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Affective Synchrony in Dual- and Single-Smoker Couples: Further Evidence of “Symptom-System Fit”?

MICHAEL J. ROHRBAUGH, PH.D.^{*,†}, VARDA SHOHAM, PH.D.^{*}, EMILYA. BUTLER, PH.D.[†], BRANT P. HASLER, PH.D.^{*}, and JEFFREY S. BERMAN, PH.D.[§]

^{*} Department of Psychology, University of Arizona, Tucson, AZ

[†] Department of Family Studies/Human Development, University of Arizona, Tucson, AZ

[§] Department of Psychology, University of Memphis, Memphis, TN

Abstract

Couples in which one or both partners smoked despite one of them having a heart or lung problem discussed a health-related disagreement before and during a period of laboratory smoking. Immediately afterwards, the partners in these 25 couples used independent joysticks to recall their continuous emotional experience during the interaction while watching themselves on video. A couple-level index of affective synchrony, reflecting correlated moment-to-moment change in the two partners' joystick ratings, tended to increase from baseline to smoking for 9 dual-smoker couples but decrease for 16 single-smoker couples. Results suggest that coregulation of shared emotional experience could be a factor in smoking persistence, particularly when both partners in a couple smoke. Relationship-focused interventions addressing this fit between symptom and system may help smokers achieve stable cessation.

Keywords

Health-compromised smokers; Couple interaction; Emotion regulation; Symptom-system fit

Family systems theories emphasize that human problems rarely occur in a vacuum, but persist as an aspect of ongoing social interaction. Some of these models call special attention to the interpersonal functions a problem serves, not simply for the patient, but for the current close relationships in which he or she participates (Haley, 1976; Hoffman, 1981; Minuchin, 1974). From this perspective, problem maintenance involves a kind of interpersonal homeostasis, modeled on a cybernetic negative feedback loop, in which the problem behavior provides a basis for the restoration or perpetuation of some vital relationship parameter (e.g., marital cohesion, conflict reduction). Thus, in the addictions arena, clinicians have observed that drinking and smoking can serve important communication functions in family relationships, particularly for regulating emotional closeness and distance (Doherty & Whitehead, 1986; Leipman, Silvia, & Nirenberg, 1989; Steinglass, Bennett, Wolin, & Reiss, 1987; Whitehead & Doherty, 1989). A pattern we call *symptom-system fit* (SSF) occurs when a problem such as drinking or smoking appears to have adaptive consequences for a relationship, at least in the short run (Rohrbaugh, Shoham, & Racioppo, 2002; Rohrbaugh, Shoham, Trost, Muramoto, Cate, & Leischow, 2001; Shoham, Butler, Rohrbaugh, & Trost, 2007). For example, in couples where both partners smoke or drink, shared substance use might create a context for mutually supportive interactions or help partners stay positive, even when they disagree.

Research on alcohol-involved couples highlights ways in which problem drinking promotes temporary relational cohesion for some (but not all) couples and families in ways that can reinforce and perpetuate drinking behavior (Dunn, Jacob, Hummon, & Seilhamer, 1987; Jacob & Leonard, 1988). Studies of “drinking partnerships” suggest further that couples with two heavy drinkers often have better relationships than couples with one (Fals-Stewart, Birchler, & O’Farrell, 1999; Floyd, Cranford, Dougherty, Zucker, & Fitzgerald, 2006; Roberts & Leonard, 1998). While this may or may not be the case for shared nicotine addiction (Mudar, Leonard, & Soltysinski, 2001), our own experimental and clinical observations suggest that tobacco use plays a key role in smoking partnerships by triggering immediate positive experiences and more cohesive couple interactions that may in turn reinforce the partners’ shared smoking (Rohrbaugh et al., 2001; Shoham et al., 2007).

