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Relative Contributions of Treatment-Related Changes in Communication Skills and Dyadic Coping Skills to the Longitudinal Course of Marriage in the Framework of Marital Distress Prevention

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Most prior studies of skill-based preventive interventions for couples compare changes in problem-solving behaviors made by treated couples with those made by control couples. Unexpected findings in these studies highlight the need to examine within-group variability in behavior change among treated couples, alternative behavioral domains, including dyadic support and coping, and partners' intended and actual use of strategies taught in the interventions. A 24-month longitudinal study of 109 couples participating in an 18-hour intervention designed to enhance communication and dyadic coping revealed that marital outcomes are enhanced to the extent that (a) wives increase their positive problem-solving behavior and husbands decrease their negative problem-solving behavior over the course of the intervention, and (b) wives and husbands increase their positive dyadic coping behaviors, and husbands decrease their negative dyadic coping behaviors. Moreover, greater

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postintervention use of strategies taught in the intervention program produced better outcomes, and wives' improvements in positive and negative dyadic coping strengthened associations between strategy use and relationship satisfaction. Discussion emphasizes the importance of devising interventions that target key interpersonal processes and that motivate participants to display newly acquired behaviors.

KEYWORDS *marriage, communication, dyadic coping, support, prevention, distress*

Although interventions designed to promote intimacy and prevent relationship distress hold great promise for strengthening couples and families, relatively few studies have been conducted to determine whether preventive interventions have enduring benefits for couples and how any such benefits might arise (Jakubowski, Milne, Brunner, & Miller, 2004). Among these studies, the most common research strategy involves delivering a skill-based intervention to couples, typically in a group format, and comparing their learned behavioral competencies and eventual relationship outcomes with those of couples receiving either no intervention or a placebo. At least three findings from these studies cast doubt on these interventions.

First, there is evidence that treated and control couples do not differ in satisfaction at posttest or 1 year later, despite better performance by treated couples at posttest in specific positive and negative verbal and nonverbal codes (Kaiser, Hahlweg, Fehm-Wolfsdorf, & Groth, 1998; Laurenceau, Stanley, Olmos-Gallo, Baucom, & Markman, 2004). Although this finding might suggest that more time must pass before intervention effects become apparent, other data demonstrate higher satisfaction scores among treated couples within 3 months of treatment, even in the absence of posttreatment differences between treated and control couples on observed positive discussion, validation, invalidation, and conflict behaviors at posttest (Halford, Moore, Wilson, Farrugia, & Dyer, 2004). Finally, among couples deemed to be at low risk for adverse outcomes on the basis of their family backgrounds, control couples report higher satisfaction than treated couples after 4 years despite no differences in observed behavior at posttest (Halford, Sanders, & Behrens, 2001). Among high-risk couples, treated couples did go on to report higher marital satisfaction 4 years later, although they outperformed control couples on just one behavioral index (negative nonverbal codes).

In short, although randomized controlled studies provide valuable information on the eventual outcomes of treated and untreated couples, they do not yet demonstrate systematic associations among participation in skill-based preventive interventions, behavior change, and subsequent relationship outcomes. Several factors may contribute to the failure of these findings to conform to expectations derived from social learning theory, and

in this article we argue specifically that further development of skill-based interventions for couples will be strengthened by examining (a) within-group variation in behavioral changes displayed by treated couples, as compared to the between-group comparisons that have been emphasized to date; (b) changes in social support processes, as compared to the emphasis on problem-solving skills that have been traditionally targeted; and (c) spouses' intent to use the skills they learned in the intervention, and their self-reported use of these skills following the intervention, as compared with their ability to display communication skills in a lab-based assessment when prompted to do so.

The extent to which treated couples differ from control couples in behavioral change provides an index of how well the average treated couple performs compared to the average control couple, relative to their pooled within-group variation estimates. Largely overlooked in analyses of this kind is the extent to which individual partners or couples within the treated group vary in how much they improve or deteriorate in their behavioral skills over the course of treatment (Bradbury & Fincham, 1990). By combining couples who do not show behavioral changes with those who demonstrate improvements in communication, this approach may underestimate the effects of skill-based interventions when behavioral change does occur.

Three recent reports shed light on the association between within-group variability in response to treatment and relationship outcomes. Consistent with predictions from social learning theory, a nonexperimental 5.5-year study of 39 newlywed couples receiving the PREP intervention (Schilling, Baucom, Burnett, Allen, & Ragland, 2003) found that husbands' decreases in negative communication behaviors and increases in positive behaviors reduced the likelihood that the couple would become distressed. Other findings, however, run contrary to this model: (a) husbands' behavior changes were unrelated to wives' marital outcomes; (b) wives' increases in positive behaviors predicted an increased likelihood of marital distress for themselves and for their partners; and (c) wives' decreases in negative behaviors were unrelated to later marital outcomes for themselves or for their partners (Schilling et al., 2003). In their 5-year study of 77 couples receiving a German modification of the PREP intervention, Baucom, Hahlweg, Atkins, Engl, and Thurmaier (2006) subsequently identified 9 couples (12%) in which the wives demonstrated extreme increases in positive communication and decreases in negative communication. Echoing the Schilling et al. (2003) findings, these couples demonstrated rapid declines in satisfaction following treatment. Cluster analysis identified an additional 42 women (54%) who showed very little change in observed behavior, and 26 women (34%) who made expected gains in behavior, especially on verbal codes. Finally, in an analysis of two samples of couples receiving PREP ($N = 105$ and 29 couples), Stanley, Rhoades, Olmos-Gallo, and Markman (2007) failed to replicate the paradoxical effect for changes in wives' positive communication. However, across samples, improvements in husbands' and

wives' positive communication did not predict better outcomes, and wives' decreases in negative communication did not predict better outcomes. In the smaller sample, husbands' increases in negative communication marginally predicted poorer outcomes for wives (but not husbands), whereas in the larger sample, husbands' increases in negative communication predicted poorer outcomes only for themselves and not for their wives.

