

An Experimental Study of Emotion Regulation During Relationship Conflict Interactions: The Moderating Role of Attachment Orientations

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Romantic couples ($N = 127$) engaged in a relationship conflict interaction during which their autonomic physiology, emotional experience, and emotional behavior were recorded. Couples were assigned randomly to one of two interventions, or to a control condition: In the affective suppression condition, one partner was instructed to refrain from expressing emotions. In the positive mindset condition, one partner was instructed to think about the positive aspects of the relationship. Results revealed that emotion regulation interventions influenced the physiology, emotional behavior, and emotional experience of both the manipulated person and his or her partner, who was oblivious to regulation manipulations. Specifically, suppression increased, and positive mindset decreased cardiovascular arousal and negative affect. These effects were generally exacerbated among those high on attachment anxiety and attenuated among those high on attachment avoidance. The results of this research corroborate and extend the Temporal Interpersonal Emotion Systems model (Butler, 2011) in the context of relationship conflict interactions.

Keywords: relationship conflict, couple interaction, attachment orientations, positive mindset, affective suppression

Interpersonal interactions involve the exchange of explicit, verbal information, and also the communication and detection of nonverbal messages that often do not permeate conscious awareness. Although these messages are typically subtle and implicit, they may exert a considerable influence on the emotional climate of the interaction. Research on marriage suggests that explicit and implicit emotional exchanges are powerful indicators and predictors of marital quality and stability (e.g., Levenson & Gottman, 1983). On the basis of a growing body of literature showing that changes in the emotional state of one partner influences the emotions of the other partner (see Butler, 2011 for a comprehensive review), the current research focuses on the interactive effects of emotion regulation during relationship conflict. Specifically, we examine how instructing one relationship partner to either suppress or cognitively reappraise (by assuming a positive mindset) emotions affects the self-reported emotional experience, emotional behavior and autonomic physiology of both the manipulated person and his or her relationship partner. Furthermore, because emotional function-

ing in close relationships has been associated with individual differences in attachment orientations (e.g., Mikulincer & Shaver, 2005), we examine whether the attachment orientations of both the manipulated person and the nonmanipulated partner qualify these emotional responses.

Emotion in Relationship Interactions

Research on close relationships often relies on self-report methods that may reveal important findings on relationships, but also suffers from several limitations, such as self-presentation biases and problems with shared-method variance (Fincham & Bradbury, 1990; Weiss & Heyman, 1990). To address these limitations, some relationship studies employ an interaction paradigm wherein couples engage in conversation about important topics in their relationship (e.g., Gottman & Levenson, 1992; Kiecolt-Glaser, Bane, Glaser, & Malarkey, 2003; Levenson, Carstensen, & Gottman, 1994). These interaction studies often utilize behavioral and physiological measures to tap the implicit affective undertones of romantic relationships.

The preponderance of couple interaction research, conducted under the multimethod framework (Levenson & Gottman, 1983), measures various channels of affective communication and typically employs an observational paradigm wherein the natural course of a relationship interaction is followed with no intervention on behalf of the experimenter. The lack of experimental interventions in studies conducted under this tradition is an advantage insofar as the ecological validity of the research is concerned. The underutilization of experimental paradigms in relationship interaction research, however, has limited our ability to understand the causal process by which changes in the

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emotional state of one partner influence the emotions of the other partner—a process now recognized as vitally important in the understanding of interpersonal relationships (Butler, 2011).

Emotion Regulation in Romantic Relationships

Emotion regulation is pivotal to understanding the quality of the relationship and its future prognosis (Gottman & Notarius, 2000). It is remarkably difficult, however, to detect emotion regulation when observing couple interactions because these processes are either internal or involve attempts to conceal the expression of emotion (Gross, Richards, & John, 2006). In spite of this limitation, observational research has revealed the crucial role of emotion regulation in relationship interactions. Research on marital interaction using the multimethod approach (Levenson & Gottman, 1983) indicates that couples who showed greater *physiological linkage* (an association between husbands' and wives' physiological arousal) were less satisfied with their relationship. This study suggests that the negative emotions of one partner are associated with the negative emotions of the other partner and may instigate a cycle of negativity and dissatisfaction. Similarly, dissatisfied couples are more likely to experience *negative affect reciprocity*, in which negative affect expressed by one spouse during the interaction is responded to with negative affect expressed by the other spouse (Carstensen, Gottman, & Levenson, 1995; Gottman, 1994; Gottman, Coan, Carrere, & Swanson, 1998). Happily married couples express a significantly higher ratio of positive to negative affect during interactions (Gottman, 1993), suggesting that they successfully employ affective regulation strategies.

Many of the studies examining emotion regulation in close relationships have measured multiple indices of the autonomic nervous system (ANS) because of the well-validated associations between the ANS and emotional functioning (Levenson, 2003; Porges, Doussard-Roosevelt, & Maiti, 1994). The ANS controls visceral functions, regulates the body's homeostasis, and is divided into two branches, the parasympathetic and sympathetic nervous systems (Cameron, 2009). Both neural systems originate in the brainstem and function to regulate automatic functions, including heart rate, digestion, respiration rate, salivation, and perspiration, and each function is influenced by the interplay of the two systems (Beauchaine, 2001). The main function of the sympathetic nervous system is to mobilize the body's resources under stress, increase arousal, and induce the fight-or-flight response (Porges, 1998). The parasympathetic nervous system engages in energy preservation, relaxation of vital organs, and reduction of heart rate reactivity (Porges, Doussard-Roosevelt, & Maiti, 1994). Cardiovascular arousal is an index of the sympathetic branch of the ANS, and is the measure used in the current research because it is considered an important marker of emotion regulatory abilities (Appelhans & Luecken, 2006), and of emotional functioning during social interaction (e.g., Mosek-Eilon, Hirschberger, Kanat-Maymon, & Feldman, in press).

Observational studies of emotion regulation imply that emotion regulation has shared effects, influencing both relationship partners, but these studies have not revealed how this process takes place, or what kind of regulation strategies are involved. Experimentally manipulating emotion regulation strategies may elucidate the causal processes by which changes in the emotional behavior

of one spouse influences the emotions of the other spouse and may show how different regulation strategies have different intrapersonal and interpersonal effects during relationship interaction. In the current study, we experimentally manipulated emotion regulation strategies in a relationship interaction paradigm to better understand the causal relationships between emotion regulation and subsequent partners' responses in actual relationship conflicts.

Emotion Regulation Strategies

Emotion can be regulated from the input stage, in which an emotion arousing stimulus is detected, to the output stage, where the emotional response is manifested (Gross, 1998). In the current research, we focused on the two most commonly studied regulation strategies: cognitive reappraisal and expressive suppression—representing the regulation of emotion at the input and output stages of the emotion process (Gross, 1998). Cognitive reappraisal, which takes place at the input stage of the emotion process, refers to the way a person appraises a situation to change its emotional meaning. This can be accomplished by either changing the way one thinks about a situation or by assessing available resources needed to deal with the situation. For example, a relationship conflict may be reappraised as an opportunity to resolve a problem in a relationship rather than be seen as a relationship threat.

Expressive suppression takes place at the output stage of the emotion process and consists of attempts to conceal, reduce, or shorten the behavioral expression of an affective experience. By doing so, people may control other people's reactions to their internal state (e.g., suppressing the desire to shout at one's partner; Gross & Levenson, 1993).

Research on the intrapersonal consequences of cognitive reappraisal indicates that reappraisal significantly reduces the intensity of the emotion experience, but the effect of reappraisal on physiology is inconclusive. Some research shows that it does not significantly change the level of physiological arousal (Gross, 1998; Lévesque et al., 2003; Ochsner, Ray, & Cooper, 2004), whereas other research suggests that it decreases amygdala activation (Wager, Davidson, Hughes, Lindquist, & Ochsner, 2008). Suppression, on the other hand, reduces expressive behavior, but at the same time increases cardiovascular arousal because of the effort involved in hiding feelings (e.g., Gross & Levenson, 1993, 1997; Hagemann, Levenson, & Gross, 2006).

Only a few studies to date have directly studied emotion regulation in a dyadic interaction paradigm. In one of the only studies of its kind, dyads consisting of women with no prior acquaintance watched an emotion-eliciting film together and were then asked to discuss it (Butler et al., 2003). One participant in each dyad was first instructed to either cognitively reappraise her emotions, suppress the expression of her emotions, or was provided with neutral instructions (control condition). The results of this study indicated that emotion regulation influences not only the person regulating emotion, but also her interaction partner. When one of the women suppressed her emotions, her conversation partner experienced a significant increase in cardiovascular arousal. This finding was termed "the second-hand smoke effect" of emotion regulation because of the insidious effects of one person's regulation efforts on the physiological arousal of her conversation partner who was oblivious to the manipulation.

It is noteworthy that whereas suppression manipulations are typically similar across different studies, cognitive reappraisal can mean a variety of different things (McRae et al., 2012). Often reappraisal involves assuming a positive mindset when thinking about a situation, as in the research conducted by Richards and her colleagues (2003). In other cases, however, reappraisal entails emotional withdrawal, as in the research conducted by Butler and her colleagues (2003), in which participants in the reappraisal condition were instructed to “remain calm and dispassionate” (p. 52). We were interested in more clearly differentiating the reappraisal condition from the neutral control condition and thus borrowed the instructions of Richards and her colleagues (2003) who had conducted a study of emotion regulation and memory.

