Shorter communication

Behaviorally-based couple therapies reduce emotional arousal during couple conflict

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ABSTRACT

Emotional arousal during relationship conflict is a major target for intervention in couple therapies. The current study examines changes in conflict-related emotional arousal in 104 couples that participated in a randomized clinical trial of two behaviorally-based couple therapies. Emotional arousal is measured using mean fundamental frequency of spouse's speech, and changes in emotional arousal from pre-to post-therapy are examined using multilevel models. Overall emotional arousal, the rate of increase in emotional arousal at the beginning of conflict, and the duration of emotional arousal declined for all couples. Reductions in overall arousal were stronger for TBCT wives than for IBCT wives but not significantly different for IBCT and TBCT husbands. Reductions in the rate of initial arousal were larger for TBCT couples than IBCT couples. Reductions in duration were larger for IBCT couples than TBCT couples. These findings suggest that both therapies can reduce emotional arousal, but that the two therapies create different kinds of change in emotional arousal.

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High levels of conflict-related emotional arousal are a well replicated correlate of relationship distress and are a major target of intervention in many couple therapies. Couple therapy may bring about greater relationship satisfaction in part through a reduction in negative emotional arousal in the face of "hot" topics (e.g., Christensen, 2010). However, it is currently unknown whether couple therapy impacts emotional arousal, and, if so, which aspects of negative emotionality are altered: the overall level of emotional arousal, the rate of increase in emotional arousal, and/or the duration of emotional arousal. It is also possible that therapies that directly target emotional arousal, such as Integrative Behavioral Couple Therapy (IBCT; Jacobson & Christensen, 1998), could create greater change in emotional arousal than those produced by therapies, such as Traditional Behavioral Couple Therapy (TBCT; Jacobson & Margolin, 1979), that target emotional arousal indirectly. The current study tests these possibilities in examining whether spouse's emotional arousal changes after completing a

course of IBCT or TBCT and whether the two therapies produce different amounts of change in emotional arousal.

Emotional reactions to relationship conflict are a central component of many couple therapies (e.g., IBCT, Emotionally Focused Couple Therapy [e.g., Greenberg & Johnson, 2010], etc.), and there is wide spread agreement that high levels of negative emotional arousal co-occur with maladaptive communication behaviors (Christensen, 2010). Highly emotionally reactive spouses have greater difficulty using adaptive communication behaviors and an increased likelihood of engaging in dysfunctional communication behaviors, such as the demand–withdraw interaction pattern (e.g., B. Baucom, Atkins, et al., 2011; K. Baucom, Sevier, Eldridge, Doss, & Christensen, 2011).

Behaviorally-based couple therapies aim to reduce emotional arousal but do so in markedly different ways. For example, IBCT uses acceptance-based and contingency-shaped change intervention strategies, such as empathic joining and unified detachment, to lessen spouse's negative emotional arousal and thereby interrupt maladaptive behavior during conflict. In contrast, TBCT uses structured practice and rule-governed intervention strategies, such as communication skills training and problem-solving training, to help couples

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learn more adaptive communication behaviors. These interventions may have secondary benefits of interrupting negative reciprocity which may reduce negative emotional arousal as a by-product.

Data for the current study come from a randomized clinical trial of IBCT and TBCT, both of which have documented efficacy in creating significant improvements in relationship satisfaction (e.g., Christensen, Atkins, Baucom, & Yi, 2010) and communication behavior (e.g. K. Baucom, Sevier, et al., 2011). Though both therapies create similar amounts of change in communication behaviors, TBCT produces more rapid change than IBCT from pre-treatment to post-therapy (Sevier, Eldridge, Jones, Doss, & Christensen, 2008) while IBCT produces slower but more sustained change from post-therapy to 2-year follow-up (K. Baucom, Sevier, et al., 2011). Researchers have suggested that this difference may be due to TBCT's greater focus on explicit instruction in communication skills training. These findings suggest that though both IBCT and TBCT are likely to reduce emotional arousal, IBCT may do so to a greater degree than TBCT because of IBCT's focus on directly impacting negative emotional arousal and TBCT's focus on directly impacting communication behavior.

