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Behavioral Indices of Positivity Resonance Associated with Long-term Marital Satisfaction

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Abstract

Positivity resonance—defined as a synthesis of shared positive affect, mutual care and concern, plus behavioral and biological synchrony—is theorized to contribute to a host of positive outcomes, including relationship satisfaction. The current study examined whether, in long-term married couples, behavioral indices of positivity resonance (rated using a new behavioral coding system) are associated with concurrent shared positive affect using a well-established dyadic-level behavioral coding system (i.e., Specific Affect Coding System: SPAFF), and whether positivity resonance predicts concurrent marital satisfaction independently from other affective indices. Long-term married couples completed a self-report inventory assessing marital satisfaction and were then brought into the laboratory to participate in a conversation about an area of marital disagreement while being videotaped for subsequent behavioral coding. Inter-rater reliability for positivity resonance behavioral coding was high (intraclass correlation coefficient: 0.8). Results indicated that positivity resonance is associated with frequency of shared positive affect using SPAFF. No associations were found between positivity resonance and frequencies of SPAFF-coded individual-level positive affect or shared negative affect. Additionally, positivity resonance predicted marital satisfaction independently from frequencies of SPAFF-coded shared positive affect and individual-level positive affect alone. The effect of positivity resonance on marital satisfaction also remained significant after controlling for overall affective tone of conflict conversation. These findings provide preliminary construct and predictive validity for positivity resonance behavioral coding, and highlight the possible role positivity resonance may play in building relationship satisfaction in married couples.

Keywords

positive psychology; relationship well-being; emotion; behavioral coding; affective science

Marriage plays a central part in adult life. Yet, the factors contributing to marital satisfaction are not fully understood. With nearly half of American marriages ending in divorce and

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divorce rates doubling over the last two decades, the question of what contributes to satisfied marriages is not a trivial matter (Amato, 2010; Kennedy & Ruggles, 2014). One of the most powerful predictors of marital satisfaction may be the affect that is shared between two partners (Bloch, Haase, & Levenson, 2014; Bradbury, Fincham, & Beach, 2000; Gottman, Coan, Carrere, & Swanson, 1998; Gottman & Levenson, 1992). Prior work has focused on the effects of reciprocated negative behavior on marital satisfaction, and has found that negative interaction patterns, such as being defensive, demanding, stubborn, or withdrawing from conversation, are associated with higher concurrent marital dissatisfaction, and deterioration of marital satisfaction over time (Eldridge & Christensen, 2002; Gottman & Krokoff, 1989; Levenson & Gottman, 1983). Recognizing that the absence of negative interaction patterns does not imply the presence of positive ones (Algoe, in press), relationship science has also targeted positive interaction patterns between spouses, such as expressions of affection, appreciation, or forgiveness, and willingness to work on relationship issues. These positive interchanges have been shown to buffer against the adverse effects of negative affect, build high-quality relationships, or both (Algoe, Fredrickson, & Gable, 2013; Fincham, Stanley, & Beach, 2007; Huston & Chorost, 1994; Yuan, McCarthy, Holley, & Levenson, 2010).

One positive interpersonal process plausibly related to marital satisfaction centers on shared experiences of the emotion of love (i.e., “love-the-emotion” as distinct from, albeit contributing to “love-the-relationship”). Fredrickson’s Positivity Resonance Theory (2016) posits that a core elemental feature of love is positivity resonance, defined as brief episodic experiences of interpersonal connectedness characterized by a holistic synthesis of three key features: (a) shared positive affect (i.e., a pleasant subjective state co-experienced by two or more people), (b) mutual care and concern (i.e., vocal intonation and verbal communication conveying investment in one another’s well-being), and (c) behavioral and biological synchrony (i.e., simultaneous nonverbal behavior and physiological changes). Fredrickson (2016) postulates that these intertwined features of positivity resonance (a.k.a., love-the-emotion) augment the quality of interpersonal connections and – consistent with the Broaden-and-Build Theory of positive emotions (Fredrickson, 1998, 2001) – accumulate over time to build social bonds and bolster relationship satisfaction. This new theorizing was inspired in part by prior work in relationship science on perceived partner responsiveness (Reis, 2014), capitalizing on shared good news (Gable & Reis, 2010), and expressed appreciation (Algoe et al., 2013). In contrast to this prior work, Positivity Resonance Theory targets holistic and observable patterns of behavior emergent at the level of the dyad (or group) and offers a more general, cross-cutting construct rooted in affective science. Although a self-report measure of perceived positivity resonance has been recently introduced with initial evidence of validity (Major, Le Nguyen, Lundberg & Fredrickson, 2018), no empirical work to date has quantified group-level behavioral expressions of positivity resonance. Moreover, despite the possible importance of positivity resonance in predicting marital satisfaction, no studies have examined the association of these two constructs. It remains unclear, for instance, how well positivity resonance, which includes the experiences of mutual care and behavioral synchrony in addition to shared positive affect, predicts marital satisfaction compared to each partner’s individual experience of positive affect or even each couple’s moments of shared positive affect.