Our study differs from that of Butler and her colleagues (2003) in that we studied young couples in committed relationships rather than dyads who had no previous acquaintance; couples engaged in an emotionally significant discussion over real issues in their relationship rather than discussing a film they watched together; and we examined a theoretically significant individual difference variable (attachment orientations) that may shed new light on the effects of emotion regulation both on the person regulating emotions and on his or her relationship partner.

Individual Differences in Emotion Regulation: Attachment Orientations

We measured the attachment orientation (continuous measures of attachment anxiety and attachment avoidance) of both the manipulated person and his or her relationship partner because attachment orientations are likely to moderate the manipulated persons' emotional responses to the manipulations, as well as the nonmanipulated partners' emotional responses toward the emotionally regulated participant.

Attachment theory (Bowlby, 1982/1969) contends that humans have an innate psychobiological system (*the attachment behavioral system*) that motivates them to seek proximity to significant others (*attachment figures*) at times of need as a way of protecting themselves from threats and dangers. Caregivers' supportive and caring response to a person's needs enables the person to develop a sense of attachment security, along with constructive strategies for coping with threats and regulating emotions. Conversely, caregivers' unavailability or unreliable response to a person's needs promotes the development of an insecure pattern of attachment that may be conceptualized as regions in a two-dimensional space.

The first dimension, *attachment avoidance*, reflects the extent to which a person finds it difficult to trust the goodwill of relationship partners, strives to maintain behavioral independence and emotional distance from partners, and relies on deactivating strategies, such as denial of attachment needs and suppression of attachment-related thoughts and emotions. The second dimension, *attachment anxiety*, reflects the degree to which a person worries that a partner will not be available at times of need and adopts hyperactivating attachment strategies (i.e., an insatiable need for care, support, and love from relationship partners) as a means of regulating distress and coping with threats (see Mikulincer & Shaver, 2005, for a comprehensive review). Located in the region in which both anxiety and avoidance are low, attachment security reflects the degree to which people feel comfort with closeness and have faith in the

availability, responsiveness, and supportiveness of important others.

Research on the link between attachment orientations and emotion regulation reveals that people high on attachment anxiety exaggerate appraisals of threat and react to threats before others do (e.g., Ein-Dor, Mikulincer, & Shaver, 2011; Mikulincer, Birnbaum, Woddis, & Nachmias, 2000) and find it difficult to suppress negative thoughts and feelings (e.g., Mikulincer, Dolev, & Shaver, 2004). People high on attachment avoidance tend to react to threatening situations with an exaggerated sense of self-reliance and reluctance to seek assistance from others (e.g., Ein-Dor et al., 2011). Accordingly, they employ cognitive and behavioral distancing strategies and tend to deny or suppress negative emotions and distress (e.g., Berant, Mikulincer, & Florian, 2001; Birnbaum, Orr, Mikulincer, & Florian, 1997).

Attachment differences in emotion regulation may significantly influence relationship interactions. People scoring high on attachment anxiety are often unable to suppress their own negative thoughts and feelings, tend to disclose them indiscriminately to their partners, and may be unable to provide sensitive and responsive care to their partner at times of need (e.g., Mikulincer et al., 2004; Mikulincer & Nachshon, 1991; Reizer, Ein-Dor, & Possick, 2012). This may increase their partners' distress and dissatisfaction with the relationship.

People scoring high on attachment avoidance may remain distant from their partner even when he or she needs emotional closeness and support (e.g., Kuncze & Shaver, 1994), and they are also less likely to seek support, to express their distress, and to share their negative experiences with their spouse (Shaver & Mikulincer, 2007). People characterized by attachment security effectively regulate their emotions and enjoy high relationship satisfaction and high levels of intimacy and closeness (e.g., Mikulincer, Gillath, & Shaver, 2002). It is quite likely then that attachment orientations will have an effect both on the manipulated partner's reaction to the emotion regulation manipulation and on his or her partner's reaction to these affective changes. Specifically, individuals high on attachment anxiety are likely to show amplified responses to emotion regulation manipulations, whereas individuals high on avoidance will exhibit an attenuated response to these manipulations. Moreover, the attachment insecurities of one partner, in the form of either anxiety or avoidance may cause the other partner to feel dissatisfied (e.g., Mikulincer & Shaver, 2005; Rokach & Brook, 1998). This partner dissatisfaction may be attenuated in the case of highly anxious individuals in the positive mindset condition, who may express less anxiety and contribute to a calmer emotional exchange.

The Present Study

In this research, we examined the impact of two different types of emotion regulation manipulations, expressive suppression and positive mindset, on the physiological arousal, self-reported emotional experience, and emotional behavior of both the manipulated person and his or her partner who was oblivious to the regulation manipulation. We also examined whether manipulating emotion regulation strategies in one person would influence the emotional reactions of both the manipulated person and his or her partner as a function of their attachment orientations. Our predictions were as follows:

(1) Manipulations of expressive suppression, as compared with control instructions, would decrease the expression of negative affect among manipulated partners, increase the expression of negative affect among nonmanipulated partners, and increase cardiovascular arousal among both manipulated and nonmanipulated partners (as in Butler et al., 2003).¹

(2) Manipulations of positive mindset, as compared with control instructions, would increase the experience of positive affect and decrease the experience of negative affect among both manipulated and nonmanipulated partners.

(3) Individual variations in attachment anxiety of both the manipulated and nonmanipulated partner would qualify the effects of emotion regulation manipulations on experienced and expressed affect and on physiological arousal. Specifically, persons high on attachment anxiety would show the strongest reactions to both suppression and reappraisal manipulations. These individuals would respond to suppression manipulations with elevated experienced negative affect and with more distress when their partners suppress emotions. We also expected reappraisal to effect persons high on attachment anxiety such that it would attenuate their chronic levels of distress. Because anxious people tend to verbalize their emotions and share them with their partners to the point of being intrusive (Mikulincer & Shaver, 2005), we expected partner effects to be stronger among people high on attachment anxiety.

(4) Individual variations in attachment avoidance of both the manipulated and nonmanipulated partner would also qualify the effects of emotion regulation manipulations. Participants high on attachment avoidance would exhibit a minor reaction to emotion regulation manipulations, and show little change in experience, behavior or physiology whether they were the manipulated or nonmanipulated partner. Because these individuals tend to withhold their emotion, and withdraw from relationships, we expected partner effects to be weaker among people high on attachment avoidance.

Method

Participants

One hundred twenty-seven heterosexual Israeli couples participated in the study. To participate in the study, couples had to meet the following criteria: (a) have no children; (b) be living together between 6 months to 6 years; and (c) be fluent Hebrew speakers. Women's age ranged between 20 to 32 years ($Mdn = 23$), and men's age ranged between 21 and 35 ($Mdn = 25$). Over half of the couples in our sample were married (55.9%), and the remaining couples cohabited.² The average relationship length was 33.5 months ($SD = 20$). Couples were recruited through fliers posted on campus or through advertisements on Internet relationship forums, and were paid 200 NIS (approximately \$50) for their participation.

Materials

Attachment orientations. Attachment orientations were assessed with a Hebrew version of the Experiences in Close Relationships scales (ECR; Brennan, Clark, & Shaver, 1998). Participants rated the extent to which each item was descriptive of their feelings in close relationships on a 7-point scale ranging from 1 = *not at all* to 7 = *very much*. Eighteen items assessed attachment

anxiety (e.g., "I worry about being abandoned") and 18 assessed avoidance (e.g., "I prefer not to show a partner how I feel deep down"). The reliability and validity of these scales have been repeatedly demonstrated (Brennan, Clark, & Shaver, 1998; see Mikulincer & Shaver, 2005, for a recent review). In our study, Cronbach alphas were high (anxiety: .80 for men and .85 for women; avoidance: .88 for men and .86 for women). Mean scores were computed for each scale, and the two scores were not significantly correlated for men, $r(126) = .14$, $p = .12$, or for women, $r(126) = .06$, $p = .48$. Couple's avoidance was not significantly correlated, $r(126) = .13$, $p = .16$, and couple's anxiety was only weakly associated, $r(126) = .18$, $p = .048$.

Health survey. When couples arrived at the laboratory they completed a health survey confirming that they did not take any medications and did not consume alcohol or caffeine for at least 4 hours before the beginning of the study.

Affect scale. To measure the experience of emotion, we employed Richards and colleagues' (2003) affect scale. This questionnaire included five negative emotions (disgust, annoyance, anxiety, sadness, embarrassment), and five positive emotions (pride, joy, amusement, pleasure, love) that were rated on a 7-point scale ranging from 1 = *not at all* to 7 = *very much*. Because both self-report and behavioral research on emotion indicate that positive affect is less differentiated than negative affect (e.g., Ekman, 1992; Ellsworth & Smith, 1988), we computed a composite of positive affect ($\alpha = .84$) and analyzed each negative emotion separately.³ Correlations between partners in emotional experience scores are presented in Table 1.