In a recent laboratory demonstration of this phenomenon, 25 couples in which one or both partners smoked discussed a health-related disagreement before and during a period of actual smoking. Participants in dual-smoker couples reported increased positive emotion contingent upon lighting up, while in single-smoker couples both partners (smokers and nonsmokers alike) reported the opposite. In interpreting these results we speculated that dyad-level emotion regulation might help to explain why smokers have more trouble quitting and remaining abstinent when a spouse or partner also smokes (Ferguson, Bauld, Chesterman, & Judge, 2005; Homish & Leonard, 2005; Murray, Johnston, Dolce, Lee, & O’Hara, 1995).

Shoham and colleagues’ results leave open the question of whether SSF in dual-smoker couples amounted simply to a surge of positive emotion in each partner as an individual, or whether something inherent in what the partners experienced *together* as a couple played a role as well. While the initial report demonstrated differential change in the *level* of positive/negative affect reported by partners in dual- and single smoker couples, we focused there on the partners as individuals rather than on how emotional experience may have changed for the couple as a dynamic, interacting unit. The present study examines the latter possibility directly, using the same data set to track the coordination or *synchrony* of partners’ moment-to-moment emotional experience and to determine if this also changed coincident with active smoking. Indeed, a dyadic level of analysis is arguably more germane to an interpersonal-systems account of smoking maintenance mechanisms, and the inherently dyadic construct of affective synchrony may provide a useful window on how in tune partners were during the two phases of the smoking experiment (Bernieri & Rosenthal, 1991). In this report we not only analyze the previously described data in a fundamentally different way, but also frame and discuss these analyses in a manner more consistent with family-systems theory.

Research on couple synchrony has taken diverse forms depending on conceptual and methodological approaches to the construct. Thus, approaches to measuring synchrony vary widely, as some investigators focus on observed behavior and others on reported emotional experience; some rely on observers’ global judgments and others on statistical indices from time-series or sequential analysis; and some examine partner coordination during interactions lasting only a few minutes while others collect data at much longer (e.g., daily) intervals (Butner, Diamond, & Hicks, 2007; Cappella, 1997; Davis, Haymaker, Hermecz, & Gilbert, 1988; Julien, Brault, Chartrand, & Begin, 2000). In the present study we used a statistical index to capture correlated moment-to-moment change in the two partners’ reported experience within relatively brief time frames sufficient for the act of smoking a cigarette.

Even more important for understanding factors that maintain health-compromising behavior are theoretical considerations that shape whether one views synchrony as a relatively stable couple attribute or as a fluctuating state-like process that varies from situation to situation. For example, attachment theory favors trait-like accounts of couple-level coregulation or emotional attunement based on the partners’ individual attachment styles (Butner et al., 2007; Mikulincer,

Shaver, & Pereg, 2003), whereas communication and family-systems theories attach more importance to state like situational factors (Burgoon, Stern, & Dillman, 1995; Haley, 1976; Watzlawick, Beavin, & Jackson, 1967). Here we take a situational approach by hypothesizing that affective synchrony will change during smoking, albeit in different ways for single and dual-smoker couples, and that variations in this state-like construct need have little or nothing to do with the overall (trait-like) quality of a couple's relationship.

A related question is whether it is reasonable to assume that increases or decreases in couple synchrony contingent upon smoking reflect the kind of short-term relational processes that could reinforce smoking, as proposed by the SSF hypothesis. Extrapolating from relational-trait research, it may be relevant that nonverbal synchrony in interactions between adults, including married couples, appears to correlate with partners' reports of marital satisfaction and relational rapport (Cappella, 1997; Julien et al., 2000), just as synchronous mother-infant interactions correlate with lower levels of negative infant emotionality (Bernieri, Reznick, & Rosenthal, 1988). On the other hand, it is also clear from studies of negative reciprocity in couples that symmetrical (and presumably synchronous) exchanges of negative affect and behavior are not adaptive in the long run (Gottman, 1994). A possible reconciliation of such findings is that synchrony of positive affect or behavior exchange tends to be beneficial for couples while synchrony in negative domains does not (Butner et al., 2007; Julien et al., 2000). Still, supporting evidence for this comes only from studies of trait-like relationship satisfaction and stability, which say little about whether a short-term relational process associated with smoking (e.g., temporary cohesion reflected in affective synchrony) could represent a mechanism of smoking maintenance. It is even possible that such short-term (reinforcing) processes are *not* adaptive for a couple in the long run—in which case they might correlate negatively with measures of stable (trait) relationship quality.