As was the case with the between-group studies, these four within-group analyses fail to reveal much systematic evidence to support the contention that improved problem-solving communication—whether it be in the form of increases in positive, constructive behaviors or decreases in negative, destructive behaviors—yields consistent improvements in relationship satisfaction or dissolution. As a set, these findings question the assumption that adverse marital outcomes can be prevented by modification of problem-solving behavior, and they may suggest the need for more complex conceptualizations of the processes that may give rise to distress and discord. Before we can conclude with confidence that prevailing skill-based prevention models require modification, however, additional within-person analyses are needed to test the core predictions of the social learning model.

The first aim of this study is to examine the self-reported changes in behavior that couples make in an 18-hour skill-based intervention program (Couples Coping Enhancement Training [CCET]; Bodenmann & Shantinath, 2004), in relation to marital outcomes over the ensuing 2 years. In the absence of a stronger alternative model that fits the existing results, we predict on the basis of social learning theory that increases in negative behavior over the course of the intervention will increase risk for distress, and that increases in positive behaviors will decrease risk for distress. In view of the prior findings noted earlier, we aim to test these hypotheses with four methodological features in place:

1. As statistical power may be contributing in part to the inconsistent findings (Stanley et al., 2007), we employ a sample that is comparable in size to that of the largest study previously cited, with approximately 110 couples providing data to estimate 2-year changes.
2. As ceiling effects may be contributing to the pattern of results (Baucom et al., 2006), we begin with a sample of established couples varying widely in satisfaction. This type of sample represents a large population of couples, many of whom have children, and there is growing interest in testing interventions that stabilize and strengthen their relationships (e.g., Kaiser et al., 1998).
3. As simultaneous consideration of husbands' and wives' change scores may be responsible for spurious sign changes in the survival analyses conducted by Schilling et al. (2003; see Stanley et al., 2007), we used multilevel modeling for our primary analyses, which is designed to accommodate dependencies of this sort.

4. Finally, as brief lab-based assessments of couple interaction can misrepresent naturalistic interactions (Neff & Karney, 2005), and in view of evidence that self-report and observational measures of interaction behavior are equally powerful in predicting 4-year marital outcomes (Rogge & Bradbury, 1999), we use self-reports to assess couple communication behaviors.

The second aim of this research is to expand the focus of interpersonal processes typically targeted within social-learning-based intervention programs (i.e., positive and negative communication behaviors, particularly when discussing relationship conflicts) by also examining how individual couples change in their dyadic coping abilities, or how partners work jointly and mutually as they contend with common, everyday stresses (see Bodenmann, 2005). CCET is based on this approach to understanding stress in couples and, in addition to addressing standard problem-solving skills, it is designed to enhance how partners communicate their experiences of stress to one another, how partners perceive stress in their mate, and how partners can work together to manage stressful circumstances and events (Bodenmann, 2005, 2007).

Dyadic coping can be readily understood within the social learning framework, in that rewarding exchanges in this domain are expected to promote successful relationship outcomes, whereas mismanagement of stress and inadequate support are expected to promote relationship distress (e.g., Cutrona, 1996). At the same time, these transactions can be theorized to exert effects that are distinct from marital problem-solving exchanges. Conflict management skills are deployed when differences of opinion arise within the dyad, whereas support and coping skills are enacted when individual partners are upset by stressful events and circumstances arising outside the dyad. Research supports this distinction: Observed social support behaviors predict 2-year changes in relationship satisfaction independent of the anger and contempt that couples display in problem-solving conversations, and the effects of these problem-solving behaviors are strongest when social support is most deficient (Pasch & Bradbury, 1998). Accordingly, we predict that improvements in dyadic coping over the course of the intervention program will covary with less relationship distress in the 2-year follow-up interval and that these associations will remain after controlling for the predicted changes in the positive and negative communication behaviors outlined earlier.

The third goal of this study is to examine the extent to which spouses, at the completion of the intervention, intend to use the skills taught in the workshop and the extent to which they report using these skills at subsequent follow-up assessments. Although several between-group studies have been exemplary in their collection of observational data during follow-up assessments (e.g., Halford et al., 2001; Kaiser et al., 1998), far less is known about the extent to which couples intend to use the learned skills, their

actual use of the skills, and the covariation of these intentions and behaviors with postintervention changes in satisfaction. Using self-reports, we predict that the intent to use learned skills will predict actual use of learned skills during the follow-up interval, that actual use of learned skills will covary with higher relationship functioning following the intervention, and that higher levels of couple functioning prior to the intervention will covary with greater use of the skills following the intervention.