Physiological measures. Continuous recordings of eight physiological measurements of autonomic and somatic nervous system responses were collected using a system consisting of a James Long Company (JLC) 12-channel bioamplifier and a microcomputer with analog and digital input/output capabilities: (a) Cardiac interbeat interval (IBI)—JLC electrodes were placed in a bipolar configuration on opposite sides of the participant's chest and the interval between successive R-waves of the electrocardiogram (EKG) were measured in milliseconds; (b) Skin conductance level/response (SCL/SCR)—chloride skin conductance electrodes were placed on the medial phalanges of the second and fourth fingers of the participant's nondominant hand. JLC skin conductance gel consisting of a citrate salt in propanediol carboxylate polymer base and having a pH of 6.25 was used as the electrolyte medium. A 0.5 V root mean square 30 Hz sine wave excitation signal was applied to the skin and conductance was recorded with a low-pass filter of 10 Hz; (c) Finger pulse amplitude (FPA)—a UFI photoplethysmograph attached to the third finger of the nondominant hand records the volume of blood in the finger. The trough-to-peak amplitude of the finger pulse was measured, providing an index of the amount of blood in the periphery; (d) Pulse

¹ Our hypotheses are on negative affect in general while our analyses examines specific affect codes because we did not have a priori hypotheses on which specific emotion would be affected in each experimental condition. We nevertheless believe that presenting the results of specific negative emotions is important as it may inform future research.

² There were no significant effects of relationship status on any of the study variables.

³ Running the analysis separately on each positive emotion reveals almost identical patterns of results, further justifying the decision to create a positive affect composite.

Table 1
Pearson Correlations Between Partners' Self-Reported Emotional Experience

	Women's sadness	Women's disgust	Women's annoyance	Women's embarrassment	Women's anxiety	Women's positive affect
Men's sadness	.18*	.16	.23*	-.12	.12	-.20*
Men's disgust	.32***	.26**	.15	.06	.18*	-.28**
Men's annoyance	.18*	.01	.10	-.05	-.01	-.29**
Men's embarrassment	-.03	-.08	-.08	.09	-.08	.03
Men's anxiety	.08	.04	.074	-.03	-.03	-.15
Men's positive affect	-.18*	-.12	-.22*	-.12	-.12	.42***

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

transmission time to the finger (FPTT)—the time interval was measured between the R-wave of the EKG and the upstroke of the peripheral pulse at the finger; (e) Ear pulse amplitude (EPA)—a UFI photoplethysmograph attached to the left earlobe records the volume of blood in the ear. The trough-to-peak amplitude of the ear pulse was measured, providing an index of the amount of blood in the periphery; (f) Pulse transmission time to the ear (EPTT)—the time interval was measured between the R-wave of the EKG and the upstroke of the peripheral pulse at the ear; (g) Skin temperature—an Incutherm thermistor was attached to the palmar surface of the wrist of the dominant hand with surgical tape; and (h) General somatic activity—an electromechanical transducer attached under the participant's chair generates an electrical signal proportional to the amount of body movement in any direction.

The physiological measures were selected to sample broadly from major organ systems (cardiac, vascular, thermoregulatory, electrodermal, and somatic muscle), to allow for continuous measurement, and to be as unobtrusive as possible. A computer program was used to calculate second-by-second averages for each physiological measure for each partner. In the current report, we focused on the five cardiovascular measures: IBI, FPTT, FPA, EPTT, and EPA. For each measure we calculated a difference score which reflected the difference between mean arousal levels during the conflict and mean baseline levels.

Because the coherence of physiological measures may vary throughout the conversation (Mauss, Levenson, & McCarter, 2005), we divided the conversation into six segments of 150 seconds and computed the reliability of the five cardiovascular measures for each segment. The reliability ranged from .59 to .74 (mean $\alpha = .63$), and thus in line with previous research (e.g., Mauss et al., 2005; Seider, Hirschberger, Nelson, & Levenson, 2009; Sturm, Levenson, Rosen, Allison, & Miller, 2006; Werner et al., 2007), we computed a composite measure of cardiovascular arousal by averaging the standardized means of the five cardiovascular variables for each partner (see Seider et al., 2009, for a full discussion of the advantages of physiological composites). The standardized scores of the cardiovascular measures were multiplied by -1 so that higher numbers would indicate greater arousal. Partners' cardiovascular arousal was not significantly correlated, $r(122) = .12$, $p = .20$. Cardiovascular arousal was not significantly correlated with self-reported affect, but was correlated with negative expressive behavior (disgust, contempt, belligerence, and tension) such that greater expression of negative emotions was associated with higher cardiovascular arousal (r s range between .22–.28, all $p < .05$).

Audiovisual equipment. For each participant, an earphone was attached to one ear, so that they would be able to receive instructions from the experimenter without the knowledge of their partner. Two remotely controlled, high-resolution video cameras that were partially concealed behind darkened glass were used to obtain frontal views of each partner's face and upper torso. These images were combined into a single split-screen image and were recorded. Two lavalier microphones were used to record the partners' conversations. The video recording and physiology measurement were synchronized using a vertical interval time code generator (VITC).

Emotional behavior. Emotional behavior during the conflict conversation was analyzed by two trained coders using the Specific Affect Coding System (SPAFF; Gottman & Krokoff, 1989; SPAFF Version 2.0, Gottman, 1989). SPAFF is a cultural informant coding system in which coders, working with videotapes, consider a gestalt consisting of verbal content, voice tone, context, facial expression, gestures, and body movement. SPAFF treats the stream of behavior as continuous (rather than segmenting it into time blocks or turns at speech), and, thus, codes can be given at any time. For speakers, the positive affect codes were interest, affection, humor, validation (i.e., acknowledgment for partner's feelings), and joy. The negative affect codes were anger, contempt, disgust, belligerence, domineering, defensiveness, fear/tension/worry, sadness, and whining. There was also a neutral code. For listeners, codes were positive, negative, neutral, and stonewalling. The final score was the sum of the total codes per emotion category throughout the interaction. The overall Kappa reliability for the SPAFF coding was .74 indicating adequate interrater reliability. In keeping with our coding of emotional experience, we created a composite of positive affect ($\alpha = .71$) and analyzed each negative code separately. Correlations between partners' emotional behavior scores are presented in Table 2.

Procedure

Couples who agreed to participate in the study were mailed a questionnaire packet that they were asked to individually complete at home, without disclosing their responses to their partner. The packet included an informed consent sheet as well as the ECR scale tapping attachment orientations.

When participants arrived at the laboratory they were asked to complete the health survey, and were then seated in the lab facing each other. A research assistant attached sensors to their body to measure autonomic nervous system responses. At the beginning of

Table 2
Pearson Correlations Between Partners' Emotional Behavior (Specific Affect Coding System [SPAFF] Codes)

Men's/women's	Contempt	Disgust	Sadness	Anger	Belligerence	Domineering	Defensiveness	Whining	Tension	Stonewalling	Positive affect
Contempt	.44***	.06	.06	.40***	.16	.30**	.17	.06	.02	.04	.14
Disgust	-.05	-.01	-.06	-.02	-.05	-.07	.09	-.04	.04	-.01	.02
Sadness	.03	.09	-.01	.18*	.07	.04	-.08	.13	.06	-.06	-.10
Anger	.30***	-.02	.11	.47***	.12	.19*	.26**	.01	.11	.08	-.24**
Belligerence	.32***	.02	-.12	.21*	.16	.45***	.24**	-.05	-.02	-.01	-.16
Domineering	.31***	-.05	.13	.36***	.15	.32***	.39***	.01	-.01	.06	-.44***
Defensiveness	.34***	.22*	-.03	.28**	.30**	.55***	-.01	.12	.04	.18*	-.13
Whining	.12	.03	.01	.21*	.04	.34***	-.10	.01	-.09	.48***	-.14
Tension	.08	.08	.31**	.11	.03	.09	.15	-.01	.39***	-.02	-.06
Stonewalling	-.05	-.02	.15	.07	-.08	-.06	.19*	.05	.06	-.02	-.15
Positive affect	-.11	-.01	-.04	-.26**	-.01	-.23**	-.25**	.01	-.03	-.05	.58***

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

the experiment a 5-min baseline of physiological responses was recorded. Then, the experimenter returned and gave each participant a Hebrew version of the Couple's Problem Inventory (CPI; Gottman, Markman, & Notarius, 1977), and participants were asked to rate the degree to which they disagree with their partner on 14 issues that are typically a source of disagreement in close relationships (e.g., finances, sex, leisure time, relatives). Participants rated their level of disagreement on a scale of 0–100, such that higher scores indicate greater levels of disagreement. Based on participants' responses, the experimenter asked couples to discuss an issue rated by both partners as a point of contention in their relationship. This conflict discussion lasted for 15 minutes.

At the beginning of the conflict session, each participant received instructions to his or her earphone prior to engaging in conversation. These instructions were based on the random assignment of couples to one of two emotion regulation conditions or to a neutral control condition. Previous research has used these instructions to induce the emotion regulation strategies of suppression and reappraisal (e.g., Richards, Butler, & Gross, 2003). In the current research we renamed the reappraisal condition *positive mindset* to emphasize the focus on a positive construal of the relationship in this condition, and to make it distinct from the affectively neutral form of reappraisal used in the research of Butler and her colleagues (2003). In each condition one of the partners was assigned randomly to be the manipulated partner and received instructions through his or her earphone without the knowledge of the other partner (the nonmanipulated partner) who was led to believe that his or her partner received the same instructions as he or she did. Participants in the control condition and nonmanipulated partners received neutral instructions.