Although the number of couples in the Shoham et al. (2007) sample is small, the fact that one partner in each couple had a health problem aggravated by smoking gives the sample added clinical relevance for a preliminary examination of links between smoking and affective synchrony. Data collection entailed a video-recall procedure similar to one validated against both behavioral and physiological criteria in previous research (Gottman & Levenson, 1985). An advantage of this methodology for studying couples is that it provides a way to track the simultaneous experiences of both partners during a real-time interaction. Immediately following the laboratory interaction task, which included consecutive baseline (nonsmoking) and smoking phases, the partners watched themselves on video and used joysticks to record how positive versus negative they felt from moment to moment during the interaction. To examine dyadic synchrony, we created two synchrony scores for each couple—one for baseline and one for smoking—by correlating residualized change in the two partners' average joystick positions from interval to interval within each phase. A positive correlation thus indicates that the two partners' emotion ratings tended to move up and down together in a coordinated or synchronous manner, while a negative or null association indicates affective synchrony was discordant or absent. The correlation coefficients representing these phase-specific within-case associations then served as the dependent variable for between-case comparisons of dual- and single-smoker couples (Affleck, Zautra, Tennen, & Armeli, 1999).

Our primary hypothesis was that affective synchrony would increase from baseline to smoking when both partners in the couple smoked but decrease when only one partner smoked. Because SSF is a quintessentially situational idea, we expected a dynamic (time varying) indicator of the synchrony construct to be relatively sensitive to the situational (smoking) manipulation and to have low rank-order (test-retest) stability across the baseline and smoking phases. We also attempted to determine if synchrony change in the smoking experiment was independent of the changes in emotional valence reported in Shoham et al. (2007), which would suggest that couple-level change in synchronous emotional experience represents a different aspect or

dimension of SSF. Accordingly, a further hypothesis was that any Couple- Type $\times$ Smoking-Phase interaction observed for dyadic synchrony would occur over and above the mean-level changes in individual affect identified earlier.

Additional exploratory analyses examined possible variations in affective synchrony during the smoking experiment as a function of overall marital quality and nicotine addiction severity. Marital quality is relevant to the relational state-trait issue mentioned earlier and, like addiction severity, is of interest as a plausible moderator of how couples might respond to the smoking manipulation. For example, SSF could be most pronounced in poor relationships if a compensatory process is at work, or most pronounced when addiction severity is high if individual-dispositional factors contribute to the SSF pattern.

METHOD

Participants

Participants were 25 couples recruited to participate in a couple-level smoking-cessation intervention (Rohrbaugh et al., 2001; Shoham, Rohrbaugh, Trost, & Muramoto, 2006). One partner (the primary smoker) in each couple had either a diagnosed heart or lung problem aggravated by smoking or at least two other documented risk factors for coronary artery disease. All primary smokers had smoked at least 10 cigarettes per day on average for the previous 6 months. In 9 (dual-smoker) couples the primary smoker's partner also smoked, and in 16 (single-smoker) couples only the patient smoked. The primary smokers included 15 men and 10 women, while 5 men and 4 women were secondary-smoker partners. All couples were either married ($n = 23$) or had lived together in a committed relationship for at least 2 years ($n = 3$). All but 2—a gay couple with 2 smokers and a lesbian couple with 1—were heterosexual.

