arousal expressed by wives before they began therapy was associated with anger, frustration, and irritation. Although this possibility is admittedly speculative, wives in this sample were far more likely than husbands to initiate participation in this study (Doss, Atkins, & Christensen, 2003), so there is some indirect evidence that wives were discontented with the state of their marriages and were motivated to pursue change. In the lexicon of IBCT, anger, frustration, and irritation are all hard emotions that include significant messages of blame. The primary IBCT intervention techniques, such as empathic joining, seek to shift from expressions of hard emotion to expressions of soft emotion; TBCT does not contain techniques that explicitly target a shift in emotional expression. Though additional study is required to confirm this possibility, it is likely that interventions that specifically targeted emotion helped highly aroused wives shift the emotions associated with their arousal over the course of therapy and display greater benefits from the therapy they received. A shift in emotions may also help wives to integrate their experience of long-standing conflicts. A substantial literature links moderate-to-

high levels of emotional arousal associated with novel stimulation to enhanced long-term memory consolidation (McGaugh, 2000). It may be that arousal associated with new or different emotional experiences enhanced learning ideas, concepts, and/or skills associated with the new emotional experience, whereas arousal associated with existing emotional experiences may have impaired learning ability for new concepts, ideas, and skills delivered over the course of therapy (Maroun & Akirav, 2008).

Pretreatment Severity

Pretreatment severity emerged as a moderately robust predictor of treatment response for all couples. As was discussed above, this variable may represent cumulative risk for severely distressed couples. However, it is important to examine the possibility that this finding is somewhat artifactual in nature. By definition, moderately distressed couples are closer to the recovered category of clinical significance, so it could be easier for them to get there over the course of treatment. It also may be easier for severely distressed couples to be in the improved category due to regression to the mean. To examine this possibility, we collapsed treatment response categories into two groups: those who improved (recovered and improved) and those who did not (no change and deteriorated). A roughly equal percentage of severely (61%) and moderately (69%) distressed couples improved. The percentage of couples that did not improve over the course of treatment was also highly similar for moderately (31%) and severely (39%) distressed couples. However, the percentage of couples that improved in therapy and were in the recovered range by the end of treatment

was notably different between severely (50%) and moderately (80%) distressed couples. Thus, it is likely that a proportion of the effect of pretreatment severity is somewhat artifactual and is due to the nature of clinical significance as an outcome.

Limitations

The current study is subject to several limitations. First, there is a relative lack of research on long-term prediction of treatment response to couple therapies, and, as a result, the current study was guided by prediction studies of treatment response at therapy termination. It is possible that important predictors were not included in the current study. We took steps to counteract this possibility by including theoretically viable predictors that had not been previously explored, and a number of these variables turned out to be significant (i.e., influence tactics and encoded arousal). Second, a relatively large number of variables was explored for the amount of data that was available. We used bootstrap resampling techniques to minimize the possibility that the findings of the current study reflect capitalization on chance and that they converge to suggest that any effects due to chance are minimal. Third, alternative methods for analyzing individual variables and combining individual scores into couple-level indices may have resulted in different findings. For example, weak- or strong-link approaches could have been used in place of average individual scores. Alternative methods for analyzing individual variables and combining individual level scores into couple-level scores were explored with several variables, and they did not reveal alternative results.[6] Fourth, the use of some summary variables (such as the presence or absence of a psychological diagnosis on the SCID and overall psychopathology [the Mental Health Index] on the COMPASS) may have limited the sensitivity of analyses performed in this study. It is possible that continuous measures of specific psychopathology, such as depression and anxiety, may predict treatment outcome. Fifth, the demographic composition of couples in the current study may limit the generalizability of these results. Despite outreach efforts to obtain a diverse sample, couples were largely Caucasian and college educated. Finally, 4 couples who participated in the study were unable to be assessed 2 years after treatment termination and were excluded as a result. There is no evidence that there was anything unique about these couples that separated them from the couples that were assessed and included; however, it is possible that exclusion of these 4 couples may have slightly altered the results of the current study.

Summary and Future Directions

The findings of the current study are cause both for optimism for the field of couple therapy and for a call for continued efforts. Optimism springs from the importance of malleable communication variables for treatment response combined with the relative insignificance of static demographic and intrapersonal variables, as well as from the Treatment $\times$ Predictor interactions that suggest that particular couples may differentially benefit from specific treatments. Some of these predictors, such as encoded arousal and influence tactics, have not been previously explored in prediction studies. These findings necessitate replication but suggest fruitful avenues for exploration by those seeking to understand the mechanisms of couple therapy, why particular treatments work better

for certain couples, and how treatments may be modified for the particular needs of any given couple. Encoded arousal appears to hold particular promise in this regard. One of the most powerful effects identified by the treatment outcome research literature is exposure. Exposure has yet to be studied as a mechanism of change in couple therapy, but it is clearly implicated in the strategies of IBCT that promote emotional acceptance. It is possible that couples who benefit from IBCT will show significant declines in arousal associated with conflict over the course of treatment. The findings of the current study demonstrate that arousal plays an important role in the outcome of couple therapy and suggest that exploration of exposure as a mechanism of change in couple therapy is likely to be fruitful. Some findings of the current study (i.e., the positive effects of being married for longer periods of time) require further study. In particular, additional study is needed to help us understand the relative lack of predictors of treatment outcome for couples who were severely distressed prior to treatment. However, despite these caveats, the current study shows that variables measured prior to treatment can substantially predict outcome over 2 years later.

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[6] We conducted several additional analyses to test alternative methods for analyzing individual variables and combining individual variables into couple level indices. These additional analyses included the addition of a variable representing the square of encoded arousal, the addition of average couple level scores for each of the power bases, and the use of signed difference scores for power bases rather than unsigned scores. None of these additional analyses revealed any alternative findings or changed any of the findings presented in the Discussion section.

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