The *expressive suppression* condition ($N = 40$) informed participants that: (a) "The study is designed to understand the link between the emotional expressions a person makes and the kind of conversation they have"; (b) "We would like for you to inhibit the expression of emotion through your facial expressions and tone of voice so that your partner will not know you are experiencing any emotions at all"; and (c) "We would like for you to prepare for the conversation by calling to mind the major issues related to the conflict topic you will be discussing."

In the *positive mindset* condition ($N = 40$) instructions informed participants that: (a) "The study is designed to understand the link

between the kind of mindset a person adopts before entering a conversation and the kind of conversation they have"; (b) "we would like for you to keep in mind that all couples have conflicts and that discussing them can make it hard to remember the positive aspects of the partner and the relationship"; and (c) "we would like for you to prepare for the conversation by calling to mind some of the positive aspects of your relationship and partner, as well as some of the good times you have had together."

The nonmanipulated partner in the above conditions and all of the participants in the *control condition* ($N = 47$) received the following instructions: (a) "The study is designed to understand how couples talk about conflict," and that (b) "We would like for you to prepare for the conversation by calling to mind the major issues related to the conflict topic you will be discussing." Thus, no regulatory instructions were given.

Then, participants engaged in a 15-minute conversation on their selected area of disagreement. When the conversation ended the experimenter entered the room and gave each participant a questionnaire assessing their emotions during the conversation (based on Richards et al., 2003).

A second 5-minute baseline period followed the conflict conversation to help participants relax after which they engaged in a 15-minute conversation about positive aspects of their relationship. This conversation ensured that participants would leave the study in a positive state of mind about their relationship, and was not analyzed for the current report. Upon completion of the positive conversation, couples were paid for their participation, debriefed and probed for suspicion. Participants were informed of experimental conditions and were told that some of their partner's reactions may have been because of assignment to one of the conditions. None of the nonmanipulated participants suspected that their partner received instructions that were different from the ones that they had received. Only 4 participants reported feeling that there was something unusual about their partner's behavior.

Results

To examine the impact of expressive suppression and positive mindset manipulations, and self-reported attachment orientation on the experience and expression of emotion during couple conflict interactions, and on concomitant cardiovascular arousal, we com-

puted an actor–partner interdependence model (APIM; Kashy & Kenny, 2000)—a data-analytic procedure designed to deal with violations of statistical independence that occur with dyadic data. The APIM estimates two kinds of effects: actor effects and partner effects. In our case, actor effects are effects of a person's (manipulated person's or nonmanipulated person's) attachment variables on his or her own experience and expression of emotion during couple conflict interactions, and on concomitant cardiovascular arousal. Partner effects are the effects of a manipulated person's attachment variables on the nonmanipulated person's reports of these measures and vice versa. That is, the APIM provides separate, statistically independent, tests of actor and partner paths, in each of which path effects are estimated while controlling for the other path. With this approach, the dyad is treated as the unit of analysis, and actor and partner effects are tested with the proper degrees of freedom (see Campbell & Kashy, 2002; Kashy & Kenny, 2000; Kenny, 1996, for further details).

In the APIM, actor and partner effects are aggregated across both members of a couple. However, when members of a couple are distinguishable on some variable, such as type of manipulation (emotion suppression, positive mindset, control) and target identity (manipulated person, nonmanipulated person), as is the case in the present study, it is possible to ask whether actor and partner effects are qualified by these variables. We therefore examined the extent to which type of manipulation, target identity, and their interaction moderated the actor and partner effects of attachment insecurities on the experience and expression of emotion during couple conflict interactions and on concomitant cardiovascular arousal.

We used Hierarchical Linear Modeling (HLM) analyses because the effects of interest included both within-dyad variables (manipulated person's and nonmanipulated person's attachment variables, experience and expression of emotion during couple conflict interactions, cardiovascular arousal, and target identity) and between-dyad variables (type of manipulation). HLM provides independent coefficients for effects at the lower (within-dyad) level and models them at the upper (between-dyad) level. At the lower (within-dyad) level, we examined the main effects of target identity ($-1 = \text{nonmanipulated person}$; $1 = \text{manipulated person}$) on the experience and expression of emotion during couple conflict interactions, and on concomitant cardiovascular arousal; the main actor and partner effects of attachment insecurities (anxiety, avoidance) on these measures; and the interactive actor and partner effects of attachment insecurities and target identity. At the upper (between-dyad) level, we introduced two dummy variables: a dummy variable contrasting the suppression (1) and control condition (-1) and a dummy variable contrasting the positive mindset (1) and control condition (-1). We examined the unique contribution of these measures to lower-level main effects and interactive actor and partner effects of attachment insecurities and target identity on the experience and expression of emotion during couple conflict interactions and on concomitant cardiovascular arousal. To facilitate interpretation, participants' attachment orientations were standardized around the grand mean. The relevant HLM coefficients are presented in Tables 3 to 5. In Table 4, we present HLM coefficients only for self-reports of positive affect, disgust, and sadness because no significant effects were found on annoyance, anxiety, and embarrassment. In Table 5, we present HLM coefficients for the overt expression of positive affect, sad-

Table 3
Unstandardized Hierarchical Linear Modeling (HLM) Coefficients for the Effects of Emotion Regulation Manipulations and Attachment Orientations on Cardiovascular Arousal

	Cardiovascular
Suppression	.62**
Reappraisal	-.11*
Target identity	.22
Suppression \times Identity	.21
Reappraisal \times Identity	-.18
Actor effects	
Attachment avoidance	.05
Attachment anxiety	-.03
Avoidance \times Identity	-.07
Anxiety \times Identity	-.002
Avoidance \times Suppression	.01
Avoidance \times Reappraisal	-.02
Anxiety \times Suppression	-.04
Anxiety \times Reappraisal	-.01
Avoidance \times Suppression \times Identity	.01
Avoidance \times Reappraisal \times Identity	.03
Anxiety \times Suppression \times Identity	-.05
Anxiety \times Reappraisal \times Identity	-.01
Partner effects	
Attachment avoidance	-.16***
Attachment anxiety	.06*
Avoidance \times Identity	-.07
Anxiety \times Identity	.06
Avoidance \times Suppression	.17**
Avoidance \times Reappraisal	-.13
Anxiety \times Suppression	-.06
Anxiety \times Reappraisal	-.03
Avoidance \times Suppression \times Identity	.01
Avoidance \times Reappraisal \times Identity	-.01
Anxiety \times Suppression \times Identity	-.01
Anxiety \times Reappraisal \times Identity	-.02

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

ness, contempt, disgust, and stonewalling because no significant effect was found on the expression of other emotions.

Because the main focus of this research is on the emotion regulation manipulations, we organized the reports of the findings according to the effects of the manipulations on each set of dependent variables.

Cardiovascular Arousal

Suppression. As expected, suppression manipulations increased the cardiovascular arousal of both the manipulated partner and the nonmanipulated partner (Table 3). This effect, however, was qualified by a significant interaction between suppression and partner's attachment avoidance. Using Preacher, Curran, and Bauer's (2006) method to probe interaction effects in HLM, we found that although suppression manipulations increased the cardiovascular arousal of both partners, this increase was higher for people with partners low on attachment avoidance (one standard deviation below the mean of attachment avoidance), $b = .79$, $SE = .26$, $t(219) = 3.06$, $p = .003$, than for people with partners high on attachment avoidance (one standard deviation above the mean of attachment avoidance), $b = .45$, $SE = .22$, $t(219) = 2.04$, $p = .04$.

Table 4
Unstandardized Hierarchical Linear Modeling (HLM) Coefficients for the Effects of Emotion Regulation Manipulations and Attachment Orientations on Emotion Experience

	Positive affect	Sadness	Disgust
Suppression	.24	1.38	.08
Reappraisal	.36	.91	-.24
Target identity	-.47	.90	-.28
Suppression × Identity	.34	.69	-.76
Reappraisal × Identity	.68	.13	.03
Actor effects			
Attachment avoidance	-.29*	-.49*	.01
Attachment anxiety	.02	.52**	.30**
Avoidance × Identity	.11	-.32	-.14
Anxiety × Identity	-.06	.23	.12
Avoidance × Suppression	-.22	-.57**	-.11
Avoidance × Reappraisal	-.33	-.31	.02
Anxiety × Suppression	.03	.30*	.08
Anxiety × Reappraisal	.07	.09	-.03
Avoidance × Suppression × Identity	-.01	-.37	-.06
Avoidance × Reappraisal × Identity	-.03	-.12	.02
Anxiety × Suppression × Identity	-.14	.25	.04
Anxiety × Reappraisal × Identity	.06	-.20	-.19*
Partner effects			
Attachment avoidance	-.10	.22	.13
Attachment anxiety	.12	-.04	.05
Avoidance × Identity	.33*	-.09	.14
Anxiety × Identity	-.21	-.08	-.03
Avoidance × Suppression	.21	.08	-.02
Avoidance × Reappraisal	.11	.20	.03
Anxiety × Suppression	.12	-.19	.01
Anxiety × Reappraisal	-.04	-.27	.01
Avoidance × Suppression × Identity	.09	.04	.24*
Avoidance × Reappraisal × Identity	.16	.10	.02
Anxiety × Suppression × Identity	-.07	-.04	.04
Anxiety × Reappraisal × Identity	-.36*	.19	.12

* $p < .05$. ** $p < .01$.