METHOD

Participants

Newspaper ads placed in the German-speaking region of Switzerland were used to recruit 122 couples for participation in a marital communication workshop. Women averaged 39.4 years of age ($SD = 7.6$), men averaged 41.6 years of age ($SD = 7.7$), and relationships averaged 13.4 years in duration ($SD = 8.6$). Most couples (84%) were married and 76% had one or more children. Modal household income was between \$50,000 and \$90,000, and the modal woman (64%) and man (54%) ended their education with an associate's degree.

Measures

RELATIONSHIP SATISFACTION

The 31-item *Partnerschaftsfragebogen* (Partnership Questionnaire [PFB]; Hahlweg, 1996) was used to measure perceptions of relationship satisfaction. The PFB discriminates reliably between distressed and nondistressed couples, and allows close monitoring of changes associated with relationship interventions (Hahlweg, 1996). Coefficient alpha in this sample was .90. PFB cutoff scores are used to designate low, (<54), medium (55–72), and high (>72) levels of relationship quality. Women averaged 56.6 on the PFB ($SD = 12.3$, range = 27–83) and men averaged 54.9 ($SD = 11.6$, range = 26–78), indicating that the modal couple was experiencing a medium level of relationship satisfaction.

MARITAL COMMUNICATION QUESTIONNAIRE

The Marital Communication Questionnaire (MCQ) is a 19-item scale (see Bodenmann, 2000) based on the affective communication categories identified by Gottman (1994) that assesses perceptions of positive and negative problem-solving behaviors. Items are administered on a 6-point scale ranging from 1 (*never*) to 6 (*very often*). Factor analysis revealed two factors, representing 6 positive behaviors (e.g., I am actively interested and curious

about what my partner is telling me; I validate my partner's opinion and feelings; I try to understand my partner; I search for constructive solutions with my partner; $\alpha = .82$) and 13 negative behaviors (e.g., I insult my partner; I criticize my partner; I deny responsibility or blame my partner; I react with a whining quality in my voice; I withdraw from communication; $\alpha = .78$). The validity of the MCQ has been documented. The questionnaire is correlated with the Marital Communication Inventory (MCI) by Bienvenu (1971), with $r = .84$ (Bodenmann, 2000).

DYADIC COPING QUESTIONNAIRE

The Dyadic Coping Questionnaire (FDCT-N) is a 55-item questionnaire that assesses dyadic coping and communication when either or both partners experience stress. Items on the FDCT-N reflect six forms of dyadic coping, including stress communication (e.g., telling the partner about the stress experience, asking for emotional or practical support; 5 items), supportive dyadic coping (e.g., providing practical support, understanding, comfort; helping the partner reframe the situation; 13 items), supportive dyadic coping by the partner (using the same items as for one's own supportive coping but with partner as actor; 13 items), common dyadic coping (e.g., facing the stressful event together, mutual comforting, exchanging relevant information; 10 items), negative dyadic coping (e.g., criticizing the partner while supporting him or her, dismissing the partner's stress, helping the partner but without real interest; 7 items), and negative dyadic coping by the partner (using the same items as for one's own negative dyadic coping but with the partner as actor; 7 items). Items were rated on a scale ranging from 0 (*never*) to 4 (*very often*). Cronbach's alpha was .92. The criterion validity and construct validity of the FDCT-N have been previously evaluated (Bodenmann, 2000).

INTENDED SKILL USE

After completing the workshop, participants completed 14 items assessing how often they intended to use the strategies presented in the workshop (e.g., stress communication, providing dyadic coping to the partner, following specified communication and problem-solving principles), on a scale ranging from 1 (*never*) to 6 (*always*). Alpha for the resulting composite index was .88 for wives and .90 for husbands.

REPORTED SKILL USE

Participants' self-reported use of the 14 main strategies covered in the workshop were assessed at posttest and at 6-, 12-, and 24-month follow-ups, on

a scale ranging from 0 (*never*) to 3 (*always*). The modal alpha value across assessments for the composite index was .86 for wives and .86 for husbands, with a range of .78 to .89.

Intervention Program

Couples participated in the 18-hour CCET (Bodenmann & Shantinath, 2004), which was offered to groups of six to eight couples as a six-module week-end course that addressed the nature of stress and coping, improvement of individual coping, enhancement of dyadic coping, exchange and fairness in the relationship, improvement of communication, and improvement of problem solving. Trainers were advanced graduate students in clinical psychology with extensive training in delivering CCET. Standardization among trainers was ensured through the use of a detailed and structured manual for trainers and intense supervision. A ratio of one trainer per two couples was maintained during the exercises, which involved four interactional tasks designed to teach couples skills in communication, problem solving, and dyadic coping. All couples completed the intervention program.

Procedure

Participants responding to the advertisements were scheduled to attend one of the workshop sessions. Two weeks before attending (i.e., at pretest), each partner was sent questionnaires with instructions to complete the forms independently and return them by mail to the institute. Identical procedures were used 2 weeks following completion of the workshop (posttest) and again at 6-, 12-, and 24-month follow-ups.