Behavioral coding systems have a long history of use to characterize positive and negative behaviors during interpersonal interactions, with particular interest in behavioral and communication patterns of couples in marriages and other committed relationships. One of the most commonly used behavioral coding systems is the Specific Affect Coding System (SPAFF; Coan & Gottman, 2007; Gottman & Krokoff, 1989). Introduced by Gottman and Krokoff (1989), SPAFF examines the specific emotional behaviors of couple members, coded on a second-by-second basis, such as displays of affection, anger, or validation. Though useful in characterizing positive exchanges between romantic partners, SPAFF does not specifically code for moments of mutual care or behavioral synchrony with a partner, which together with shared positive affect, serve as the behavioral indicators of positivity resonance. Moreover, prior work using SPAFF primarily has focused on how overall emotional expression or behavioral *sequences* of positive and negative affect between partners relate to relationship satisfaction and longevity, for instance, when a couples starts at a neutral tone and then engages in negative affect (Carstensen, Gottman, & Levenson, 1995; Gottman & Levenson, 1999). These prior emphases on overall levels of emotion and behavioral sequences contrasts with an emphasis on the *simultaneity* of experience featured in the construct of positivity resonance (Fredrickson, 2016; Major et al., 2018). Prior work examining the simultaneity of affect in couples discussing an area of conflict has linked lower marital satisfaction to greater levels of shared affect, both negative and positive (Levenson & Gottman, 1983), suggesting that shared affect during conflict may influence marital relationship quality. Importantly however, this early work was based on partners' subjective self-reports of affect, not on behavioral coding, leaving open the question of whether shared affect measured via face, body movement, vocal intonation, and verbal content is linked to marital satisfaction.

The aims of the current study were fivefold. First, we sought to develop a reliable behavioral coding system for positivity resonance given that no coding system to date captures combined evidence for shared positive affect, mutual care/concern, and behavioral synchrony (biological synchrony is beyond the scope of this paper). Second, we sought to examine whether our newly developed behavioral codes of positivity resonance show convergent and discriminant validity relative to a well-established behavioral coding system (i.e., SPAFF). Third, given that positivity resonance is theorized to bolster relationship quality (Fredrickson, 2016), we sought to assess whether greater evidence of positivity resonance is associated with greater marital satisfaction. Fourth, given that positivity resonance includes experiences of mutual care and behavioral synchrony in addition to shared positive affect, we investigated whether any association between positivity resonance and marital satisfaction was independent from the frequency of SPAFF-coded positive affect, either individual or shared. Lastly, noting that any observed effects of positivity resonance on marital satisfaction may be confounded or bounded by the intensity of affect during conflict, we conducted additional analyses to examine whether behaviorally-coded positivity resonance remained a significant predictor of relationship satisfaction even after accounting for overall affective tone expressed during the target interaction.

Our specific hypotheses were that 1) behaviorally-coded positivity resonance will be more strongly associated with the frequency of SPAFF-coded shared positive affect relative to the frequencies of SPAFF-coded shared negative affect or individual-level positive affect (i.e.,

husband and wife positive affect alone); 2) greater behavioral evidence for positivity resonance will be associated with greater marital satisfaction across partners; 3) positivity resonance will predict marital satisfaction independently from the frequencies of both individual-level positive affect and shared positive affect; 4) the positive association between positivity resonance and marital satisfaction will remain even after statistically controlling for overall affective tone expressed during the targeted interaction.