Demographically, the mean age of all participants was 55 years (range 35–72); 23% had graduated from college, and 54% were at least partially retired. Three of the 50 participants were Mexican American, one was Native American, and the rest were Caucasian. Couples had been together an average of 21 years (range 2–47), and 62% of the participants had been previously married. Although no couple had children living in their household, most (69%) had an adult child in the local area.

In the clinical domain, 16 (64%) of the 25 primary smokers (but none of their partners) had a diagnosed heart or lung problem aggravated by smoking, and all reported multiple unsuccessful prior quit attempts. At the time of initial screening, primary and secondary smokers reported averaging 25.3 ($SD = 9.2$) and 23.4 ($SD = 11.3$) cigarettes a day, respectively. On the Fagerstrom test of nicotine dependence, where scores in the 6–7 range indicate “high dependence” (Heatherton, Kozlowski, Frecher, & Fagerstrom, 1991) primary and secondary smokers had scores of 6.5 ($SD = 2.1$) and 5.6 ($SD = 2.2$).

Participating couples were fairly satisfied with their relationships, as reflected in average scores toward the high end of Hendrick's (1988) Relationship Assessment Scale (*Mdn* partner score = 4.6 out of 5). Similar positive scores were recorded for Heavey, Larson, Christensen, and Zumtobel's (1996) Constructive Communication Scale, which correlated highly with the Hendrick measure for both patients ($r = .82$) and their partners ($r = .60$). To create a couple-level index of marital quality we averaged the z -scores for both of these measures across both partners.

Procedures

After enrolling in the study, but before participating in any treatment, each couple attended a 2-hour laboratory assessment session to provide informed consent and complete a series of assessments, including the in vivo smoking experiment from which the main data in this report

are derived. The assessments also included the measures of marital quality, addiction severity, health status, and psychological distress mentioned above. Six couples who provided data in the assessment session ultimately did not participate in the smoking-cessation intervention, usually because a partner was reluctant to attend the required sessions, and in one case because the couple separated before treatment began.

In preparation for the smoking experiment, each couple completed a modified Areas of Change Questionnaire (Weiss & Birchler, 1975) to help identify at least three health-related disagreements they could discuss during the videotaped marital interaction task. We instructed couples to choose topics that were important to both partners and concerned desired changes in at least one partner's behavior. Typical topics included disagreements in regard to the management of smoking, diet, and exercise; financial management of health care costs; relationships with health care providers; and involvement of family members in health-related issues. Disagreements also concerned divisions of labor and shared couple activities, particularly when health problems interfered with those activities.

During the videotaped interaction, partners sat at a 90° angle, partially facing each other as well as the camera. When the research assistant left the room, the couple began discussing the first disagreement on their list. After 5 minutes a light came on signaling smokers to light up, and the conversation continued for another 5 minutes. Participants did not know in advance how long they would talk before the signal. Subsequent coding of video recordings revealed that couples on average devoted 51.7% of their discussions to smoking-related topics.

Immediately following the smoking experiment we rearranged the room so that the partners could recall their emotional experience while watching their entire interaction on videotape. Each partner did this with an electronic joystick that moved from left to right, with clearly marked anchors of "very negative" (−) and "very positive" (+) on its left and right sides, respectively. A research assistant demonstrated how to move the joystick from side to side, normalized using the full range of the scale, and explained our interest in how each partner felt during the interaction on a continuous, second-to-second basis, regardless of whether he or she was talking at the time. A barrier between the partners prevented them from seeing each other's hands or facial expressions as they made their ratings.

The calibrated joysticks recorded scores of − 100 at the far-left position, + 100 at the far-right position, and 0 at the neutral (resting) position, with continuous gradations in between. A computer in an adjacent room recorded the second-to-second position of each joystick. To balance the baseline and smoking phases, we included emotional-experience ratings from the 5 minutes before and after the first smoker lit up, yielding up to 600 second-to-second data points for each partner. Technical difficulties with the equipment resulted in losing joystick data for one additional (dual-smoker) couple, whom we did not include in any analyses.