In contrast to the well-developed conceptual models of how negative emotional arousal and maladaptive behaviors are related, little attention has been paid to selecting the measure of emotional arousal, characterizing emotional arousal during conflict, and hypothesizing which aspects of negative emotional arousal are likely to be impacted by couple therapy. Of the various possibilities for measuring emotional arousal, emotional expression appears to be particularly well suited to the study of negative emotional arousal and relationship functioning. Bloch, Haase, and Levenson (2014) compared the ability of the duration of negative emotional arousal assessed using physiological, expressive, and subjective measures to predict relationship satisfaction and found that only expressive negative emotional arousal was associated with concurrent and longitudinal satisfaction.

Expressive emotional arousal during couple conflict can be assessed through facial expressions as well as verbal and non-verbal vocal aspects of speech; earlier work on a vocal measure of emotional arousal, fundamental frequency (f_0), suggests that it may be particularly well suited to the study of changes brought about by couple therapy. Computing f_0 is an ideal method for measuring emotional arousal because it is related to spouse's physiological and subjective experiences of emotional arousal (e.g., Weusthoff, Baucom, & Hahlweg, 2013), conveys information about one spouse's internal emotional state, is related to maladaptive communication behaviors (e.g., B. Baucom, Atkins, et al., 2011), is related to couple therapy outcomes (e.g., B. Baucom, Atkins, Simpson, & Christensen, 2009), and does not require specialized or invasive equipment other than a standard audio- or video-recorder. Thus, the current study measures expressive emotional arousal using mean f_0.

There are also a number of methods for characterizing emotional arousal during couple conflict (Burt & Obradovic, 2013). Concepts from exposure-based models of intervention (see Craske et al., 2008 for a review) and empirical work on affective processes suggest that the overall level of emotional arousal, the rate of increase in emotional arousal at the start of the interaction (i.e., start-up; Carstensen, Gottman, & Levenson, 1995), and the trajectory of emotional arousal over the course of the interaction are all likely to be impacted by couple therapy. Each of these forms of arousal can be modeled using mean f_0. Additionally, it is possible that couple therapy could impact one of these forms of arousal but not the others. For example, if a couple changed from having a steady increase in arousal over the course of the interaction to having an initial increase followed by a later decrease that may or may not result in a change in the total amount of overall arousal.

In summary, it is likely that IBCT and TBCT reduce emotional arousal during couple conflict, and these changes are likely to be larger in IBCT than in TBCT. We hypothesize that, relative to pre-treatment, 1) average levels of f_0 will be lower at post-therapy, 2) the rate of decrease at the end of the interaction will be higher at post-therapy and 3) the rate of increase in f_0 at the start of the interaction will be lower at post-therapy. Finally, these changes will be larger for IBCT couples than for TBCT couples.

1. Methods

1.1. Participants

Participants are a subsample ($N = 104$ couples) of 134 chronically and stably distressed married couples recruited for participation in a two-site randomized clinical trial of IBCT and TBCT. Inclusion criteria included being legally married, cohabiting, and both spouses reporting significant levels of relationship distress. Exclusion criteria included meeting criteria for current substance abuse or dependence, schizophrenia, bipolar disorder, or borderline, schizotypal, or antisocial personality disorder, and self-reports of moderate to severe husband-to-wife physical aggression. Please see Christensen et al. (2004) for a complete description of recruitment procedures, inclusion criterion and study protocol.

Participants in this sample ranged from 22 to 72 years old at pre-treatment, with a median age for men of 44 years (SD = 8.85) and a median age for women of 41 years (SD = 8.74). They were, on average, college educated (median level of education for men and women was 17 years, SD = 3.0 and 3.21 years respectively) and earned a median annual income of $ 40,000 for men and $ 30,000 for women. Couples had been married for an average of 10.34 years (SD = 7.55). Spouses self-identified as 75% Caucasian, 9% African American, 6% Asian/Pacific Islander, 6% Latino/Latina, 1% Native American, and 3% Other.