Positive mindset. In contrast to previous research, which did not find changes in autonomic arousal following reappraisal manipulations, we found that positive mindset significantly reduced the cardiovascular arousal of both the manipulated partner and the nonmanipulated partner (Table 3). This effect was robust and was not significantly qualified by actor or partner effects of attachment orientation.

Emotion Experience

Suppression. Suppression affected the experience of sadness as a function of participants' attachment insecurities (Table 4). We found that following suppression, the higher the participant's (manipulated person's or nonmanipulated person's) attachment anxiety, the higher his or her experience of sadness, $b = .81$, $SE = .24$, $t(219) = 3.38$, $p < .001$. In contrast, the higher the participant's attachment avoidance, the lower his or her experience of sadness following suppression, $b = -1.01$, $SE = .35$, $t(219) = -2.89$, $p = .004$. This latter effect was qualified by a marginally significant 3-way interaction between suppression, actor effect of attachment avoidance, and target identity. We found that for the manipulated person, $b = -1.69$, $SE = .49$, $t(219) = -3.43$, $p < .001$, but not for the nonmanipulated partner, $b = -.35$, $SE = .53$, $t(219) = -.65$, $p = .52$, the higher the attachment avoidance, the lower his or her experience of sadness following suppression.

Suppression marginally affected the experience of disgust as a function of the participant's identity and the partner's attachment avoidance. Following suppression, the manipulated partner experienced more disgust mainly when the nonmanipulated partner was high on attachment avoidance, $b = .48$, $SE = .27$, $t(219) = 1.80$, $p = .07$. The effects of suppression on other emotion scores were not significant.

Positive mindset. As indicated in Table 4, the effect of positive mindset manipulations on the experience of positive affect was qualified by target identity (manipulated, nonmanipulated person) and partner's attachment anxiety. We found that positive mindset manipulation increased the positive affect of the nonmanipulated person as a function of the manipulated person's attachment anxiety: The higher the manipulated person's attachment anxiety, the higher his or her partner's positive affect following positive mindset manipulations, $b = .90$, $SE = .37$, $t(219) = 2.43$, $p = .02$. This finding implies that positive mindset had a significant anxiety-buffering effect that led nonmanipulated partners to feel more positive.

The effect of positive mindset on the experience of sadness was qualified (at marginal significance) by partner attachment anxiety. We found that in the control condition, participants (manipulated or nonmanipulated) with partners high on attachment anxiety experienced more sadness than participants with

Table 5

Unstandardized Hierarchical Linear Modeling (HLM) Coefficients for the Effects of Emotion Regulation Manipulations and Attachment Orientations on Emotion Expressions

	Positive affect	Sadness	Disgust	Contempt	Stonewalling
Suppression	-.64	-1.15	.08	.47*	-.58
Reappraisal	-.48	-.35	-.06	-.32	.54
Target identity	-1.02**	.09	.11	.15	-1.13**
Suppression × Identity	-.74*	.16	.25**	.29*	-.42
Reappraisal × Identity	-.38	.37	-.13	-.29*	-.41
Actor effects					
Attachment avoidance	-.13	.11	.01	-.02	.01
Attachment anxiety	-.08	.79***	.01	-.13	.04
Avoidance × Identity	.10	-.48	.02	.23	.08
Anxiety × Identity	.14	.19	.01	-.04	-.02
Avoidance × Suppression	-.04	-.21	.03	-.29	.01
Avoidance × Reappraisal	-.06	-.28	.02	-.14	-.06
Anxiety × Suppression	.07	.60**	-.01	-.07	.07
Anxiety × Reappraisal	.10	.38	-.01	-.16	.09
Avoidance × Suppression × Identity	.07	-.32	.03	-.13	-.01
Avoidance × Reappraisal × Identity	.16	-.06	.01	-.01	-.01
Anxiety × Suppression × Identity	.02	-.06	.01	-.02	-.05
Anxiety × Reappraisal × Identity	.25*	-.20	.01	-.06	-.10
Partner effects					
Attachment avoidance	-.07	.70*	-.01	-.27	-.01
Attachment anxiety	-.03	-.16	-.01	-.02	-.01
Avoidance × Identity	-.04	.17	.02	.01	.20*
Anxiety × Identity	.10	.11	.01	-.07	.09
Avoidance × Suppression	.09	.21	-.02	.09	.09
Avoidance × Reappraisal	.11	.46	.03	-.03	-.10
Anxiety × Suppression	.08	-.24	.01	.09	-.01
Anxiety × Reappraisal	-.01	-.50*	.01	-.03	-.11
Avoidance × Suppression × Identity	-.05	.17	.24*	.04	.11
Avoidance × Reappraisal × Identity	-.12	.03	.02	-.01	.12
Anxiety × Suppression × Identity	.15	.25	.04	.08	.09
Anxiety × Reappraisal × Identity	-.17	.30	.12	.25	.10

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

partners low on attachment anxiety at marginal significance, $b = .23$, $SE = .13$, $t(219) = 1.90$, $p = .06$. In the positive mindset condition, however, partner's attachment anxiety was no longer related to the experience of sadness, $b = -.31$, $SE = .26$, $t(219) = -1.19$, $p = .23$.

As indicated in Table 4, the effect of positive mindset on the experience of disgust was qualified by target identity (manipulated, nonmanipulated person) and by an actor effect of attachment anxiety. We found that in the control condition, the higher the manipulated partner's attachment anxiety, the higher his or her experience of disgust, $b = .64$, $SE = .18$, $t(219) = 3.59$, $p < .001$. In the positive mindset condition, however, the manipulated person's attachment anxiety was no longer associated with increased disgust, $b = .20$, $SE = .19$, $t(219) = 1.07$, $p = .29$. All other effects were not significant. These findings suggest that positive mindset has an anxiety-buffering effect on chronically anxious individuals.

Emotion Expression

Suppression. Suppression increased the expression of contempt of both the manipulated person and the nonmanipulated person (Table 5). Target identity (manipulated person, nonmanipulated person), however, qualified the effect of suppression on the expression of contempt as well as on the expression of positive

affect and disgust. For the manipulated person, suppression increased the expression of contempt, $b = .75$, $SE = .27$, $t(220) = 2.84$, $p = .005$] and disgust [$b = .33$, $SE = .15$, $t(220) = 2.20$, $p = .03$, compared with the control condition. The impact of suppression on the nonmanipulated person was even stronger than its effect on the manipulated person and led the nonmanipulated person to express significantly more contempt, $b = .44$, $SE = .21$, $t(220) = 2.04$, $p = .04$] and disgust [$b = .34$, $SE = .16$, $t(220) = 2.14$, $p = .03$, compared with the manipulated person, and also to express significantly less positive affect than the manipulated person, $b = -1.75$, $SE = .64$, $t(220) = -2.72$, $p = .01$. In the control condition there were no significant differences in the expression of positive affect, disgust, and contempt between manipulated and nonmanipulated partners ($ps > .35$).

The analyses also revealed that suppression qualified the link between attachment anxiety and the expression of sadness. In the suppression condition, the higher the person's (manipulated person's and nonmanipulated person's) attachment anxiety, the higher the expression of sadness, $b = 1.38$, $SE = .35$, $t(220) = 3.91$, $p < .001$. In the control condition, attachment anxiety was not significantly associated with the expression of sadness, $b = .19$, $SE = .22$, $t(220) = .88$, $p = .39$.

Positive mindset. As indicated in Table 5, the effect of positive mindset on the expression of contempt was qualified by target

identity. For the manipulated person, positive mindset decreased the expression of contempt, $b = -.61$, $SE = .27$, $t(220) = -2.26$, $p = .025$, compared with the control condition. Positive mindset did not affect the nonmanipulated person's expression of contempt ($p = .14$).

The analyses also revealed that positive mindset and target identity qualified the link between attachment anxiety and the expression of positive affect. For the nonmanipulated person in the control condition, the higher the attachment anxiety, the lower their expression of positive affect at marginal significance, $b = -.30$, $SE = .16$, $t(220) = -1.88$, $p = .06$. Following positive mindset instructions, however, the link between attachment anxiety and the expression of positive affect was no longer significant and in fact opposite in its sign, $b = .41$, $SE = .25$, $t(220) = 1.61$, $p = .11$.

Positive mindset also qualified the link between partner's attachment anxiety and the expression of sadness (at marginal significance). We found that in the control condition, people with partners high on attachment anxiety, expressed more sadness, $b = .33$, $SE = .18$, $t(220) = 1.81$, $p = .07$. In the positive mindset condition, people with partners high on attachment anxiety, expressed less sadness, $b = -.66$, $SE = .37$, $t(220) = -1.80$, $p = .07$, attesting to the anxiety buffering function of reappraisal on anxious individuals.

Table 6 summarizes the main research findings and shows that suppression increased cardiovascular arousal and the expression of negative emotion, especially among participants high on attachment anxiety. Among participants high on attachment avoidance, however, suppression ironically decreased cardiovascular arousal and decreased the experience of sadness. The positive mindset condition reduced cardiovascular arousal and expressed negative affect and increased expressed and experienced positive affect, primarily among participants high on attachment anxiety. Positive mindset primes had a positive influence on the partners of participants high on attachment anxiety as well, and decreased their expressed and experienced sadness.