RESULTS

Preliminary Analyses

DESCRIPTIVE STATISTICS

Table 1 shows means and standard deviations for the main study variables, for men and women, at pretest and posttest. Table 1 shows that, with the exception of women's positive communication, all variables changed in the expected direction. Computed effect sizes showed that the largest changes from before to after the CCET intervention involved negative communication for women ($d = -.50$) and men ($d = -.46$), negative dyadic coping for men ($d = -.36$) and women ($d = -.34$) and positive dyadic coping for women ($d = .30$) and men ($d = .21$). Smaller effects were observed for positive communication for men ($d = .22$) and women ($d = -.07$). Effect sizes for women's and men's satisfaction were .18 and .19, respectively. Thus, on

TABLE 1 Means and standard deviations for study variables, for men and women, at pretest and posttest

Variable	Pretest		Posttest		<i>t</i>	<i>D</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Positive dyadic coping (women)	3.29	0.63	3.46	0.49	4.19***	0.30
Positive dyadic coping (men)	3.35	0.53	3.46	0.53	3.07**	0.21
Negative dyadic coping (women)	2.14	0.49	1.97	0.50	4.10***	-0.34
Negative dyadic coping (men)	2.00	0.47	1.84	0.41	4.53***	-0.36
Negative communication (women)	2.36	0.52	2.11	0.51	-7.12***	-0.50
Negative communication (men)	2.19	0.49	1.99	0.42	-6.94***	-0.46
Positive communication (women)	4.07	0.77	4.04	0.65	-0.68	-0.05
Positive communication (men)	3.58	0.69	3.73	0.61	2.60*	0.22
Marital quality (women)	56.74	12.03	58.88	11.54	3.09**	0.18
Marital quality (men)	55.00	11.66	57.13	11.07	2.97**	0.19

Note. *N* = 122 men, 122 women; **p* < .05; ***p* < .01; ****p* < .001.

average, (a) negative communication was more likely to change than positive communication, (b) negative dyadic coping was more likely to change than positive dyadic coping in men, (c) positive and negative dyadic coping were more likely to change than positive communication, and (d) men and women changed to approximately the same degree, with the exception of positive communication. Within these average effects, individuals vary in how much they changed; this study links these individual-level changes to changes in marital satisfaction.

CORRELATIONS AMONG MEASURES

At pretest, higher marital quality was associated with more positive communication and positive dyadic coping and less negative communication and negative dyadic coping (see Table 2, pretest scores). Correlations between marital quality and communication ranged from $-.45$ to $.24$, indicating reliable but incomplete overlap between these measures. Somewhat stronger links were found between marital quality and dyadic coping ($r = -.39$ – $.65$). Partners reporting more positive and less negative communication reported higher scores in positive dyadic coping and lower scores in negative dyadic coping.

Initial marital quality was largely unrelated to pretest to posttest changes in positive and negative communication and positive and negative dyadic coping (see Table 2, change scores). Changes in positive and negative communication were unrelated for men and for women. Improvements in positive communication were significantly correlated with changes in positive dyadic coping in women and men and were negatively correlated with changes in negative dyadic coping (only significant in men). Declines in negative communication tended, on the other hand, to covary with changes

TABLE 2 Correlations between initial marital quality, communication, individual and dyadic coping for pretest scores and pretest to posttest change scores

Pretest Scores	Marital Quality	Positive Communication	Negative Communication	Positive Dyadic Coping	Negative Dyadic Coping
Marital quality		.33***	-.45***	.65***	-.39***
Positive communication	.24**		-.15 [†]	.50***	-.17 [†]
Negative communication	-.32***	-.26**		-.23*	.34***
Positive dyadic coping	.69***	.47***	-.27**		-.34***
Negative dyadic coping	-.46***	-.18*	-.23*	-.41***	
Change Scores	Initial Marital Quality	Change in Positive Communication	Change in Negative Communication	Change in Positive Dyadic Coping	Change in Negative Dyadic Coping
Initial marital quality		.08	.02	.02	-.14
Change in positive communication	.08		-.04	.46***	-.22*
Change in negative communication	-.16 [†]	-.14		-.17 [†]	.26**
Change in positive dyadic coping	.08	.38***	-.15 [†]		-.17 [†]
Change in negative dyadic coping	-.08	-.11	.22*	-.31**	

Note. $N = 122$ men, 122 women. Results for men are shown above the diagonal in each panel, and results for women are shown below the diagonal in each panel. Change scores were estimated after first partialling pretest scores from posttest scores for each variable.

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

in negative dyadic coping in women and men but not with changes in positive dyadic coping. Posttest minus pretest difference scores, not shown here, indicated that partners with higher initial scores tended to improve less.

Extremely Large Pretest to Posttest Changes in Communication

In view of the Baucom et al. (2006) finding that unusually large increases in positive behaviors by a small number of wives were responsible for the paradoxical effects of these behaviors on marital outcomes, z scores were computed in an effort to identify spouses who made extreme changes on self-reported behaviors from pretest to posttest. Among the 114 women in the sample, one increased by 2 SD on positive communication and another decreased by 4.7 SD on negative communication. All other changes were within the 3 SD range. No extreme changes were observed for men. These results preclude further analysis of whether very large increases in positive behaviors increase risk for relationship deterioration.