1.2. Procedures

Couples completed assessments prior to beginning therapy (i.e., pre-treatment), at treatment termination (i.e., post-therapy[1]), and two-years later (i.e., 2-year follow-up). Each of these assessments included self-report questionnaires and participation in two 10-min videotaped problem-solving discussions.[2] Each spouse determined the topic for one of the two discussions; the order of the discussions was randomly alternated. Mean f_0 was extracted from videotaped discussions at pre-treatment and post-therapy for the current study.

A stratified random assignment design was used to assign couples to receive up to 26 sessions of TBCT, 68 couples, or IBCT, 66 couples. Christensen et al. (2004) provides additional details regarding treatment procedures. Institutional Review Boards approved all study procedures.

1.3. Measures

1.3.1. Mean f_0

Mean f_0 values were extracted using a two-step process. First, recordings were segmented into periods of husband speech and wife speech using procedures outlined in Black and colleagues (Black et al., 2013). Recordings with a low signal-to-noise ratio (i.e., SNR < 5 db)

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[1] The post-therapy assessment was conducted 26 weeks after a couple began therapy. Couples were allowed to receive up to 26 weekly sessions of therapy so if couples proceeded through the program without any cancellations or finished therapy prior to 26 sessions, this assessment was truly post-therapy. Most couples had cancellations due to illness, holidays, etc. so this assessment was very near the end of treatment.

[2] Couples also completed two personal problem discussions at each assessment that were not analyzed in the current study.

were excluded from analyses because a low SNR prevents reliable mean f_0 estimation. Recordings were also excluded from analysis if periods of husband and wife speech could not be confidently identified resulting in a final sample of 104 couples[3] and 360 total problem-solving discussions, 168 pre-therapy, 133 post-therapy, and 59 2-year follow-up. Because there were so few available data at 2-year follow-up (59 recordings represented 33 couples), we decided to omit these data from analyses. Mean f_0 was then estimated for each tenth of a second using Pratt (Boersma & Weenink, 2005).

1.4. Statistical analyses

Study hypotheses were tested using a series of multilevel models (MLM). Each model includes main effects of and interactions between treatment condition (0 = IBCT, 1 = TBCT), assessment (0 = post-therapy, 1 = pre-treatment), and spouse (0 = husband, 1 = wife). The following equation illustrates the composite equation for the 3-level model used to examine average mean f_0 over the 10 min discussion:

$$\text{Mean } f_{0tij} = \beta_0 + \beta_1 * \text{Spouse} + \beta_2 * \text{Assessment} + \beta_3 * \text{Treatment}$$
$$+ \beta_4 * (\text{Spouse} \times \text{Assessment})$$
$$+ \beta_5 * (\text{Spouse} \times \text{Treatment})$$
$$+ \beta_6 * (\text{Assessment} \times \text{Treatment})$$
$$+ \beta_7 * (\text{Spouse} \times \text{Assessment} \times \text{Treatment}) + u_{0j}$$
$$+ r_{0ij} + e_{tij}$$

where t indexes time during discussion, i indexes spouses, and j indexes couples. This model was expanded to examine spouse's initial trajectory of mean f_0 at the beginning of the discussion and the trajectory of mean f_0 over the course of the discussion by adding linear and quadratic effects of time as well as interactions between time, treatment condition, and assessment as described by the following composite equation:

$$\text{Mean } f_{0tij} = \beta_0 + \beta_1 * \text{Spouse} + \beta_2 * \text{Assessment} + \beta_3 * \text{Treatment}$$
$$+ \beta_4 * \text{Time} + \beta_5 * \text{Time}^2$$
$$+ \beta_6 * (\text{Spouse} \times \text{Assessment})$$
$$+ \beta_7 * (\text{Spouse} \times \text{Treatment})$$
$$+ \beta_8 * (\text{Assessment} \times \text{Treatment})$$
$$+ \beta_9 * (\text{Assessment} \times \text{Time})$$
$$+ \beta_{10} * \left(\text{Assessment} \times \text{Time}^2 \right)$$
$$+ \beta_{11} * (\text{Treatment} \times \text{Time})$$
$$+ \beta_{12} * \left(\text{Treatment} \times \text{Time}^2 \right)$$
$$+ \beta_{13} * (\text{Spouse} \times \text{Assessment} \times \text{Treatment})$$
$$+ \beta_{14} * (\text{Assessment} \times \text{Treatment} \times \text{Time})$$
$$+ \beta_{15} * \left(\text{Assessment} \times \text{Treatment} \times \text{Time}^2 \right) + u_{0j}$$
$$+ u_{1j} * \text{Time} + u_{2j} * \text{Time}^2 + r_{0ij} + e_{tij}$$