METHOD

Participants

Participants were drawn from the first wave of a longitudinal study of long-term heterosexual marriages (N = 156 couples) gathered between 1989 and 1990 (Levenson, Carstensen, & Gottman, 1993). Due to missing original video recordings (n = 5) or lack of consent (n = 3), positivity resonance was not coded for 8 dyads. The total final number of dyads coded for behavioral indicators of positivity resonance was therefore 148. SPAFF coding was carried out in 1992, and for similar reasons, was not coded for 7 dyads resulting in a total final number of dyads coded with SPAFF of 149. From the original sample, 143 dyads were coded for both positivity resonance and SPAFF, and these 143 comprised the analysis sample. This final sample included a cohort of 78 middle-aged couples (husband age: M = 44.89, SD = 2.92; wife age: M = 43.86, SD = 2.93; length of marriage: M = 21.25, SD = 3.48) and a cohort of 65 older couples (husband age: M = 64.05, SD = 3.06; wife age: M = 62.52, SD = 3.25; length of marriage: M = 40.31, SD = 3.68; see Table 1). The original sample was recruited to be representative of the sociodemographic characteristics (socioeconomic status, religion, ethnicity) of long-term marriages in the area around the University of California, Berkeley at that time. The resulting sample was primarily Caucasian (86%; 7.7% Black; 2.1% Hispanic; 2.8% Asian; 1.4% other), Protestant (42%), relatively higher socioeconomic status, and with children (94.4% of couples had a least one child). Full details of the sampling and recruitment procedures have been reported previously (e.g., Levenson, Carstensen, & Gottman, 1993). Several prior studies using this sample's data have been reported (Bloch, Haase, & Levenson, 2014; Carstensen, Gottman, & Levenson, 1995; Haase, Holley, Bloch, Verstaen, & Levenson, 2016; Haase et al., 2013; Holley, Haase, & Levenson, 2013; Kupperbusch, Levenson, & Ebling, 2003; Levenson, 1994; Levenson et al., 1993; Levenson, Carstensen, & Gottman, 1993; Pasupathi & Gottman, 1999; Shiota & Levenson, 2007; Yuan et al., 2010), but none of them addressed the issues of focus in the present study.[1]

Procedure

Study procedures were based on those developed by Levenson and Gottman (1983) and approved by the Committee for the Protection of Human Subjects at the University of California, Berkeley. During the laboratory session, couples engaged in three conversations (a) events of the day, (b) recurring topic of disagreement in the marriage, and (c) something they enjoyed doing together. Each conversation lasted 15 minutes and was preceded by a 5-

[1]Published articles that used SPAFF data include Levenson, Carstensen, & Gottman, 1993; Carstensen et al., 1995; Kupperbusch, Levenson, & Ebling, 2003; Yuan et al., 2010; Haase et al., 2013; Bloch, Haase, & Levenson, 2014; Haase, Holley, Bloch, Verstaen, & Levenson, 2016; Verstaen A, Haase CM, Lwi SJ, Levenson RW, 2018.

minute baseline period. Partially concealed cameras were used to video-record each interaction for subsequent behavioral coding (see below). The present study uses data solely from the second conversation because behavioral coding for SPAFF was not available for the other two conversations.

Measures

Behavioral indicators of positivity resonance.—Couples' behavior was coded using a behavioral coding system newly developed for this study[2]. The coding system involved making one rating for each 30-second period, based on the following prompt: *"Did positivity resonate between the two partners? That is, did they show actions, words, or voice intonation that conveyed mutual warmth, mutual concern, mutual affection and/or a shared tempo (i.e., shared smiles and laughter)?"* This prompt was informed by the episode-level self-report measure of perceived positivity resonance (Major, Le Nguyen, Lundberg & Fredrickson, 2018), and meant to capture a gestalt of the construct at the macro-level. Coding was completed on a 3-point scale (0 = not present, 1 = low intensity, and 2 = high intensity), based on overall magnitude, duration, and clarity of the behavior during that 30-second period. Examples of behaviors that were coded as positivity resonance intensity level 1 include simultaneous closed-mouth smiles, a single instance of synchronous head tilting, and a single instance of affectionate voice intonation and/or use of a term of endearment (e.g., "Honey"). Examples of behaviors that were coded as positivity resonance intensity level 2 include shared open-mouth laughter, two or more instances of synchronous head tilting, affectionate voice intonation that lasted at least 15 seconds, and/or two or more instances of using terms of endearment[3]. All videotaped conflict conversations were edited in Adobe Premiere Pro CS6 such that a black screen was inserted after each 30-second period, making a total of 30 periods for the entire 15-minute conversation. The black screen prompted coders to pause the video, rewind, and view the 30-second period a second time before making their final rating and proceeding to code the next 30-second period.