Posttreatment Changes in Marital Satisfaction Parameters in Relation to Communication Variables

ANALYSIS PLAN

Following Raudenbush, Brennan, and Barnett (1995), hierarchical linear modeling (HLM) analyses were undertaken to predict changes in husbands' and wives' marital quality over time from both partners' dyadic coping and communication scores. The dependent variables for this analysis are derived from the four postintervention satisfaction assessments; pretest levels were subtracted from these scores to make the intercepts more informative. HLM of dyadic data was further warranted by the empirical dependencies between husbands' and wives' scores from pretest to the 24-month follow-up, which were evident for marital satisfaction (r s = .61, .50, .54, .63, and .61, respectively), positive dyadic coping (.51, .42, .56, .47, and .45), and negative communication (.37, .32, .37, .45, and .37); all correlations are highly reliable. Lower between-partner correlations were evident for negative dyadic coping (.23, .28, .32, .21, and .23), and correlations for positive communication (.11, .07, .15, .03, and .18) were nonsignificant. These correlations do not appear to grow markedly stronger or weaker with the passing of time, suggesting that the intervention does not, on average, create greater similarity between partners. With the exception of one variable (positive dyadic coping, $r = .41$), changes between pre- and posttest scores were uncorrelated between the partners, suggesting that partners respond differently to the intervention.

On the first level, the changes in the marital satisfaction of each couple were predicted from (a) one intercept for the husband, and (b) one intercept for the wife, each corresponding to his or her average marital quality change from pretest level considering the 2 years postintervention, and (c) the time in years for the husband, and (d) the time in years for the wife, with these slopes corresponding to the amount of change in marital quality in 1 year for each partner (see Table 1). As one disadvantage of this model is a rapid increase in the number of parameters, predictors that proved nonsignificant in preliminary analyses were not included (e.g., the quadratic time component). Positive intercepts (a and b) indicate that the partners' marital satisfaction level is higher after than before the intervention. Positive slopes for time (c and d) indicate that the partners' marital satisfaction increases over 2 years.

On the second level, the intracouple parameters estimated on the first level could further be predicted by (a) the pretest marital satisfaction for husbands and (b) for wives, and the change between pre- and posttest in (c) positive dyadic coping for husbands and (d) for wives, (e) negative dyadic coping for husbands and (f) for wives, (g) positive communication for husbands and (h) for wives, and (i) negative communication for husbands and (j) for wives. For the sake of parsimony, other predictors such as

sociodemographic variables were not included. For predictors of Level 1 intercepts, positive B s indicate that higher pretest marital satisfaction and higher increases in positive or decreases in negative coping or communication are associated with improved marital satisfaction on average over the 2 years. In predictors of Level 1 slopes, positive B s indicate that higher pretest marital satisfaction and higher increases in positive or decreases in negative coping or communication are associated with improvement in satisfaction during the 2 years.

MARITAL SATISFACTION PARAMETERS

In the 24 months following the intervention, marital satisfaction intercepts were higher relative to pretest levels, for husbands ($B = .043$, $p < .05$) and for wives ($B = .041$, $p < .05$), who did not differ, $\chi^2(1) = 0.01$, *ns*. Analysis of slopes indicated that husbands' satisfaction decreased following the intervention ($B = -.028$, $p < .05$). Wives' satisfaction did not decrease ($B = -.016$, *ns*), and husbands and wives did not differ in their rates of change, $\chi^2(1) = 0.59$, *ns*.

Sufficient interindividual variability was observed on the intercepts (for husbands and for wives, $.16$, $p < .001$) and on slopes (for husbands, $.08$, $p < .001$; for wives, $.09$, $p < .001$) to warrant prediction of these parameters from Level 2 variables. Thus, although the average individual does experience a higher level of marital satisfaction, and although the average husband does experience a reliable decrease in satisfaction, the considerable within-person variance suggests that the intervention affected different individuals and relationships in different ways. We used the pretest levels of the self-reported satisfaction and pretest to posttest changes in communication and coping variables to predict the variability in the slopes and intercepts.

PREDICTION OF CHANGES IN MARITAL SATISFACTION FROM COMMUNICATION AND COPING

To address associations between the five Level 2 predictors and posttreatment changes in satisfaction, a complete model was estimated that included scores on these predictors for husbands and for wives. Only the significant predictors were retained for final estimation; Table 3 presents the results for this final model.

Husbands with higher pretest marital satisfaction scores were found to have lower levels of satisfaction in the 24 months following treatment ($B = -.30$, $p < .001$), which suggests that relatively satisfied husbands regressed to the mean over time. For wives, two associations with pretest marital quality were evident. First, like husbands, wives with higher pretest scores also had lower posttreatment satisfaction levels ($B = -.13$, $p < .01$), although this effect was weaker for wives than for husbands: $\chi^2(1) = 6.98$, $p < .008$.

TABLE 3 Hierarchical linear modeling results for the prediction of 24-month posttreatment changes in marital satisfaction, adjusting for pretest satisfaction scores (final model including significant predictors only)

	Level 2 Predictors				
	Pretest Marital Quality	Changes in Positive Dyadic Coping	Changes in Negative Dyadic Coping	Changes in Positive Communication	Changes in Negative Communication
Level 1 parameters	B_{husband} B_{wife}	B_{husband} B_{wife}	B_{husband} B_{wife}	B_{husband} B_{wife}	B_{husband} B_{wife}
Husband Intercept ^a	-0.30***	0.11**	NE	NE	-0.14***
Wife Intercept ^a	0.12**	NE	NE	NE	NE
Husband Slope ^b	-0.13**	NE	NE	NE	NE
Wife Slope ^b	NE	0.16***	-0.14***	NE	NE
Husband Slope ^c	NE	NE	NE	NE	NE
Wife Slope ^c	NE	NE	NE	0.03*	NE
	NE	NE	NE	NE	NE
	NE	NE	NE	NE	0.07*

Note. NE = not estimated in the final model because nonsignificant in the general model.