where the couple's initial trajectory is represented by the linear effect of time, and the trajectory of the couple's mean f_0 over the course of the conversation is represented by the combination of the

linear and quadratic effects of time. We model the initial trajectory and the trajectory over time at the level of the couple because we conceptualize the impact of couple therapy as a couple level process that is reflected in a joint impact on both spouses. All analyses were done using R v2.15.3 (R Core Development Team, 2013) and made extensive use of the lme4 package for mixed models (Bates, Maechler, & Bolker, 2012).

2. Results

Fig. 1 presents scatter plots and best fit lines of mean f_0 over time for an example couple. These plots illustrate that there is substantial variability of mean f_0 over time within a spouse, the trajectories of husbands' and wives' mean f_0 were highly similar at each assessment, and the trajectories of mean f_0 were variable between pre-treatment and post-therapy. Consistent with expectations, mean f_0 appears to be lower at post-therapy relative to pre-treatment and the change in the shape of the trajectories appears to indicate decreased emotional reactivity.

2.1. Changes in mean f_0 from pre-treatment to post-therapy

2.1.1. Overall levels of mean f_0
Table 1 presents parameter estimates for overall level of mean f_0 during the discussions. Significant effects emerged for spouse, assessment, and treatment as well as for interactions between spouse and assessment and between spouse, assessment, and treatment. Consistent with differences between men and women in the anatomical structures involved in voice production (e.g., Titze, 1989), wives' mean f_0 was significantly higher than husbands' at post-therapy; this effect did not differ for IBCT and TBCT couples. Additionally, mean f_0 of all husbands and all wives significantly decreased from pre-treatment to post-therapy. This effect was stronger for TBCT wives than for IBCT wives but not significantly different for IBCT and TBCT husbands (see Fig. 2).

2.1.2. Trajectories of mean f_0
Table 1 presents parameter estimates for trajectories of mean f_0 across the 10 min of the discussions; Fig. 3 presents plots of these trajectories for IBCT and TBCT couples across the two assessments. Significant linear trajectories emerged for both IBCT and TBCT at post-therapy, and these trajectories were not significantly different from one another. This finding indicates that the rate of increase in mean f_0 at the start of the interaction is similar for IBCT and TBCT couples at post-therapy. Additionally, the linear trajectory of mean f_0 at the beginning of the discussions significantly declined for both IBCT and TBCT couples from pre-treatment to post-therapy, and this effect was more pronounced for TBCT couples than for IBCT couples.

Significant quadratic effects of time emerged for both IBCT and TBCT couples over the course of the post-therapy discussion, and there was no significant difference in the strength of this effect across the two treatments. The negative value of the quadratic effect combined with the positive value of the linear effect of time indicates that though mean f_0 significantly increased at the start of the conversation, it eventually leveled off and ultimately decreased during the later portions of the conversation. The quadratic effect was significantly weaker for both IBCT and TBCT couples at post-therapy relative to pre-treatment, and this change in the quadratic effect was stronger for IBCT couples than for TBCT couples. This finding indicates that the change in the trajectory of mean f_0 is less pronounced at post-therapy than at pre-treatment.