Discussion

Romantic relationships constitute the most intimate of relationships wherein people may feel free to express their inner thoughts

and feelings; yet, even within this intimate context the expression of inner states must be regulated to some degree because intimacy also entails heightened sensitivity and vulnerability to expressions of dissatisfaction, anger, and disappointment by one's partner. This is especially true during relationship conflict, a particularly vulnerable episode that provides the opportunity for repair and improvement of relationships, but also entails the risk of conflict escalation and relationship deterioration (e.g., Gottman, 1993; Weiss & Heyman, 1990).

The current research examined the emotional exchange between interacting partners as a function of two different regulation strategies: expressive suppression and positive mindset—a specific form of cognitive reappraisal. Our results reveal that subtle changes in the emotional behavior of one partner may lead to a cascade of reactions in the other partner which include behavioral, physiological, and experiential facets of emotion. Moreover, whereas the regulating partner may have been somewhat aware of his or her emotion regulation, the changes in the other partner seemed to occur outside of conscious awareness. These findings contribute to the growing understanding of bidirectional effects in emotional interactions that involve an exchange of explicit, verbal information along with subtle nonverbal emotional cues (Butler, 2011).

Overall, the results of the current research reveal several distinct patterns of emotional regulation strategies and their effect on experienced and expressed affect and on cardiovascular arousal during relationship conflict. First, the findings replicate and extend Butler and colleagues (2003) *second hand smoke effect* of emotion regulation and indicate that affective suppression influences not only the manipulated person but also his or her unassuming partner. Namely, suppression increased the cardiovascular arousal, increased the expression of negative affect, and decreased the expression of positive affect of the nonmanipulated partner, especially if he or she was high on attachment anxiety. It is noteworthy that the nonmanipulated partner's self-reports of emotion were only marginally affected by suppression, suggesting that the effect of suppression on the nonmanipulated partner is primarily manifested in implicit modes of emotional responses and not at the conscious level of emotional experience.

Table 6
Summary of Results

	Cardiovascular arousal	Experience of sadness	Expression of sadness	Expression of disgust	Expression of contempt	Experience of positive affect	Expression of positive affect
Suppression (Main effect)	More			More	More	Less	
(+ Person high on attachment avoidance)	Less	Less					
(+ Partner high on avoidance)				More			
(+ Person high on attachment anxiety)		More	More				
Positive Mindset (Main effect)	Less				Less		
(+ Person high on attachment anxiety)				Less		More	More
(+ Partner high on attachment anxiety)		Less	Less				

Our findings extend beyond the findings of [Butler and colleagues \(2003\)](#) by indicating that just as second-hand emotion regulation may compromise interpersonal functioning, so may it repair couple affective communication. This appears to be the effect of assuming a positive mindset about the relationship during interpersonal conflict because it reduced cardiovascular arousal for both partners regardless of attachment orientation; increased the experience and expression of positive affect, and decreased the experience and expression of negative affect of the nonmanipulated partner. Previous research has documented the effects of reappraisal on the experience and expression of emotion in a manner consistent with our findings ([Gross, 1998](#); [Gross & John, 2003](#); [Lévesque et al., 2003](#); [Ochsner et al., 2004](#)), but reappraisal did not have a significant effect on autonomic arousal in most of these studies. Our findings are consistent, however, with research on the amygdala showing that reappraisal decreases amygdala activation ([Wager et al., 2008](#)). We speculate that in the intense context of a relationship conflict the effects of reappraisal, which are manifest in increased partner positivity and responsiveness, may have had a reassuring and soothing effect that they did not have in most individual-level studies that elicit less emotional engagement from participants. It is also important to note that in the current study we relied on a specific form of reappraisal that asked participants to think of their relationship in positive terms. It is likely that this positive form of reappraisal is more effective in inducing positive affect and reducing cardiovascular arousal than other forms of reappraisal that are not affectively valenced.

The results also indicate that manipulated persons found it difficult to suppress the expression of emotion to their partners, and increased rather than decreased the expression of negative emotions such as contempt, disgust, and sadness, and also decreased the expression of positive affect. This was especially pronounced among highly anxious individuals. This unexpected effect of suppression is inconsistent with previous research using similar methods and identical instructions ([Richards et al., 2003](#)). The main differences between our sample and the sample used by Richards and her colleagues are relationship commitment, relationship length, and culture. In the current sample participants were in committed relationships (cohabitation or marriage) and in the Richards study they were in dating relationships. Perhaps in the context of committed relationships hiding feelings is extremely aversive and even goal incongruent, because sharing feelings is an integral component of any normal couple interaction, and a critical component of relationship conflict resolution ([Greenberg, Ford, Alden, & Johnson, 1993](#); [Johnson, Hunsley, Greenberg, & Schindler, 1999](#)). Research on culture and emotion (e.g., [Soto, Levenson, & Ebling, 2005](#)) suggests that cultural differences in the expression and inhibition of emotions between American and Israeli couples could also account for these differences.

This paradoxical effect of suppression was primarily evident among individuals high on attachment anxiety. These individuals typically engage their partners and attempt to increase relationship closeness by constantly sending signals of distress ([Mikulincer & Shaver, 2005](#)). The instruction to suppress this display might have frustrated their basic relational strategy, and led to even greater distress. Ironically, this elevated level of distress may have further increased their need to display distress signals. Thus, for them, suppression instructions seemed to elicit a behavioral form of ironic reversal ([Wegner, 1994](#)), wherein they experienced a greater

need to express emotions when asked to suppress them. It is notable that those emotions displayed in the suppression condition are considered the most toxic emotions for relationship stability over time, such as contempt—an emotion classified by [Gottman](#) as one of the “four horsemen of the apocalypse” ([Gottman et al., 1998](#)).

Although suppression had ironic effects on the emotion expression of manipulated partners, it had the expected effect on non-manipulated partners. For them, suppression significantly increased the expression of negative affect to an extent greater than its effect on the manipulated partner. This is particularly notable given that these individuals were oblivious to experimental manipulations.

Whereas suppression had deleterious consequences on participants high on attachment anxiety, it did not seem to provoke much of a response among participants high on attachment avoidance. These participants did not show a pronounced response to suppression manipulations, and in one instance even exhibited a positive reaction—a reduction in experienced sadness. It seems that suppression was less destructive for persons high on attachment avoidance, as it serves their attachment goals (e.g., [Berant et al., 2001](#); [Ein-Dor et al., 2011](#)). The detached conduct of persons high on avoidance is likely to steer them away from emotional involvement in conflict and to protect them from the emotional implications of reliance on another person ([Mikulincer & Shaver, 2005](#)). Similarly, manipulated partners reacted with a milder cardiovascular response to suppression manipulations if their partner was high on avoidance than if their partner was low on avoidance. The instruction to suppress an already emotionally detached interaction with an avoidant partner may not be experienced as a significant change, and might even be perceived as a welcome relief from typically unpleasant signals. In contrast, people with partners who are low on attachment avoidance seemed to expect that their suppression of affect would be detected, would influence the interaction, and therefore exhibited greater cardiovascular arousal in this condition. Overall, it seems that suppression has little effect on highly avoidant individuals who habitually suppress and avoid negative emotions—they are not inclined to expend efforts in reading the emotions of others, and are also inaccurate in understanding other people’s mental state ([Simpson et al., 2011](#)).

Positive mindset manipulations decreased the experience and expression of negative emotions in a manner consistent with previous research on the effects of reappraisal on individual participants ([Gross, 1998](#); [Lévesque et al., 2003](#)). This result, however, differs from the findings of previous interaction research which did not find any significant effects of reappraisal ([Butler et al., 2003](#)). It is important to note that Butler and her colleagues used a reappraisal manipulation that was less focused on emotional valence whereas the reappraisal manipulation in the current research constitutes a positive reframing of relationship conflict. Thus, the current research indicates that in the context of a relationship conflict, positive reframing, in particular, is a beneficial form of emotion regulation for people high on attachment anxiety, as it serves to modulate their chronic levels of attachment-related anxiety. These individuals experienced and expressed elevated levels of sadness, disgust, and contempt, and lower levels of positive affect in the control condition. Following positive mindset manipulations, however, there was no longer a significant positive association between negative affect and attachment anxiety, or a

negative association between positive affect and attachment anxiety, indicating that positive mindset primes significantly reduced chronic levels of negative affect (Mikulincer et al., 2004, Mikulincer & Nachshon, 1991). These effects of positive mindset were not limited to the manipulated partners: When highly anxious persons were instructed to think of their relationship in positive terms, their partners experienced more positive affect, a finding consistent with previous research on reappraisal and attachment (Mikulincer & Sheffi, 2000). Thus, positive mindset instructions seems to have an anxiety-buffering effect, as it calms people high on attachment anxiety and creates a more secure, less threatening environment for their partners, allowing them and their partners more intimacy and security.