^a*df* = 109. ^b*df* = 110. ^c*df* = 112.

p* < .05. *p* < .01. ****p* < .001.

Second, to the extent that their wives were higher in satisfaction at pretest, husbands had higher posttreatment levels of satisfaction ($B = .12, p < .01$). No associations were observed between pretest marital satisfaction and rates of change in satisfaction following treatment, for husbands or for wives.

Three associations linked changes in dyadic coping with posttreatment satisfaction scores; all three involved intercepts rather than slopes. Husbands who made larger gains in positive dyadic coping were also found to have higher posttreatment intercepts in satisfaction ($B = .11, p < .01$). This association was also observed among wives ($B = .16, p < .001$) and to a comparable degree, $\chi^2(1) = 1.07, ns$. Thus, posttreatment satisfaction levels were increased to the extent participants made greater changes in, for example, communicating more and more explicitly about one's stress, offering more emotional and practical support to a partner experiencing stress, and coping together with the problems they encountered. Moreover, wives were also found to have higher posttreatment satisfaction scores to the extent that their negative dyadic coping declined over the course of the intervention ($B = -.14, p < .001$), suggesting that wives' satisfaction can improve to the extent that they, for example, minimize the partner's stress less, reduce the superficial support that they provide, and offer less criticism while supporting the partner.

Changes in problem-solving communication were linked with posttreatment satisfaction scores in three ways. First, wives who increased in their positive problem-solving communication had husbands who experienced slower posttreatment rates of change in satisfaction ($B = .03, p < .05$).

Second, wives who increased in their negative problem-solving communication themselves experienced slower posttreatment rates of change in satisfaction ($B = .07, p < .05$). Contrary to predictions, this suggests that increases in wives' negative problem-solving behaviors decrease the rate at which their marital satisfaction drops following the intervention. Finally, husbands experience lower levels of marital satisfaction following the intervention to the extent that they reduce their negative problem-solving communication from pre- to posttreatment ($B = -.14, p < .001$). This association was comparable in magnitude to the finding for husbands' dyadic coping, $\chi^2(1) = 0.22, ns$. Post-hoc comparisons of the corresponding B coefficients revealed a marginally stronger effect for the changes in dyadic coping than in communication, $\chi^2(1) = 3.32, p < .064$. However, no significant differences were found when comparing the strength of all of the wives' changes and all of the husbands' changes, $\chi^2(1) = 2.43, ns$.

Intended and Actual Use of Communication Strategies

The third goal was to examine individual variability in intended and actual use of communication strategies, and their ability to predict changes in post-treatment satisfaction.

INTENDED USE OF STRATEGIES

At the completion of the workshop, couples were asked to rate on a 6-point scale the extent to which they intended to use in their daily lives the various strategies they had learned in the CCET intervention. Participants indicated that they intended to use these strategies often or most of the time; for husbands, $M = 4.3, SD = 0.6$; for wives, $M = 4.6, SD = 0.6$ —and wives scored higher in this regard, $t(115) = 15.64, p < .001$. The correlation between spouses was $r = .43, p < .001$.

ACTUAL USE OF STRATEGIES

Turning to the reported actual use of the strategies following the intervention, a 4×2 repeated measures analysis of variance, with time (2 weeks, 6 months, 12 months, 24 months postintervention) and gender as between-subject factors, revealed a main effect of gender, $F(1, 88) = 4.71, p = .033$, with wives reporting more frequent use (marginal means for husbands and wives were: men 1.27 ± 0.37 and women 1.34 ± 0.35). A main effect of time was also found, $F(3, 86) = 5.77, p < .001$. (Strategy use was assessed on a 4-point scale, ranging from 0 [*never*] to 3 [*always*].) Graphing the means for the four assessments showed that scores dropped from the 2-week assessment ($M = 1.34$) to the 6-month assessment ($M = 1.28$), quadratic contrast, $F(1, 88) = 5.77, p < .002$,

after which they increased to 12 months ($M = 1.32$) and again to 24 months ($M = 1.44$), linear contrast, $F(1, 88) = 8.09, p < .006$. There was no evidence that the association between gender and reported strategy use differed as a function of time: Time \times Gender, $F(3, 86) < 1, ns$. The average correlation between spouses across assessments in strategy use was $r = .40, p < .001$.

ASSOCIATION BETWEEN INTENDED AND ACTUAL USE OF STRATEGIES

As expected, reported intent to use strategies immediately after the workshop predicted actual use of the learned techniques 6, 12, and 24 months after participation in the CCET (average $r = .25, p < .007$ for women and $r = .49, p < .001$ for men). Intended strategy use was unrelated to pretest scores in coping, communication, marital satisfaction, and relationship duration for women and men.

PREDICTING POSTTREATMENT CHANGES IN MARITAL QUALITY FROM ACTUAL USE OF STRATEGIES

A second HLM model was estimated to examine changes in marital quality following the intervention in relation to actual strategy use, thus addressing whether different satisfaction outcomes could be linked to differential use of the strategies covered in the intervention. Reported use of the strategies was entered at Level 1; time could not be included in this model because of multicollinearity. A positive slope for these predictors indicates that marital quality is higher at those times when the partners report having used the strategies more often since the prior assessment. Entered at Level 2 were husbands' and wives' scores on intention to use the learned strategies, changes in positive dyadic coping, and changes in negative dyadic coping. Only formerly significant predictors were included in the final model; for husbands, $df = 112$, for wives, $df = 109$.