2.1.3. Post-hoc analyses
To further explore changes in the trajectories of mean f_0, we took the first derivative of the trajectory for each treatment at

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[3] The similarity of these 104 couples to the full treatment sample was examined by comparing the percentages of clinically significant change categories of relationship satisfaction. These percentages are highly similar in both samples (full vs. subsample: deteriorated − 13%, vs. 16%, unchanged − 22% vs. 20%, improved − 17% vs. 21%, recovered − 48% vs. 42%; Christensen et al., 2004).
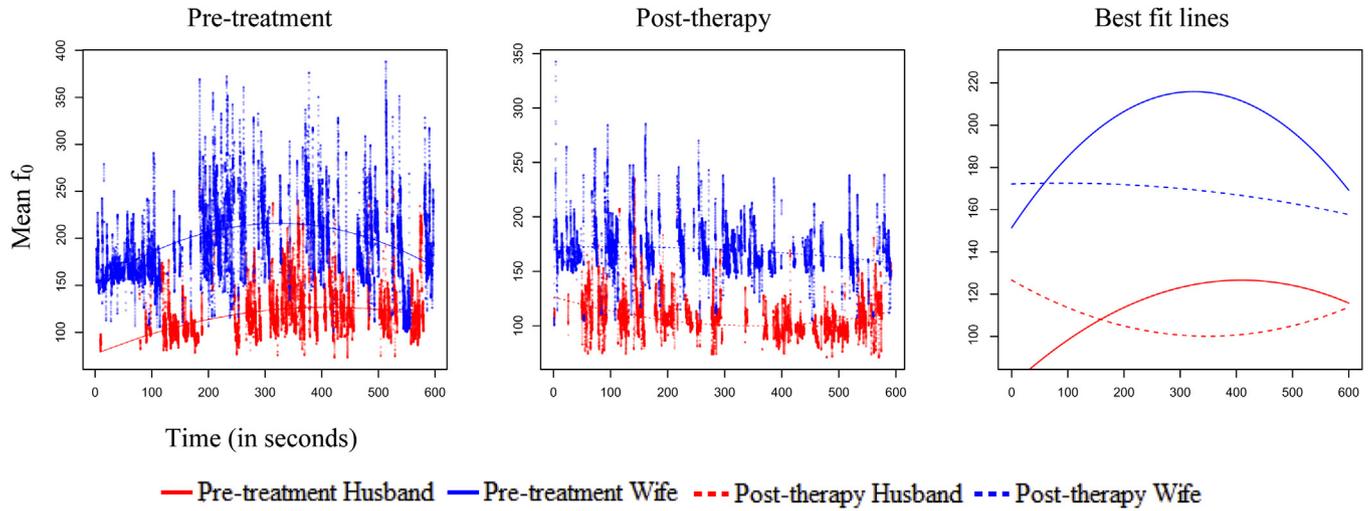
Fig. 1. Scatter plots of mean f_0 values and best fit lines for an example couple.

Table 1
Estimated coefficients for models examining trajectories of mean f_0 across assessments.

Variable	Overall levels of mean f_0			Trajectories of mean f_0		
	B	SE B	95% CI	B	SE B	95% CI
Intercept	115.90***	2.75	(110.5, 121.3)	107.20***	2.63	(102.1, 112.4)
Spouse	76.80***	3.11	(70.7, 82.9)	77.20*	3.10	(71.1, 83.2)
Assessment	4.62**	1.52	(1.65, 7.59)	1.34	1.53	(−1.65, 4.34)
Treatment	−3.28	4.10	(−11.31, 4.76)	−0.19	3.93	(−7.90, 7.51)
Time	–	–	–	2.91***	0.47	(2.00, 3.83)
Time^2	–	–	–	−0.20***	0.04	(−0.27, −0.12)
Spouse × Assessment	1.31***	0.07	(1.18, 1.44)	0.84***	0.07	(0.71, 0.97)
Spouse × Treatment	−2.47	4.62	(−11.53, 6.58)	−3.21	4.61	(−12.24, 5.82)
Assessment × Treatment	3.14	2.23	(−1.23, 7.52)	1.58	2.25	(−2.82, 5.99)
Assessment × Time	–	–	–	1.27***	0.05	(1.18, 1.36)
Assessment × Time^2	–	–	–	−0.08***	0.00	(−0.09, −0.07)
Treatment × Time	–	–	–	−1.18	0.69	(−2.54, 0.18)
Treatment × Time^2	–	–	–	0.10	0.06	(−0.01, 0.22)
Spouse × Assessment × Treatment	3.41***	0.10	(3.22, 3.61)	4.17***	0.10	(3.98, 4.37)
Assessment × Treatment × Time	–	–	–	0.45***	0.07	(0.32, 0.58)
Assessment × Treatment × Time^2	–	–	–	−0.04***	0.01	(−0.05, −0.03)