Data Analysis

To prepare the joystick data for synchrony analysis, we aggregated each partner's second-to-second emotion ratings by averaging them within 20-second intervals during the baseline and smoking phases. There were thus approximately 15 interval scores for each partner in each phase, and the first interval in the smoking phase was the one in which any partner first lit up. Using SPSS 15.0 LAG and Regression procedures, we then regressed each person's interval scores on his or her score from the previous interval and saved separate unstandardized residual scores for $N - 1$ intervals in each phase. The dependent variable(s) for our main analyses were simple correlations between the two partners' residualized scores in each phase. Conceptually these coefficients provide a convenient index of couple-level affective synchrony during the baseline and smoking phases.¹

For the main analyses, we transformed all r s to z scores before examining them in general linear models with couple type (single-smoker vs. dual-smoker) as a between case factor and phase (baseline vs. smoking) as a within-case factor. Adding a second between-case factor to the model (e.g., marital quality or addiction severity) provided a means to evaluate possible moderators of response to the smoking manipulation. In this framework, a variable that interacts with both phase and couple-type would represent a potential couple-level correlate of SSF. In addition, to determine if possible SSF effects were independent of mean-level affect and affect change across phases, we added the latter as control and moderator variables in additional GLM models. Finally, given the small size, we screened distributions of the main variables for outlying variables to be sure these did not skew the study results.

RESULTS

Preliminary Analyses

Table 1 presents correlations among the main couple-level study variables as well as their means and standard deviations. As expected, rank-order stability from baseline to smoking was low for the affective-synchrony index ($r = .18, p = .38$) compared with the comparable coefficient for mean-level couple affect ($r = .50, p = .01$). In other words, the synchrony measure appeared less stable (or more state sensitive) across phases of the smoking experiment than the aggregate index of couple-level affect, which did not take into account moment-to-moment covariation of the partners' joystick ratings. Also as expected, the affective synchrony index was unrelated to the mean-level affect measures, and smoking-to-baseline change scores for these measures not shown in Table 1 were unrelated as well ($r = -.01$).

While we did not expect state affective synchrony to correlate with reported overall marital quality, a surprising negative correlation between these variables emerged during the baseline phase ($r = -.46, p = .02$). An examination of subgroups suggests that this association was due more to the 16 single-smoker couples ($r = -.58, p = .02$) than the 9 double-smoker couples ($r = -.20, p = .60$), but why affective synchrony would be lower in higher-functioning couples, if only when they are not smoking, is not readily apparent.

Synchrony Change for Dual- and Single-Smoker Couples

The main study hypothesis was that single- and dual-smoker couples would respond to the smoking manipulation in different ways—double smokers by showing increased emotion synchrony (commensurate with SSF) and single-smoker couples by decreasing their synchrony. The pattern of means in Figure 1 is consistent with this prediction, and a significant Couple-Type $\times$ Phase interaction, $F(1, 23) = 4.54, p = .046$, supports it as well. Simple-effect tests found synchrony differences between single- and dual-smoker couples in the smoking phase ($p = .04$) but not during baseline ($p > .1$), and tests of phase differences within groups revealed p values of .14 for single-smoker couples and .11 for double-smoker couples. Thus, although emotion synchrony changed differentially for the two subgroups, it did not appear to do so as decisively as levels of individual emotion did in Shoham and colleagues' analysis, where changes for both groups were significant at $p < .001$.²

¹To check the suitability of the 20-second aggregation interval, we ran all analyses with 10-, 15-, 25-, and 30-second intervals and found essentially the same results. We also calculated synchrony coefficients using simple running correlations between the two partners' (level) scores in each interval rather than residualized (change) scores and again found highly similar results. This was not surprising given the high correlation between the two 20-second synchrony indices in both the baseline and smoking phases (r s = .88, .91).