Marital satisfaction levels following the intervention were significantly higher to the extent that wives and husbands reported actually using the strategies taught during the CCET intervention (for husbands, $B = .17, p < .001$; for wives, $B = .16, p < .001$), and they did not differ in this regard, $\chi^2(1) = 0.22, ns$. When the spouses reported a 1-point increase in strategy use (on a 4-point scale) since the preceding measurement occasion, their satisfaction change from pretest increased by .16. This represents a fairly large change because the previous prediction model had shown the average change score was on the order of .04. Note that the dependent variable here is change in marital satisfaction from pretest to the four other measurement periods. Marital satisfaction is measured on a 4-point scale, and the average succeeding changes between assessments are, for women .07, .04, .05, and .03; comparable changes for men are .07, .02, .07, and $-.01$. Furthermore, significant within-person variations were observed in the strength of these associations (for husbands, $.11, p < .001$; for wives, $.09, p < .001$).

Level 2 predictors were used as potential moderators of the Level 1 associations between changes in strategy use and changes in satisfaction. When husbands reported a greater intention to use the communication strategies at the end of the intervention, the association between their actual strategy use and their wives' satisfaction was stronger over the following 24 months ($B = .06, p < .05$). Likewise, when wives reported a greater intention to use the strategies, the association between their actual strategy use and husbands' satisfaction was stronger ($B = .16, p < .001$). Thus, when one partner was motivated at the end of the program to incorporate newly learned skills into the couple's daily life, the mate's satisfaction improved more when the partner reportedly used the learned skills in everyday life. These effects were comparable across genders, $\chi^2(1) = 2.02, ns$. Wives' intention to use the strategies also strengthened the association between their own use of the strategies and their satisfaction ($B = .12, p < .05$).

Changes in wives' positive and negative dyadic coping from pretest to posttest also moderated the association between wives' strategy use and marital satisfaction. Thus, wives' greater increases in positive dyadic coping ($B = .07, p < .05$) and greater decreases in negative dyadic coping ($B = -.11, p < .001$) increased the likelihood that their marital satisfaction would improve when the learned strategies were used in daily life. Changes in husbands' dyadic coping were unrelated to the association between their strategy use and satisfaction.

PRETEST PREDICTORS OF ACTUAL USE OF COMMUNICATION STRATEGIES

Finally, in view of the evidence that within-person changes in reported postintervention strategy use corresponded with changes in satisfaction, we sought to identify pretest variables that would predict strategy use. Partners who reported more frequent use of the strategies in the 24 months following the intervention had, at pretest, higher marital satisfaction (wives: $r = .22, p < .05$; husbands: $r = .21, p < .05$), higher positive communication (wives: $r = .35, p < .001$; husbands: $r = .33, p < .001$), and higher positive dyadic coping (wives: $r = .30, p < .001$; husbands: $r = .28, p < .002$). All other correlations with pretest measures were nonsignificant. Pre- to posttest changes in communication or dyadic coping did not yield any significant association with the use of the strategies subsequent to the participation in the intervention, with one exception: Men's increases in positive dyadic coping covaried with more actual use of learned techniques ($r = .26, p < .006$).

DISCUSSION

What conditions and experiences promote successful outcomes for couples participating in an intensive skill-building intervention? Unlike most previous

studies, which compare changes in behavior made by treated and untreated couples, this study sought to answer this question by focusing on within-group variability in self-reported behavior change in a sample of treated couples. This study also differs from prior skill-based intervention studies by employing an intervention, the CCET (Bodenmann & Shantinath, 2004), which not only focuses on improving communication and problem solving, but also aims to enhance how individuals and couples cope with daily stress. This latter focus arises from recent conceptualizations by Bodenmann (2000, 2005) and Karney and colleagues (e.g., Karney & Bradbury, 1995; Karney, Story, & Bradbury, 2005) that argue that marital outcomes are determined in part by the contexts and environments in which couples reside and how couples adapt to challenges and stresses posed by their ecological niches. A third focus of this study was within-group variability in individuals' intentions to use strategies taught in the workshops, and their self-reported use of these strategies during the follow-up period, in relation to one another and to changes in marital satisfaction. Along with reports of intended and actual strategy use, self-reports of communication, dyadic coping, and individual coping were collected prior to and following the CCET intervention, and resulting estimates of baseline levels and pre-post changes in these variables were used in multilevel models to predict relationship satisfaction in 109 couples over the ensuing 24 months.

The guiding rationale for this study—that individuals receiving a highly standardized and manualized intervention would vary in their response to this intervention—was supported by results showing sufficient variability in key variables, and little association between spouses in the changes that were made. Efforts to analyze this variability yielded three main sets of findings. First, when changes in problem-solving communication were examined in relation to posttreatment satisfaction, two of three significant findings conformed to predictions derived from social learning theory. As expected, wives who increased in positive problem solving had husbands who experienced slower posttreatment rates of change in satisfaction, and husbands who reduced their negative problem solving experienced higher levels of satisfaction following the intervention. The former finding runs counter to Schilling et al.'s (2003) observation that wives' improvements in positive behaviors are detrimental to relationship satisfaction, whereas the latter is consistent with findings reported by Schilling et al. and by Stanley et al. (2007; larger sample) that reductions in husbands' negative problem solving covaried with better outcomes for themselves but not their wives. Our third finding, that wives who increased in their negative problem-solving communication themselves experienced slower posttreatment rates of change in satisfaction, is at odds with social learning predictions, yet echoes a very similar finding reported by Karney and Bradbury (1997) in a 4-year longitudinal study of untreated newlyweds.