Note. Robust standard errors are reported. $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$.

each assessment to determine the timing and value of the peak of the mean f_0 curves. The peak value of the mean f_0 for therapies occurred earlier at post-therapy relative to pre-treatment (7.3 vs. 8.6 min for IBCT and 8.6 vs. 12.3 min for TBCT). Similarly, the amount of increase in mean f_0 from the start of the discussion to the peak value of mean f_0 was lower for both therapies at post-

therapy than at pre-treatment (increase in mean $f_0 = 10.59$ Hz vs. 20.66 Hz for IBCT and increase in mean $f_0 = 7.48$ Hz vs. 21.25 Hz for TBCT). Overall, couples at pre-therapy had faster increase in arousal that stayed elevated longer relative to post-therapy and both therapies created similar amounts of decrease in peak levels of mean f_0.
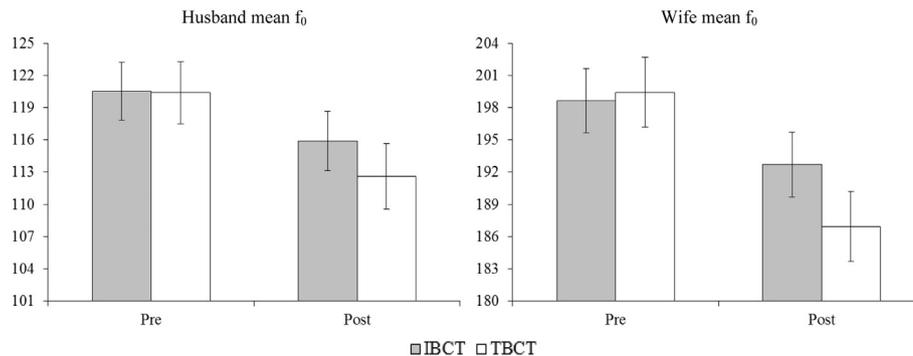

Fig. 2. Plots of the three-way interaction between spouse, assessment, and treatment for overall mean f_0. *Note.* Like letters indicate significant differences.
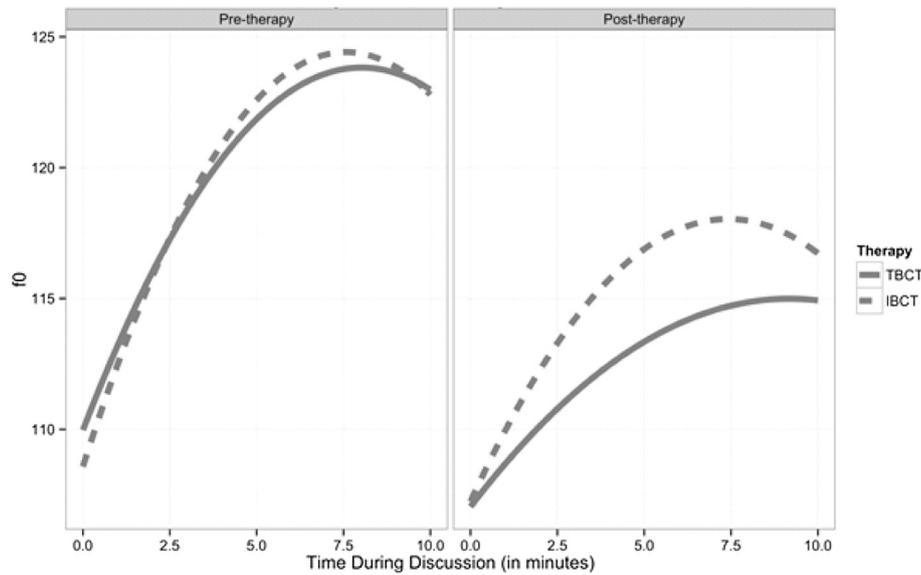
Fig. 3. Plots of mean f_0 trajectories in IBCT and TBCT at pre-treatment and post-therapy.