Coders were 3 female upper-level undergraduate research assistants at the University of California, Berkeley who were blind to the study's hypotheses. Coders underwent 2 weeks of training consisting of formal instruction on the positivity resonance behavioral coding system (i.e., review of the coding instructions and discussion of 3 example videos of couples displaying high and low levels of positivity resonance), 10 practice-coding assignments, and a 1-hour meeting per week to discuss coding disagreement. To assess reliability, all 3 coders coded 20% of the study sample. Interrater reliability for the sample was high (intraclass correlation coefficient = .80). Mean positivity resonance scores calculated across coders were used in all reported analyses when available.

Behavioral indicators of affect coded using SPAFF.—Individual partner and frequencies of shared positive and negative affect had been coded in 1992 using the Specific

[2]Positivity resonance behavioral coding instructions are included as an Appendix. Video examples of positivity resonance intensities 0, 1 and 2 are available as online supplementary media.

[3]The construct of biological synchrony (e.g., physiological linkage) was not examined in the current study. Instead, the present study examined behavioral synchrony that could be observed by independent raters while viewing video-recorded interactions of dyads. Behavioral synchrony was defined as simultaneous head and body movement shared between partners, including face touching, head tilts, and leans forward.

Affect Coding System (SPAFF). SPAFF is a cultural informant system in which coders take into account the gestalt of verbal content, voice tone, context, facial expression, gestures, and body movements. There are five positive speaker codes (interest, affection, humor, validation, joy), nine negative speaker codes (anger, contempt, disgust, belligerence, domineering, defensiveness, fear/tension/worry, sadness, whining), a neutral speaker code, and four listener codes (positive, negative, neutral, stonewalling). Trained coders viewed the videotaped interactions and rated each spouse's emotional behaviors on a second-by-second basis. Coding was completed on a 0–2 scale (0 = not present, 1 = low intensity, and 2 = high intensity). Inter-rater reliability was determined on a second-by-second basis throughout the entire 15-min conflict conversation. Cohen's kappa, which controls for chance agreement and provides a single reliability index for the whole coding system, was computed and indicated a level of reliability similar to what is typically reported for SPAFF (for these data, overall mean kappa = 0.64). Additional details regarding SPAFF reliability in this study has been published elsewhere (Carstensen, Gottman, & Levenson, 1995). Frequencies of individual and shared positive and negative affect scores and intensities of momentarily shared positive and negative affect were computed using procedures described in the data reduction section below.

Marital satisfaction.—As in our previous marriage research, marital satisfaction was assessed using two well-validated self-report inventories: (a) the Martial Adjustment Test (Locke & Wallace, 1959), which consists of 15 items assessing agreement between spouses in various life domains and amount of leisure time spent together; and (b) the Marital Relationship Inventory (Burgess, Locke, & Thomes, 1971), which consists of 22 items measuring satisfaction with affection and sexuality in the marriage, overall satisfaction with the marriage, and areas of agreement. Scores on the two measures of marital satisfaction were highly correlated, indicating high reliability (husband $r = .86$, $p < .001$; wife $r = .89$, $p < .001$). As we have done previously, we calculated an index of each couple's overall marital satisfaction by computing the mean of both of these measures (standardized using means and standard deviations of the entire sample) across both spouses. Couple marital satisfaction scores ranged between 45 and 135, with a mean of 110.90 ($SD = 16.08$). Consistent with the fact that these were long-term marriages, the mean satisfaction level was higher than the population norm (approximately 100), yet still included a wide range of marital satisfaction levels.

Data Reduction

SPAFF-coded affect.—Based on positive and negative SPAFF codes, separately for each partner, we computed one single time series of presence of emotional behaviors (on a second-by-second basis) in which +1 indicated the exhibition of any of the above positive emotional behaviors, −1 indicated the exhibition of any of the above negative emotional behaviors, and 0 indicated that the partner exhibited none of the above emotional behaviors (either as a speaker or as a listener). We defined the moments of shared positive affect as the time period (on a second-by-second basis) when both partners' SPAFF codes were greater than zero. We then calculated the total frequency (in seconds) of shared positive affect for each dyad. In a parallel manner, we calculated total frequency (in seconds) of shared negative affect. Individual partner (i.e., husband and wife) solitary positive affect was

defined as the moments when the target partner exhibited positive emotion, but the other partner did not. Similarly to the shared positive/negative affect scores, we calculated a total frequency (in seconds) of each partners' solitary positive affect.