²The Shoham et al. (2007) analysis used a multilevel modeling procedure in which repeated (second-to-second) measurement of the dependent variable afforded much greater statistical power than was possible in the present study, where we recorded the dependent measure (couple-level synchrony) only twice—once for the baseline phase and once for the smoking phase.

A further question was whether smoking-related synchrony change would be independent of mean-level affect change, and our analyses suggest it was: Expanding the ANOVA model by adding either mean couple affect or mean affect change from baseline to smoking as covariates did not reduce the Phase $\times$ Couple-Type interaction with emotion synchrony as the dependent variable. Nor was there evidence that mean level affect or affect change moderated the two-way interaction, as would be the case if the differential response of dual- and single-smoker couples to smoking depended on the emotional valence of their interaction. Interestingly, however, the negligible ($r = -.01$) correlation noted above between baseline-to-smoking change scores for affective synchrony and mean-level affect was not consistent across the two subgroups: While these indices of change were basically unrelated in the larger group of single-smoker couples ($r = -.08$), their association among the nine dual-smoker couples was more distinctly negative ($r = -.51, p = .16$). The latter finding suggests a heterogeneous response to laboratory smoking, in which dual-smoker couples tended to increase either their emotional synchrony *or* their mean level of positive affect—but not both.

Finally, to explore possible moderators of the SSF effect (i.e., variables that might interact with Couple-Type and Phase), we performed two additional GLM analyses adding, respectively, the Fagerstrom smoking-severity score and the index of couple-level marital quality. While there were no significant interactions involving marital quality, the addiction-severity analysis yielded a significant Couple-Type $\times$ Phase $\times$ Severity interaction, $F(1, 21) = 7.96, p = .01$. The pattern of slope coefficients from this analysis suggests that SSF (the Couple-Type $\times$ Phase interaction) was most evident when one of the partners had a relatively high score on the Fagerstrom nicotine-addiction index. Unfortunately, given the limited sample size, any implication of this result for vulnerability to SSF remains suggestive at best.

DISCUSSION

In this sample of couples coping with health problems, the coordination of partners' emotional experience appeared to change during periods of smoking, but in different directions depending on whether one or both of the partners smoked. Specifically, a couple-level index of affective synchrony, operationalized as correlated moment-to moment change in partners' reported emotional experience, tended to increase during smoking for dual-smoker couples but decrease for single-smoker couples. This was independent of the parallel mean-level changes in emotional valence we reported previously for the same sample (Shoham et al., 2007), indicating that couple-level synchrony represents a different aspect of partners' immediate response to smoking than simply how positive or negative they feel as individuals. In fact, the dual-smoker couples in our sample tended to increase either their affective synchrony *or* their absolute level of positive emotion in response to laboratory smoking, but not both.

Taken together, these results suggest that emotional correlates and consequences of change-resistant smoking have an important social dimension, depending not only on biological or psychological characteristics of the individual smoker, but also on the specific relational context in which smoking occurs. The observation that smoking can "fit" an interpersonal system by regulating shared emotional experience, at least when both partners smoke, may help to explain why having a partner who smokes is a risk factor for failed cessation attempts and relapse (Ferguson et al., 2005; Murray et al., 1995). Of course this is not the only plausible reason why double smokers have more trouble quitting and staying quit, as the presence of a smoking partner may also prevent or reduce exposure to pressures for change.

In any case, if the SSF hypothesis is viable, shared tobacco use in smoking partnerships may have temporary, dyad-level affective consequences that both reinforce, and are reinforced by, the specific relationship system in which it occurs. While the data say little about *why* affective synchrony operates in this way, it is possible that the experience of dancing to the same (positive

or negative) emotional tune has inherent reinforcing value, however fleeting that experience may be. The data also hint that this reinforcing effect may be especially pronounced in dual-smoker couples where a partner is highly addicted to nicotine, which (if true) would further accentuate the problem-maintaining aspects of this mechanism.