Positive mindset manipulations did not seem to influence the emotions of persons high on attachment avoidance or their partners. We assume that highly avoidant partners were reluctant to comply with positive mindset instructions, or perhaps felt awkward trying to, as this manipulation engages partners in a more intimate relationship which persons high on avoidance find threatening and incongruent with their typical attachment strategies (e.g., Ein-Dor et al., 2011). The effects of positive mindset in the current research seem to correspond with the results of previous research on the effects of positive disclosures in close relationships (e.g., Gable, Gonzaga, & Strachman, 2006) and indicate that subtle cognitive changes in reframing a conflict discussion may contribute to an atmosphere more conducive of conflict resolution. In particular, a positive mindset during relationship conflict may boost the relationship resources of people who are chronically anxious and ill-equipped to handle conflict effectively. These results somewhat differ from the social baseline model (Coan, 2008) as they suggest that only certain individuals in specific contexts will benefit from the presence of a close other.

The current research is novel in its use of experimental procedures and measures of individual differences in the context of the multimethod interaction paradigm (Levenson & Gottman, 1983). Its findings attest to the explicit and implicit effects of emotion regulation strategies, how these effects influence both the regulating and nonregulating partner, and how these effects are contingent upon the personality makeup of the sender and the recipient of the emotional message. There are, however, certain limitations to this research that need to be considered. First, the emotion regulation conditions that were developed by Richards and her colleagues and used in the current research have a significant shortcoming: Whereas the suppression condition and the control condition used similar instructions (in both cases participants are asked to think about the conflict), differing only in the instruction to inhibit emotion in the suppression condition, the instructions in the positive mindset condition differ from the other conditions in more than one way. In this condition, rather than asking participants to prepare for the conflict in which they are about to engage, they are told to keep in mind that all couples have conflicts. These differences between experimental conditions suggest that we manipulated more than just emotion regulation in the positive mindset condition, and thus our intervention in the conflict process should be understood as a multifaceted rather than conceptually focused intervention. Second, experimental manipulations during relatively naturalistic interactions may compromise the external validity of the findings, because of the artificial nature of these manipulations; yet, we believe that the ability to examine causal relationships

between emotion regulation strategies and emotional responsiveness during conflict interactions outweighs this concern. Third, this research measured general cardiovascular arousal over a 15-minute interaction, yet the complex design of the current research required that we reduce our physiological data to a single variable for the entire interaction. This constraint in our design precludes an analysis of specific physiological channels, or the modeling of change in physiological arousal over the course of the interaction. Finally, this research was conducted on a specific age and cultural group and pertains to the early stages of long-term relationships. The fact that many of our findings, and chief among them the second hand smoke effect of emotion regulation (Butler et al., 2003), replicate in a different context (close relationships) and on a different cultural group (Israelis) attests to the generalizability of these effects.

Conclusion

Relationship conflict interactions are not merely a conversation or a verbal exchange of information. When relationship partners engage in interaction they are communicating with one another using a multitude of channels: some conscious and explicit, others unconscious and implicit. Thus, when one partner makes a decision to reveal or conceal certain feelings, the other partner detects not only those feelings or lack thereof, but also a variety of other messages pertaining to the partner's openness, sincerity, and emotional availability. These messages may have a stronger impact on the quality of the interaction than the explicit information conveyed. According to the Temporal Interpersonal Emotion Systems (TIES) model, interpersonal communication leads to internal changes in autonomic physiology, explicit behavior, and emotion regulation processes. Feedback across these different channels coordinates the individual's emotional response. If the emotional response occurs while interacting with another person, the feedback processes between channels of emotion take place both within the individual and between individuals. A better understanding of these mechanisms may help understand how emotions spread between interacting individuals (Butler, 2011). Our results suggest that interaction is a delicate emotional dance wherein relationship partners need to synchronize their steps and show sensitivity to the other partner's moves. This dance requires an implicit knowledge of which feelings to reveal, which to conceal and when, how, and to whom to reveal or conceal emotional messages.

References

- Appelhans, B. M., & Luecken, L. J. (2006). Heart rate variability as an index of regulated emotional responding. *Review of General Psychology, 10*, 229–240. doi:10.1037/1089-2680.10.3.229
- Beauchaine, T. (2001). Vagal tone, development, and Gray's motivational theory: Toward an integrated model of autonomic nervous system functioning in psychopathology. *Development and Psychopathology, 13*, 183–214. doi:10.1017/S0954579401002012
- Berant, E., Mikulincer, M., & Florian, V. (2001). Attachment style and mental health: A 1-year follow-up study of mothers of infants with congenital heart disease. *Personality and Social Psychology Bulletin, 27*, 956–968. doi:10.1177/0146167201278004
- Birnbaum, G., Orr, I., Mikulincer, M., & Florian, V. (1997). When marriage breaks up—does attachment style contribute to coping and mental health? *Journal of Social and Personal Relationships, 14*, 643–654. doi:10.1177/0265407597145004

- Bowlby, J. (1982/1969). *Attachment and loss: Attachment* (Vol. 1). New York, NY: Basic Books.
- Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York, NY: Guilford Press.
- Butler, E. A. (2011). Temporal Interpersonal Emotion Systems: The “TIES” that form relationships. *Personality and Social Psychology Review*. doi:10.1177/1088868311411164
- Butler, E. A., Egloff, B., Wilhelm, F. H., Smith, N. C., Erickson, E. A., & Gross, J. J. (2003). The social consequences of expressive suppression. *Emotion*, 3, 48–67. doi:10.1037/1528-3542.3.1.48
- Cameron, O. G. (2009). Visceral brain–body information transfer. *Neuro-Image*, 47, 787–794. doi:10.1016/j.neuroimage.2009.05.010
- Campbell, L., & Kashy, D. A. (2002). Estimating actor, partner, and interaction effects for dyadic data using PROC MIXED and HLM: A user friendly guide. *Personal Relationships*, 9, 327–342. doi:10.1111/1475-6811.00023
- Carstensen, L. L., Gottman, J. M., & Levenson, R. W. (1995). Emotional behavior in long-term marriage. *Psychology and Aging*, 10, 140–149. doi:10.1037/0882-7974.10.1.140
- Coan, J. A. (2008). Toward a neuroscience of attachment. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment* (Vol. 2, pp. 241–265). New York, NY: Guilford Press.
- Ein-Dor, T., Mikulincer, M., & Shaver, P. R. (2011). Attachment insecurities and the processing of threat-related information: Studying the schemas involved in insecure people’s coping strategies. *Journal of Personality and Social Psychology*, 101, 78–93. doi:10.1037/a0022503
- Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion*, 6, 169–200. doi:10.1080/02699939208411068
- Ellsworth, P. C., & Smith, C. A. (1988). From appraisal to emotion: Differences among unpleasant feelings. *Motivation & Emotion*, 12, 271–302. doi:10.1007/BF00993115
- Fincham, F. D., & Bradbury, T. N. (Eds.). (1990). *The Psychology of marriage: Basic issues and applications*. New York, NY: Guilford Press.
- Gable, S. L., Gonzaga, G. C., & Strachman, A. (2006). Will you be there for me when things go right? Supportive responses to positive event disclosures. *Journal of Personality & Social Psychology*, 91, 904–917. doi:10.1037/0022-3514.91.5.904
- Gottman, J. M. (1989). *The Specific Affect Coding System (SPAFF)*. Unpublished research manual. University of Washington.
- Gottman, J. M. (1993). The roles of conflict engagement, escalation, and avoidance in marital interaction: A longitudinal view of five types of couples. *Journal of Consulting and Clinical Psychology*, 61, 6–15. doi:10.1037/0022-006X.61.1.6
- Gottman, J. M. (1994). *What predicts divorce? The relationship between marital processes and marital outcomes*. New York, NY: Lawrence Erlbaum.
- Gottman, J. M., Coan, J., Carrere, S., & Swanson, C. (1998). Predicting marital happiness and stability from newlywed interactions. *Journal of Marriage and Family*, 60, 5–22. doi:10.2307/353438
- Gottman, J. M., & Krokoff, L. J. (1989). Marital interaction and satisfaction: A longitudinal view. *Journal of Consulting and Clinical Psychology*, 57, 47–52. doi:10.1037/0022-006X.57.1.47
- Gottman, J. M., & Levenson, R. W. (1992). Marital processes predictive of later dissolution: Behavior, physiology, and health. *Journal of Personality and Social Psychology*, 63, 221–233. doi:10.1037/0022-3514.63.2.221
- Gottman, J., Markman, H., & Notarius, C. (1977). The topography of marital conflict: A sequential analysis of verbal and nonverbal behavior. *Journal of Marriage and the Family*, 39, 461–477. doi:10.2307/350902
- Gottman, J. M., & Notarius, C. I. (2000). Decade review: Observing marital interaction. *Journal of Marriage and Family*, 62, 927–947. doi:10.1111/j.1741-3737.2000.00927.x
- Greenberg, L. S., Ford, C. L., Alden, L. S., & Johnson, S. M. (1993). In-session change in emotionally focused therapy. *Journal of Consulting and Clinical Psychology*, 61, 78–94. doi:10.1037/0022-006X.61.1.78
- Gross, J. (1998). Antecedent and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology*, 74, 224–237. doi:10.1037/0022-3514.74.1.224
- Gross, J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85, 348–361. doi:10.1037/0022-3514.85.2.348
- Gross, J., & Levenson, R. W. (1993). Emotional suppression: Physiology, self-report, and expressive behavior. *Journal of Personality and Social Psychology*, 64, 970–986. doi:10.1037/0022-3514.64.6.970
- Gross, J., & Levenson, R. W. (1997). Hiding feelings: The acute effects of inhibiting negative and positive emotion. *Journal of Abnormal Psychology*, 106, 95–103. doi:10.1037/0021-843X.106.1.95
- Gross, J., Richards, J. M., & John, O. P. (2006). Emotion regulation in everyday life. In D. K. Snyder, J. A. Simpson, & J. N. Hughes (Eds.), *Emotion regulation in families: Pathways to dysfunction and health*. (pp. 13–35). Washington, DC: American Psychological Association. doi:10.1037/11468-001
- Hagemann, T., Levenson, R. W., & Gross, J. (2006). Expressive suppression during an acoustic startle. *Psychophysiology*, 43, 104–112. doi:10.1111/j.1469-8986.2006.00382.x
- Johnson, S. M., Hunsley, J., Greenberg, L., & Schindler, D. (1999). Emotionally focused couples therapy: Status and challenges. *Clinical Psychology: Science and Practice*, 6, 67–79. doi:10.1093/clipsy.6.1.67
- Kashy, D. A., & Kenny, D. A. (2000). The analysis of data from dyads and groups. In Harry T. Reis and Charles M. Judd (Eds.), *(Handbook of research methods in social and personality psychology* (pp. 451–477). Cambridge, United Kingdom: Cambridge University Press.
- Kenny, D. A. (1996). Models of non-independence in dyadic research. *Journal of Social and Personal Relationships*, 13, 279–294. doi:10.1177/0265407596132007
- Kiecolt-Glaser, J. K., Bane, C., Glaser, R., & Malarkey, W. B. (2003). Love, marriage, and divorce: Newlyweds’ stress hormones foreshadow relationship changes. *Journal of Consulting and Clinical Psychology*, 71, 176–188. doi:10.1037/0022-006X.71.1.176
- Kunce, L. J., & Shaver, P. R. (1994). An attachment-theoretical approach to caregiving in romantic relationships. In K. Bartholomew & D. Perlman (Eds.), *Attachment processes in adulthood* (pp. 205–237). London, United Kingdom: Jessica Kingsley Publishers.
- Levenson, R. W. (2003). Blood, sweat, and fears: The autonomic architecture of emotion. *Annals New York Academy of Sciences*, 1000, 348–366. doi:10.1196/annals1280.016
- Levenson, R. W., Carstensen, L. L., & Gottman, J. M. (1994). Influence of age and gender on affect, physiology, and their interrelations: A study of long-term marriages. *Journal of Personality and Social Psychology*, 67, 56–68. doi:10.1037/0022-3514.67.1.56
- Levenson, R. W., & Gottman, J. M. (1983). Marital interaction: Physiological linkage and affective exchange. *Journal of Personality and Social Psychology*, 45, 587–597. doi:10.1037/0022-3514.45.3.587
- Lévesque, J., Eugène, F., Joannette, Y., Paquette, V., Mensour, B., Beaudoin, G., Leroux, J. M., . . . Beaugard, M. (2003). Neural circuitry underlying voluntary suppression of sadness. *Biological Psychiatry*, 53, 502–510. doi:10.1016/S0006-3223(02)01817-6
- Mauss, I., Levenson, R., & McCarter, L. (2005). The tie that binds? Coherence among emotion experience, behavior, and physiology. *Emotion*, 175–190. doi:10.1037/1528-3542.5.2.175