Overall affective tone (Hypothesis 4) was operationalized using proportion of positive affect and proportion of negative affect expressed during the conflict conversation. To create an average positive proportion score for each couple, we: 1) created one husband and one wife total positive affect score by summing each partner's positive speaker codes (i.e., humor, affection, validation, interest, joy/excitement) over the 15-minute conversation; 2) created a positive proportion score for each partner by dividing each spouse's total positive affect score by overall SPAFF affect codes (i.e., sum of positive speaker codes and negative speaker codes [contempt, anger, disgust, whining, sadness, fear/tension, domineering, belligerence, defensiveness, stonewalling]); and 3) averaged the husband and wife positive proportion scores to create an average positive proportion score per couple. To create an average negative proportion score for each couple we 1) created one husband and one wife total negative affect score by summing each partner's negative speaker codes (listed above); 2) created a negative proportion score for each partner by dividing each spouse's total negative affect score by overall SPAFF affect codes (i.e., sum of positive speaker codes and negative speaker codes); and 3) averaged the husband and wife negative proportion scores to create an average negative proportion score per couple[4]. To adjust for differences among variables in measurement scaling, SPAFF frequency scores and proportion of negative and positive affect scores were each standardized using the means and standard deviations of the entire sample prior to performing main analyses.

Positivity resonance.—A total positivity resonance score per couple was computed by summing the positivity resonance scores across each 30-second bin (30 bins total) within the 15-minute conversation (M = 5.99, SD = 5.94, Range: 0–32). Total scores were then standardized using the mean and standard deviation of the entire sample. The total standardized score (M = .011, SD = 1.01) thus represents behavioral evidence of positivity resonance throughout the entire conversation, with greater scores indicating greater positivity resonance between partners.

RESULTS

Preliminary descriptive statistics and bivariate correlations of main study variables are presented in Table 2 (data used in main analyses are provided on the Open Science Framework, https://osf.io/d3qty/?view_only=4feae37fb13e4060a90b7d02c3ac32da). Post-hoc power analysis was conducted using G*Power (version 3.1.9.2; Faul, Erdfelder, Lang, & Buchner, 2007) to estimate the required sample size for primary analyses. To achieve a medium effect size (r = .3) with adequate power (1-beta = .95), tests indicated that a sample of at least 134 couples would be needed for a planned point biserial correlation. To achieve a medium effect size (Cohen's f = .25) with adequate power (1-beta = .95), tests indicated that

[4]Husband and wife proportion of negative and positive affect scores were averaged to create a single proportion of affect expressed across the couple (versus by each individual partner). When Hypothesis 4 was tested in a model that used individual partner proportions of positive and negative affect instead of couples' averaged scores, the pattern of results remains the same as that reported here.

a sample of at least 80 couples would be needed for a planned linear multiple regression test (4 predictors = the maximum number of predictors entered in our planned analyses). The current study was adequately powered to detect a medium effect for all analyses.

Hypothesis 1:

Behaviorally-coded positivity resonance will be more strongly associated with the frequency of SPAFF-coded shared positive affect relative to the frequencies of SPAFF-coded shared negative affect or individual partner solitary positive affect (i.e., moments when one partner showed positive affect, but the other partner did not).

Supporting Hypothesis 1, positivity resonance correlated significantly with frequency of shared positive affect as measured by SPAFF ($r = .561$, $p < .001$). No correlations were found between positivity resonance and frequencies of shared negative affect ($r = -.130$, p = .122) or individual-level solitary positive affect (husband: $r = .094$, p = .260; wife: $r = .137$, p = .102). Z statistics were used to examine the strength of correlation between positivity resonance and SPAFF measures. The correlation between positivity resonance behavioral coding and shared positive affect was significantly different than the correlations of positivity resonance and shared negative affect (Z = 7.32, $p < .001$), husband positive affect (Z= 4.56, $p < .001$), and wife positive affect (Z = 4.27, $p < .001$).

Hypothesis 2:

Greater behavioral evidence for positivity resonance will be associated with greater marital satisfaction across partners.