The results do *not* suggest that dual-smoker couples have better or happier marriages than single-smoker couples, at least in any dispositional way. Interestingly, however, we did find that the dual-smoker couples were more “together” (less discrepant) than single-smoker couples in how they felt during the entire smoking experiment. In other words, the average joystick positions of partners in couples where both smoked tended to be more similar (closer together in level based on a simple absolute discrepancy score) than those of partners in couples where only one smoked ($p < .01$). Unlike the emotion-synchrony index, however, the partner-discrepancy measure was relatively impervious to the smoking manipulation and relatively stable across experimental phases.

Because the design was quasi-experimental, we also considered several rival hypotheses about why dual- and single-smoker couples responded to the smoking manipulation with differential affective synchrony. One possibility is that group differences on demographic characteristics or clinical variables such as psychological distress could account for the observed Smoking Phase $\times$ Couple Type interaction, but apart from the findings for nicotine addiction cited above, there was no evidence this was the case. As in the Shoham et al. (2007) report, we performed additional analyses to see if synchrony variations could have been related to differential discussion content (e.g., more disagreements about smoking by single-smoker couples, leading to a deterioration of emotional climate), or to the smoking task creating an unfamiliar or uncomfortable environment for single smokers who did not typically smoke in their partner's presence. Although the subgroup samples were small, we found no evidence in either smoking phase that affective synchrony correlated with either smoking-related discussion content (previously coded) or with a questionnaire item indicating that a partner “refuses to allow smoking in the house.” Still, it is entirely possible that the laboratory smoking task had different meanings for single- and dual-smoker couples in ways not assessed.

A central limitation of this study is our uncertainty about what the measure of affective synchrony actually represents, and in particular, whether it marks a couple-level experience that could serve to reinforce and perpetuate smoking behavior in couples where both partners smoke. The synchrony index is unambiguously state-sensitive, with low stability across smoking and nonsmoking situations, yet it was unrelated to absolute levels of concurrent positive or negative affect and, in some instances, even negatively related to composite (trait) marital quality. We thus have no clear-cut, independent way to validate the synchrony measure as an index of a *temporarily* adaptive relational process, apart from how it changed in response to the smoking manipulation itself. On the other hand, the index of correlated change is operationally consistent with most conceptual definitions of synchrony in the literature (e.g., Bernieri & Rosenthal, 1991), though the operations themselves vary widely from study to study as noted above. Thus, at this point, we can say only that the measure of affective synchrony is what it is.³

Another important limitation is that having only nine dual-smoker couples makes it difficult to generalize about this crucial, understudied, and possibly heterogeneous subgroup. Nor can

³To the extent that our synchrony index does represent a temporarily adaptive or reinforcing state, the negative association between synchrony and trait marital quality during laboratory smoking raises the intriguing hypothesis that SSF may be more common in relatively poor relationships. A follow-up GLM analysis testing the interaction of Marital Quality $\times$ Phase provides no statistical evidence that this was the case, however. Another intriguing hypothesis, raised by a reviewer, is that synchrony could be driven by reciprocated negative affect, which (if true) could help to explain why affective synchrony in the early stages of interaction was associated with lower levels of (trait) marital quality.

we know with certainty that differential synchrony change for smokers in this sample was relationship specific, as the same change may occur in interactions with other (smoking or nonsmoking) acquaintances, or for that matter specific to smoking, as synchrony might also increase during other joint activities. In addition, although some literature suggests that synchrony of positive and negative emotions may have different correlates and consequences, our bi-polar joystick measure does not permit untangling them—as would be necessary, for example, to test Butner et al.'s (2007) hypothesis that optimal coregulation involves simultaneous resistance to increases in the partner's negative affective state and decreases in the partner's positive affective state. A final limitation is that our participants do not constitute a representative sample of smokers, and this constrains the generalizability of results.