- McRae, K., Gross, J. J., Weber, J., Robertson, E. R., Sokol-Hessner, P., Ray, R. D., . . . Ochsner, K. N. (2012). The development of emotion regulation: An fMRI study of cognitive reappraisal in children, adolescents and young adults. *Social Cognitive and Affective Neuroscience*, *7*, 11–22. doi:10.1093/scan/nsr093
- Mikulincer, M., Birnbaum, G., Woddiss, D., & Nachmias, O. (2000). Stress and accessibility of proximity-related thoughts: Exploring the normative and intraindividual components of attachment theory. *Journal of Personality and Social Psychology*, *78*, 509–523. doi:10.1037/0022-3514.78.3.509
- Mikulincer, M., Dolev, P., & Shaver, P. R. (2004). Attachment-related strategies during thought suppression: Ironic rebounds and vulnerable self-representations. *Journal of Personality and Social Psychology*, *87*, 940–956. doi:10.1037/0022-3514.87.6.940
- Mikulincer, M., Gillath, O., & Shaver, P. R. (2002). Activation of the attachment system in adulthood: Threat-related primes increase the accessibility of mental representations of attachment figures. *Journal of Personality and Social Psychology*, *83*, 881–895. doi:10.1037/0022-3514.83.4.881
- Mikulincer, M., & Nachshon, O. (1991). Attachment styles and patterns of self-disclosure. *Journal of Personality and Social Psychology*, *61*, 321–331. doi:10.1037/0022-3514.61.2.321
- Mikulincer, M., & Shaver, P. R. (2005). Attachment theory and emotions in close relationships: Exploring the attachment-related dynamics of emotional reactions to relational events. *Personal Relationships*, *12*, 149–168. doi:10.1111/j.1350-4126.2005.00108.x
- Mikulincer, M., & Sheffi, E. (2000). Adult attachment style and cognitive reactions to positive affect: A test of mental categorization and creative problem solving. *Motivation and Emotion*, *24*, 149–174. doi:10.1023/A:1005606611412
- Mosek-Eilon, V., Hirschberger, G., & Kanat-Maymon, Y., & Feldman, R. (in press). Infant reminders alter sympathetic reactivity and reduce couple hostility at the transition to parenthood. *Developmental Psychology*.
- Ochsner, K., Ray, R., & Cooper, J. (2004). For better or for worse: Neural systems supporting the cognitive down-and up-regulation of negative emotion. *Neuroimage*, *23*, 483–499. doi:10.1016/j.neuroimage.2004.06.030
- Porges, S. W. (1998). Love: An emergent property of the mammalian autonomic nervous system. *Psychoneuroendocrinology*, *23*, 837–861. doi:10.1016/S0306-4530(98)00057-2
- Porges, S. W., Doussard-Roosevelt, J. A., & Maiti, A. K. (1994). Vagal tone and the physiological regulation of emotion. *Monographs of the Society for Research in Child Development*, *59*, 167–186. doi:10.2307/1166144
- Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*, *31*, 437–448. doi:10.3102/10769986031004437
- Reizer, A., Ein-Dor, T., & Possick, H. (2012). Living at risk: Dyadic examination of the links among environmental stress attachment orientations and marital support provision. *Journal of Social and Personal Relationships*, *29*, 694–712. doi:10.1177/0265407512443449
- Richards, J. M., Butler, E. A., & Gross, J. J. (2003). Emotion regulation in romantic relationships: The cognitive consequences of concealing feelings. *Journal of Social and Personal Relationships*, *20*, 599–620. doi:10.1177/02654075030205002
- Rokach, A., & Brook, H. (1998). Coping with loneliness. *Journal of Psychology: Interdisciplinary and Applied*, *132*, 107–127. doi:10.1080/00223989809599269
- Seider, B. H., Hirschberger, G., Nelson, K. L., & Levenson, R. W. (2009). We can work it out: Age differences in relational pronouns, physiology, and behavior in marital conflict. *Psychology and Aging*, *24*, 604–613. doi:10.1037/a0016950
- Shaver, P. R., & Mikulincer, M. (2007). Adult attachment strategies and the regulation of emotion. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 446–465). New York, NY: Guilford Press.
- Simpson, J. A., Kim, J. S., Fillo, J., Ickes, W., Rholes, W. S., Oriña, M. M., & Winterheld, H. A. (2011). Attachment and the management of empathic accuracy in relationship-threatening situations. *Personality and Social Psychology Bulletin*, *37*, 242–254. doi:10.1177/0146167210394368
- Soto, J. A., Levenson, R. W., & Ebling, R. (2005). Cultures of moderation and expression: Emotional experience, behavior, and physiology in Chinese Americans and Mexican Americans. *Emotion*, *5*, 154–165. doi:10.1037/1528-3542.5.2.154
- Sturm, V. E., Levenson, R. W., Rosen, H. J., Allison, S. C., & Miller, B. L. (2006). Preserved simple emotion and diminished self-conscious emotion in frontotemporal lobar degeneration. *Brain*, *129*, 2508–2516. doi:10.1093/brain/awl1145
- Wager, T. D., Davidson, M., Hughes, B. L., Lindquist, M. A., & Ochsner, K. N. (2008). Prefrontal-subcortical pathways mediating successful emotion regulation. *Neuron*, *59*, 1037–1050. doi:10.1016/j.neuron.2008.09.006
- Wegner, D. M. (1994). Ironic processes of mental control. *Psychological Review*, *101*, 34–52. doi:10.1037/0033-295X.101.1.34
- Weiss, R. L., & Heyman, R. E. (1990). Marital distress. In A. S. Bellack, M. Hersen, & A. E. Kazdin (Eds.), *International handbook of behavior modification and therapy* (2nd ed., pp. 475–501). New York, NY: Plenum. doi:10.1007/978-1-4613-0523-1_23
- Werner, K. H., Roberts, N. A., Rosen, H. J., Dean, D. L., Kramer, J. H., Weiner, M. W., & Miller, B. L. (2007). Emotional reactivity and emotion recognition in frontotemporal lobar degeneration. *Neurology*, *69*, 148–155. doi:10.1212/01.wnl.0000265589.32060.d3

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