2.2. Changes in mean f_0 from 1st to 2nd conversation at pre-treatment

We modeled overall levels of mean f_0 and trajectories of mean f_0 in first versus second discussions at pre-treatment (available from the first author) to examine the possibility that results reflect a "practice effect". Overall levels of mean f_0 were higher or non-significantly different in second relative to first discussions and trajectories of mean f_0 were significantly steeper or non-significantly different during second relative to first discussions. Thus, it does not appear that pre to post-therapy differences are due to practice effects.

3. Discussion

The current study examined whether emotional arousal during couple conflict changes after completing a course of behaviorally-based couple therapy. Couples who received either IBCT or TBCT evidenced less emotional arousal at post-therapy relative to pre-treatment, and the magnitude of this effect was similar for TBCT couples and IBCT couples. Trajectories of emotional arousal also changed from pre-treatment to post-therapy, and the nature of this change was different for IBCT and TBCT couples. IBCT couples had greater declines in emotional arousal in the later portion of the conversation while TBCT couples' emotional arousal escalated less quickly at the start of the conversation. We consider the implications of these findings for understanding how IBCT and TBCT bring about change in conflict-related couple processes and consider their implications for elements of the recently proposed common principles approach to couple therapy.

3.1. Changes in emotional arousal in IBCT and TBCT

The results of the current study provide initial evidence that behaviorally-based couple therapies can bring about reductions in vocally expressed emotional arousal during couple conflict and are consistent with Ditzen and colleagues' (Ditzen, Hahlweg, Fehm-Wolfsdorf, & D. Baucom, 2011) finding that partners' cortisol responses during couple conflict declined after completing a behaviorally-based couple relationship education program. The effects in the current study were found for couples who completed

either IBCT or TBCT, and there were no significant differences in the overall level of mean f_0 at post-treatment between the two therapies. This non-significant difference at post-treatment suggests that the two treatments are similarly successful in reducing overall emotional.

In contrast to the similarity of the magnitude of the decreases in overall emotional arousal, the two treatments appear to differ in how they bring about those reductions. The trajectory of mean f_0 for couples who completed IBCT shows evidence of an initial increase followed by a subsequent decrease at both pre-treatment and post-therapy. However, the peak value of mean f_0 is lower and occurs earlier at post-treatment relative to pre-treatment indicating stronger reduction in emotional arousal over the later portions of the conversation at post-therapy than at pre-treatment. This change may be a result of the acceptance-based intervention strategies in IBCT that reduce emotional reactivity by promoting emotional connection. In order to be successful, these strategies require that spouses continue to express emotion and help them to do so in a manner that facilitates closeness. In contrast, the trajectory of mean f_0 for couples who completed TBCT shows evidence of an initial increase followed by a subsequent decrease only at pre-treatment. At post-therapy, the trajectory of mean f_0 for TBCT couples is largely linear. This change in the trajectory of emotional arousal may be a result of the communication skills training strategies in TBCT that structure communication behavior to prevent increases in emotional arousal from occurring.

Though mean f_0 decreased from pre-treatment to post-therapy for all spouses and there were no significant differences in mean f_0 at post-therapy, TBCT wives' mean f_0 decreased significantly more than did IBCT wives' mean f_0. In contrast, there were no significant treatment effects for the decreases in husbands' mean f_0. The larger change in TBCT wives' emotional reactivity is consistent with findings that TBCT wives show larger changes in communication behaviors from pre-treatment to post-therapy than do IBCT wives (Sevier et al., 2008). The similarity of these two findings is consistent with the possibility that TBCT may reduce emotional arousal by interrupting dysfunctional communication behaviors.