We next examined whether the behavioral expression of positivity resonance during conflict conversations was associated with marital satisfaction. In line with Hypothesis 2, a bivariate correlation showed that greater behavioral expression of positivity resonance was associated with greater overall marital satisfaction ($r = .257$, $p = .002$).

Hypothesis 3:

Positivity resonance will predict marital satisfaction independently from the frequencies of both individual-level solitary positive affect and shared positive affect.

To examine whether positivity resonance predicted couple marital satisfaction independently from frequencies of both SPAFF-coded shared and individual partner solitary positive affect we conducted a hierarchical linear regression. Couple marital satisfaction was the dependent variable. In the first step, we entered positivity resonance scores and in the second step we entered frequencies of SPAFF-coded shared positive affect and individual partner solitary positive affect. In this second step, greater positivity resonance predicted greater couple marital satisfaction, $\beta = .23$, $t[1,139] = 2.32$, $p = .022$, 95% CIs [0.03, 0.42], whereas shared positive affect, $\beta = .06$, $t[1,139] = .57$, $p = .567$, 95% CIs [−0.14, 0.26], and individual partner solitary positive affect (husband solitary positive affect: $\beta = -.02$, $t[1,139] = -.22$, $p = .824$, 95% CIs [−0.19, 0.15]; wife solitary positive affect: $\beta = .10$, $t[1,139] = 1.13$, $p = .262$, 95% CIs [−0.07, 0.26]) did not.

Hypothesis 4:

Positivity resonance will predict marital satisfaction even when controlling for the overall affective tone expressed during conflict conversation.

To examine whether positivity resonance predicted marital satisfaction even after statistically controlling for the overall affective tone of the conflict conversation, we conducted a hierarchal regression analysis (see Table 3 below), with average marital satisfaction as the dependent variable. In Step 1, we entered behaviorally-coded positivity resonance as the sole predictor of marital satisfaction (see Table 3, Model 1). In Step 2, we entered mean proportions of positive and negative affect expressed, as coded by SPAFF, during the entire conflict conversation to test the unique association of behaviorally-coded positivity resonance with marital satisfaction when controlling for overall affective tone of the target interaction (see Table 3, Model 2).

Results from Model 2 showed that positivity resonance remained a significant predictor of marital satisfaction when controlling for the overall affective tone of conflict conversation, $\beta = .24$, t [1,143] = 2.80, $p = .006$, 95% CIs [0.07, 0.41]. The mean negative proportion score was also a significant predictor of marital satisfaction, $\beta = -.32$, t [1,143] = −3.69, $p < .001$, 95% CIs [−0.51, −0.15], whereas the mean positive proportion score was not, $\beta = -.08$, t [1,143] = −.86, p = .394, 95% CIs [−0.28, 0.11]. Findings indicate that positivity resonance remained a significant predictor of marital satisfaction even when controlling for the overall affective tone of the target conversation. Consistent with prior research that has shown husband and wife negative affect during conflict interactions to negatively correlate with marital satisfaction (e.g., Gottman & Krokoff, 1989; Gottman & Levenson, 2000; Eldridge & Christensen, 2002), we found that proportion of negative affect (SPAFF-coded) expressed during the conflict conversation was also a significant predictor of marital satisfaction. Proportion of positive affect expressed during conflict conversation did not predict marital satisfaction after controlling for proportion of negative affect and positivity resonance. This finding is consistent with our theorizing that it is the synergy of the three features of positivity resonance—shared positive affect, mutual care and concern, plus behavioral synchrony—that predicts relationship satisfaction more strongly than overall positive affective tone alone. Lastly, we also conducted a formal exploratory test of whether an overall negative affective tone may moderate the association between behaviorally-coded positivity resonance and martial satisfaction and found no evidence that it did. (Full details of this sensitivity analysis are provided as online supplementary material.) We conclude, then, that behavioral indicators of positivity resonance predicted marital satisfaction regardless of how much overall negativity was expressed during the conflict conversation.