We approached this research from the perspective of family systems theory, which assumes that how a problem persists is more relevant to assessment and intervention than how it originated, particularly when persistence reflects a circular interpersonal process in which a symptom both maintains, and is maintained by, the relational system in which it occurs (Haley, 1976; Hoffman, 1981). While the data are consistent with that view, they do not preclude contributions of individual dispositions, such as attachment style, differentiation of self, or addiction severity, to SSF phenomena. In fact, one of our tentative findings raises the hypothesis that severity of a primary smoker's nicotine addiction may contribute to SSF vulnerability in dual-smoker couples.

An immediate practical implication of the SSF idea is that clinicians can usefully intervene by helping couples in smoking partnerships realign their relationship in ways not organized around substance use. Doing this requires investigation of possible functions smoking may serve, not just for an individual smoker, but more importantly for the close relationships in which she or he participates. In our experience, clinically relevant relational “functions” vary widely from couple to couple—for example, smoking could help to dampen conflict, make possible difficult conversations, provide a soothing or stimulating joint experience, or for some couples even establish or maintain a comfortable emotional distance. Whatever the function(s), partners who can anticipate relational difficulties likely to accompany a cessation attempt are in a good position to practice exposing themselves to such situations before attempting to quit. In this way, the clinician can help them work toward establishing substitute rituals and activities and begin to make nonsmoking fit the system. In fact, when the health-compromised smokers in the present study subsequently participated in a treatment-development project incorporating this approach, the results were very promising, with 50% of the primary smokers achieving stable abstinence over at least 6 months (Shoham et al., 2006). This family consultation (FAMCON) intervention appeared especially well suited to health-compromised smokers whose partner also smoked, and our qualitative observations suggest that the couples best able to achieve stable cessation were those who found effective ways to protect their relationship during the process of quitting.

In summary, the synchrony results presented here compliment our previous findings in calling attention to an interpersonal process (SSF) that may help to maintain change-resistant smoking (Shoham et al., 2007). Although prevailing conceptualizations cast nicotine addiction almost exclusively as an “individual” problem, further documentation of interpersonal contributions to smoking maintenance would add credence to alternative, more contextual avenues of intervention.

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Figure 1. Mean Affective Synchrony Coefficients During Baseline and Smoking Phases for Dual- and Single-Smoker Couples.

Table 1

Correlations Among Couple-Level Study Variables

	Correlations							Descriptives	
	2	3	4	5	6	7		Mean	SD
1. BL affective synchrony	.18	-.29	.08	-.16	-.06	-.46*		0.24	0.53
2. SMK affective synchrony	—	-.05	.28	.39 [†]	.07	-.01		0.18	0.47
3. BL negative-positive affect		—	.50*	.14	.08	.26		7.8	17.6
4. SMK negative-positive affect			—	.19	.17	.22		6.4	23.4
5. Double smokers (couple type)				—	.21	.07		0.37	—
6. Nicotine addiction severity					—	-.06		6.6	2.0
7. Marital quality						—		-0.01	0.84

Note. BL = baseline phase; SMK = smoking phase.

All variables are couple-level; Variables 1 and 2 are affective synchrony coefficients calculated by correlating partners' residualized change scores over 20-second intervals in each phase; variables 3 and 4 are couple means obtained by averaging the two partners' mean joystick ratings in each phase, with higher scores indicating more positive emotion. Variable 5 is a dummy-coded representation of couple type (0 = *single*, 1 = *double smokers*). Variables 6 and 7 are continuous, with couple addiction severity representing the highest partner score on Fagerstrom's index and marital quality representing the average of both partners' z scores for the Hendrick (1988) Relationship Assessment Scale and the Heavey et al. (1996) Constructive Communication Scale. Significance levels in the correlation matrix.

* $p < .05$,

[†] $p < .10$, are two-tailed and do not account for multiple comparisons.