In sum, these data lend support to two prior studies demonstrating that husbands experience better relationship functioning following reductions in their negative communication. Although the findings reported here join with Stanley et al.'s (2007) two studies to suggest that wives' improvements in positive behaviors are not detrimental to marital functioning, their increased levels of negativity were shown to foreshadow positive outcomes. No evidence was obtained here to suggest that a subset of individuals were making extreme changes in behavior that, in the study by Baucom et al. (2006), accounted for the paradoxical effects of wives' positive behaviors. Combining across studies, we are left with the conclusion that husbands who decrease their negative problem-solving behaviors appear to benefit from these behavioral changes. Results for wives appear to be less consistent across studies, yet there is growing evidence that wives' satisfaction improves with increases in their negative problem-solving behaviors. Prior findings in the marital literature suggest the need for caution in interpreting counterintuitive effects such as this, yet there is a clear need to explain why social learning predictions often fail when applied to wives' data. One likely possibility, suggested elsewhere (Karney & Bradbury, 1997), is that wives' negativity is an expression not of poor skills or discontent but of a recognized need to "take charge" in managing the relationship. Skill-based interventions may give wives permission, authority, and incentive to engage in these ostensibly negative behaviors, and in at least some couples they may circumvent more costly disputes.

In the second main set of findings, changes in dyadic coping were shown to predict levels of satisfaction following treatment. Specifically, husbands and wives who improved more in their positive dyadic coping experienced higher posttreatment satisfaction intercepts, as did wives who reduced their negative dyadic coping behaviors. These effects were estimated within the same model as the communication variables noted earlier, indicating that addressing support processes and dyadic coping in skill-based interventions can provide additional leverage for improving couples' relationship satisfaction. Behavioral modification in couples' supportive repertoires is theorized to capture a different mechanism of change, for at least three reasons: (a) it draws attention to the stresses that partners deal with outside of the relationship and that are likely to erode relationship quality (Bodenmann, 2005; Karney et al., 2005); (b) it draws attention to partners' common goals and to their need to regulate one another and their relationship (e.g., Halford, 2001); and (c) it is hypothesized to unite partners as they contend with challenges that arise within their ecological niche, whereas improved problem solving enables partners to resolve tensions arising within the dyad without necessarily drawing them closer. Predictive effects associated with dyadic coping were marginally stronger than those associated with problem-solving communication, suggesting that further exploration of this facet of couple functioning is warranted.

The third main set of results addresses participants' intentions to use strategies taught in the workshop, their self-reported use of these strategies following the workshop, and associations between strategy use and post-treatment changes in relationship satisfaction. Participants left the workshops with the expectation that they would use the strategies often or most of the time ($M \sim 4.5$ on a scale ranging from 1 to 6), and these intentions were independent of pretest communication and coping variables. Self-reported actual use of strategies varied some over the follow-up assessments but were generally in the rarely to sometimes range ($M \sim 1.5$ on a scale ranging from 0 to 3), and these were reliably predicted by posttreatment intentions and by baseline levels of satisfaction, positive communication, and positive dyadic coping. Although men who improved in positive dyadic coping reported using learned strategies ($r = .26, p < .006$), all other pretest to posttest changes in communication were unrelated to strategy use. Thus it appears that use of workshop strategies following the intervention is governed less by changes experienced during the intervention and more by characteristics of couples' relationships that are evident when the intervention begins.

Perhaps more important, we learn from this third set of findings that higher levels of actual strategy use covaried with higher levels of marital satisfaction following the intervention, that postintervention intent to use the strategies strengthened the association between actual strategy use and the partner's satisfaction, and that wives' improvements in positive and negative dyadic coping also strengthened associations between their strategy use and their satisfaction. These findings draw attention to a critical but understudied source of variation in response to skill-based interventions, as even the most theoretically compelling and engaging workshop holds little chance of benefiting couples if they fail to use the skills that are presented. The strength and consistency of these findings is reassuring, and they suggest that effective skill-based interventions are those that address key interpersonal processes and incorporate strategies that motivate partners to deploy new behavioral competencies routinely in the relationship.

Interpretation of these findings must be tempered by several observations. First, this is not a randomized, controlled study, and this limits inferences about the extent to which reported behavior changes can be tied to the intervention couples received. Second, the sample in this study was relatively homogeneous with regard to relationship quality and relationship duration, and this may limit comparability of this study with those involving newlywed couples. Third, only self-report data were used, and thus the natural dependencies in partners' behaviors were not examined as they might be with direct observational data. Definitive conclusions about the value of actual use of learned strategies awaits more rigorous measurement of this important concept, as might be accomplished with, for example, daily diary methods.

In sum, whereas randomized controlled studies provide valuable information on between-group differences in response to treatment, this study was undertaken to examine how different couples receiving the same treatment vary in how they change and the implications these varying changes have for subsequent relationship functioning. In addition to clarifying the complex effects of treatment-related changes in problem-solving behaviors on satisfaction, this study draws attention to the value of targeting dyadic coping and support in interventions with couples and to the importance of devising means by which couples can be motivated to maintain their relationship through skill use on a regular basis.

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