DISCUSSION

The current study examined whether behaviors indicative of positivity resonance (assessed using a newly developed coding system) during a 15-minute conflict conversation were associated with concurrent relationship satisfaction in a sample of long-term married couples. Results indicated that greater behavioral evidence of positivity resonance was associated with greater frequencies of shared positive affect as coded using a well-established coding system of dyadic interactions (i.e., SPAFF), but not with frequencies of

shared negative affect or individual-level solitary positive affect. Furthermore, greater behavioral evidence of positivity resonance predicted greater marital satisfaction during conflict conversation even when accounting for the frequencies of shared and individual-level solitary positive affect, and the overall positivity and negativity of those conversations. Findings from these data are the first to link behaviorally-coded positivity resonance to marital satisfaction and are consistent with the theory-based prediction that positivity resonance is associated with relationship well-being.

The current findings are correlational and do not support causal interpretations. We speculate, however, that causality may be reciprocal, indicative of upward spiral processes (Fredrickson & Joiner, 2018). That is, pre-existing relationship satisfaction is likely to facilitate the more frequent emergence of positivity resonance. In addition, however, more frequent experiences of positivity resonance may meaningfully contribute to gains in relationship satisfaction. We base this latter speculation on three lines of evidence that coincide with the three components of positivity resonance examined here (i.e., shared positive affect; mutual care/concern; behavioral synchrony). First, the effects of positive emotions on mental and physical health and well-being have been well-documented (Le Nguyen & Fredrickson, 2017; Sin & Lyubomirsky, 2009; Xu & Roberts, 2010) and recent work suggests that the benefits of positive emotions are amplified when shared with others (i.e., capitalization, shared laughter; Gable & Reis, 2010; Kurtz & Algoe, 2015). Episodic shared positive affect between married partners may thus strengthen feelings of closeness and connectedness and thereby promote greater relationship well-being. Second, repeated moments of mutual care and concern (i.e., investing in the well-being of another person solely for their benefit) can create an interpersonal environment conducive to feeling psychologically safe and respected, which promotes emotional intimacy between individuals. Indeed, prior work suggests that feeling understood and valued by a romantic partner reduces fears of judgment and facilitates self-disclosure, a key component of emotional intimacy (Reis & Shaver, 1988). Third, behavioral synchrony, evidenced when individuals' movements, speech patterns, and tempo share similarity, predicts greater embodied rapport (Vacharkulksemsuk & Fredrickson, 2012), and causally increases satisfaction with the emotional support one receives (Jones & Wirtz, 2007), as well as affiliation (Hove & Risen, 2009) and cooperation (Wiltermuth & Heath, 2009). Greater behavioral synchrony in couples may reinforce existing pair bonds, bolstering commitment and relationship security. Notably, prior work has experimentally manipulated various components of positivity resonance (e.g., Algoe, Kurtz, & Hilaire, 2016; Jones & Wirtz, 2007) and documented causal effects on relationship satisfaction. Although the current study did not hypothesize or test causality, we speculate that future experimental work may uncover evidence consistent with bidirectional causality.

The current work suggests that, in combination, these three behavioral factors (i.e., shared positive affect, mutual care and concern, and behavioral synchrony) may be more strongly associated with marital satisfaction than are individually-experienced or shared positive affect. One mechanism by which positivity resonance may help boost the effects of positive affect is by broadening one's relational mind frame and facilitating social connectedness. Following the Broaden-and-Build Theory (Fredrickson, 1998, 2001, 2013) repeated episodes of positivity resonance may promote feelings of oneness, other-orientation, perspective-

taking, and interpersonal togetherness. In the context of marriage, this could have short and long-term effects including increased perceived social support and higher-quality social connection, which may ultimately result in increased marital satisfaction.

Although positivity resonance is theorized to be a holistic synthesis of three intertwined features (i.e., shared positive affect, mutual care and concern, and behavior and biological synchrony), future work can examine the independent contributions of these facets to assess the relative impact of each on romantic relationship satisfaction. Additionally, future work can examine how positivity resonance functions in the context of non-romantic relationships, such as platonic friendships, and whether greater behavioral expression of positivity resonance can foster relationship development between and among strangers and out-group members. Moreover, although the current work is the first to examine the link between behavioral indicators of positivity resonance and marital satisfaction, it will also be important to consider how other indices of positivity resonance, such as the shared subjective experience of positivity resonance or physiological linkage effect relationship well-being and quality.