Although the findings on emotional arousal for TBCT wives were consistent with previous findings on communication behavior, the non-significant treatment effects for husbands were not (Sevier et al., 2008). It is not immediately clear why TBCT would have a

differential impact on behavior and emotional arousal for wives and husbands. One possibility is related to higher rates of initiating couple therapy in wives relative to husbands (Doss, Atkins, & Christensen, 2003). Spouses who initiate couple therapy may experience heightened levels of emotional distress and show particularly strong and widespread benefits from a fast acting intervention, such as TBCT. In contrast, spouses who are less emotionally distressed may make gains that are more closely tied to the foci of a treatment, such as TBCT's emphasis on behavior change.

3.2. Clinical implications

The results of the current study both offer support for elements of the common principles approach (Christensen, 2010) and provide additional specificity for differential manifestation of common principles between behavioral couple therapies. Findings that IBCT and TBCT both reduce emotional arousal are consistent with the notion that couple therapies reduce dysfunctional emotional reactions during couple conflict even though they bring about that change using different intervention strategies. Though the overall amount of reduced emotional arousal is similar across the two treatments, TBCT appears to primarily impact initial increases in emotional arousal whereas IBCT appears to primarily impact the extent to which arousal decreases over the later portion of a conversation. While the results of the current study do not allow for determining whether these different changes are linked with differential response to treatment, they could help to inform treatment planning decisions. For example, IBCT may be particularly well suited for heightening emotion in couples who present with concerns related to emotional disconnection and isolation. In contrast, TBCT may be a particularly advantageous approach for couples who present with strong emotional lability and concerns about feeling overwhelmed by the intensity of conflict. These clinical implications could be strengthened future research examining whether reductions in emotional arousal are tied to response to treatment and whether couples respond more favorably to treatment if they demonstrate one form of change versus the other.

3.3. Limitations

There are several limitations to bear in mind when considering the results of the current study. First, several recordings were omitted from analysis because of insufficient audio recording quality. Comparison of the subsample in the current study with the full sample revealed that the samples were highly similar. While this similarity suggests that the subsample is representative of the full sample, it is possible that omission of data impacted findings. Second, findings are limited to emotional arousal conveyed by mean f_0. While mean f_0 is known to be related to physiological and subjective measures of arousal, it is not possible to generalize the findings of the current study to other measures of emotional arousal. Examination of changes in physiological and subjective arousal that occur over a course of couple therapy as well as the implication of changes in vocal, physiological and subjective arousal for clinical outcomes are important directions for future research. Additionally, future research on vocally expressed emotional arousal would likely benefit from inclusion of additional vocal features (Busso, Lee, & Narayanan, 2009) and consideration of analytic approaches for modeling additional aspects of emotional arousal (e.g., Ghosh & Narayanan, 2009). Third, it would be valuable to examine whether spouses, research assistants, and clinicians are able to perceive and accurately rate these forms of conveyed through vocally expressed emotional arousal. Fourth, the findings of the current study are based on data from behaviorally-based

interventions and cannot be directly extended to other models of therapy encompassed within the common principles approach. Fifth, mean f_0 was measured only at pre-treatment and post-therapy, and it is therefore unclear whether these observed changes will persist over follow-up. Finally, spouses were largely middle-to upper-class, Caucasian, and college educated, which may restrict the generalizability of study findings.

3.4. Summary and future directions

The findings of current study document the ability of two behaviorally-based couple therapies to reduce emotional arousal during couple conflict. These results support long-held theoretical assumptions about the impacts of behaviorally-based couple therapies and are also consistent with the common principles approach. It would be valuable to examine covariation between changes in emotional arousal, communication behavior, and relationship satisfaction in future research. Doing so would allow for detailed examination of the specific assumptions of different treatment modalities (e.g., do changes in emotional arousal precede changes in communication behavior in IBCT? do changes in communication behavior precede changes in emotional arousal in TBCT?). The findings of the current study create an empirical foundation for these and other related questions regarding emotional arousal by providing evidence that couple therapies reduce overall emotional arousal and suggesting that the specifics of how these reductions are achieved may differ across treatment approaches.

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