In conclusion, the current study is the first to examine how the behavioral expression of positivity resonance in long-term married couples relates to marital satisfaction as well as to shared versus solitary positive affect coded using a well-established behavioral coding system. We also found that positivity resonance remains a significant predictor of marital satisfaction even when controlling for the frequency of positive affect (shared or individual) or the overall positive and negative affect tone of a conflict conversation. Using a new behavioral coding system with high inter-rater reliability, we linked greater positivity resonance to concurrent shared positive affect using a traditional behavioral coding system and to marital satisfaction. Findings are consistent with Positivity Resonance Theory (Fredrickson, 2016), showing that these positive dyadic moments are linked with relationship well-being. Findings also highlight the need to further examine the role positivity resonance may play in building satisfying and lasting relationships, romantic and otherwise.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Appendix

Behavioral Indices of Positivity Resonance (BIPR) Coding

Instructions:

You will be coding a couple having a 15-min conversation. The conversation segment you will be coding begins at minute 5 and lasts until minute 20 (5:00–20:03 on video timer).

While viewing the film clip, please answer the following question for each **30-second time interval**:

> "Did positivity resonate between the two partners? That is, did they show actions, words, or voice intonation that conveyed mutual warmth, mutual concern, mutual affection and/or a shared tempo (i.e., shared smiles and laughter)?"

Base your coding on the overall feeling you get while watching the video segments, and code 0 if you do not sense any shared "PosRes".

Use the following 0 to 2-point intensity scale based on intensity, duration and clarity of behavior: **0= no; 1= A Little; 2= A Lot**

Watch the video clips at least **2 times** before finalizing your codes.

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Table 1.

Demographic Descriptive Statistics for Research Participants (presented as the entire group and separated by age cohorts)

	Total (*N* = 143)				Middle-aged (*n* = 78)				Older (*n* = 65)			
	Min	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**
Years of marriage	13	49	29.92	10.17	13	30	21.25	3.48	33	49	40.31	3.68
Age												
Husband	39	70	53.60	10.02	39	50	44.89	2.92	59	70	64.05	3.06
Wife	37	70	52.34	9.82	37	50	43.86	2.93	55	70	62.52	3.25
Years of education												
Husband	10	35	26.44	7.32	11	35	26.28	7.12	10	34	26.63	7.60
Wife	8	34	23.50	7.08	11	34	25.26	6.38	8	34	21.40	7.35

Table 2.

Summary of Descriptive Statistics and Intercorrelations for Behavioral Coding and Marital Satisfaction Scores (across entire sample)

Measure	1	2	3	4	5	6	7	8	*M*	*SD*
1. Positivity resonance	—								5.92	5.89
2. Shared positive affect (SPAFF)	.56***	—							26.44	31.01
3. Shared negative affect (SPAFF)	−.13	−.26**	—						167.61	184.25
4. Husband positive affect (SPAFF)	.09	.25**	.39***	—					92.04	86.86
5. Wife positive affect (SPAFF)	.14	.21*	.32***	.15	—				86.85	78.14
6. Couple marital satisfaction	.26**	.22**	.35***	.06	.13	—			111.26	16.19
7. Husb. marital satisfaction	.24**	.21*	.34***	.06	.08	.96***	—		111.29	16.97
8. Wife marital satisfaction	.26**	.21*	.34***	.05	.17*	.96***	.82***	—	111.23	16.93

Note. SPAFF = Specific Affect Coding System. Husb. marital satisfaction = husband martial satisfaction. Means and standard deviations were derived from raw scores.

* $p < .05$,

** $p < .01$,

*** $p < .001$

Table 3.

Standardized and Unstandardized Coefficients for Regression of Marital Satisfaction on Behaviorally Coded Positivity Resonance, Intensities of SPAFF-coded Positive Affect and Negative Affect.

	Average Marital Satisfaction						
Effects	***b***	**SE B**	**LB**	**UB**	**β**	$R^2\Delta$	**F for change in R**
Model 1							
PosRes	.263	.081	.103	.422	.261***	.068	10.558***
Model 2							
PosRes	.239	.085	.070	.408	.237**		
Pos Proportion	−.085	.099	−.281	.111	−.081		
Neg Proportion	−.331	.090	−.508	−.153	−.324***	.153	7.232***

Note. Lower and upper bounds represent 95% confidence intervals. PosRes = average positivity resonance behavior across the 15-minute conflict conversation; Pos Proportion = mean proportion of positive affect expressed by the couple during the conflict conversation (SPAFF-coded); Neg Proportion = mean proportion of negative affect expressed by the during the conflict conversation (SPAFF-coded).

* p < .05,

** p < .01,

*** p < .001.