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# The Consequences of Suppressing Affective Displays in Romantic Relationships: A Challenge and Threat Perspective

Brett J. Peters and Jeremy P. Jamieson
University of Rochester

Emotion suppression is one of the most studied topics in emotion regulation. However, little is known about how response-focused regulation strategies unfold in romantic relationships from the perspectives of both emotion regulators and their interaction partners. Using the biopsychosocial (BPS) model of challenge and threat as an organizing framework, 2 experiments examined effects of expressive suppression (vs. expression) on affective, cognitive, physiological, and behavioral processes in regulators *and* their romantic partners. In Experiment 1 a crowd-sourced sample of individuals currently in a romantic relationship simulated scenarios in which the self or partner engaged in response-focused emotion regulation (expression or suppression of affective displays). Suppressors expected worse outcomes compared with expressers. However, individuals on the receiving end of suppression (suppression targets) did not differ from expression targets. Experiment 2 then examined romantic couples' responses to suppression/expression in vivo. Regulators were randomly assigned to suppress/express affective displays and partners (targets) were unaware of the manipulation. Suppressors *and* suppression targets exhibited more malignant physiological responses (increased vascular resistance and elevated cortisol reactivity) during an emotional conversation and reduced intimacy behavior as measured with a novel touch task. Consequences for relationship processes are discussed.

*Keywords:* emotion regulation, psychophysiology, relationships, responsiveness

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A large corpus of research has accumulated on the effects of response-focused emotion regulation, especially expressive suppression or restricting affective displays, for individuals using those strategies—the regulators (Gross, 1998b, 2002; Gross & Barrett, 2011, for a review). However, recent updates to the *process model of emotion regulation* (e.g., the *extended process model of emotion regulation*) emphasize the dynamical nature of regulation processes (Gross, 2015). That is, emotion regulation does not occur in a vacuum. Regulation strategies implemented at one time can influence affective processes over time and between people. Thus, understanding how emotion regulation processes unfold longitudinally and in interpersonal, dyadic contexts is important for advancing affective science.

The current research applied the biopsychosocial (BPS) model of challenge and threat to elucidate the affective, cognitive, physiological, and behavioral effects of dyadic emotion regulation processes in romantic relationships. There were two primary goals. First, we examined beliefs about emotion regulation in romantic relationships. Specifically, Experiment 1 established belief profiles of emotion regulation effects in regulators *and* targets (partners of regulators). Second, Experiment 2 examined dyadic emotion regulation processes in vivo in both regulators *and* targets. The use of a multimethod approach enhances our understanding of the dyadic nature of emotion regulation in close relationships.

## Expressive Suppression in Dyadic Contexts

Emotion regulation refers to altering when, how, and which emotions are experienced and expressed (Gross, 1998b). The *process model of emotion regulation* considers temporal processes in emotional experiences (Gross, 2002). Regulating antecedent situational, attentional, and cognitive appraisal processes can alter emotional experiences. For instance, adopting a third-person perspective down-regulates negative affect (Ayduk & Kross, 2010), or retraining attention away from emotionally negative cues attenuates anxiety (Amir, Beard, Burns, & Bomyea, 2009). In contrast, response-focused emotion regulation strategies are implemented *after* initial emotional experiences and alter affective signaling. In the research presented here, we focused on response-focused regulation strategies, such as expressive suppression, because of its deployment in close relationship contexts as methods to benefit (e.g., concealing negative partner evaluations: Lemay, Bechis, Martin, Neal, & Coyne, 2013) or punish (e.g., "silent treatment:" Boon, Deveau, & Alibhai, 2009) romantic partners.

Suppressing emotion, as operationalized here, refers to inhibiting *displays* of affect. A hallmark of this regulatory approach is that it requires cognitive effort (Gross, 1998a; Gross & Levenson, 1997; Harris, 2001), and research has linked suppression to myriad

Brett J. Peters and Jeremy P. Jamieson, Department of Clinical and Social Sciences in Psychology, University of Rochester.

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Correspondence concerning this article should be addressed to Jeremy P. Jamieson, University of Rochester, 437 Meliora Hall, Rochester, NY 14627 or E-mail: jeremy.jamieson@rochester.edu

negative outcomes. For instance, suppression impairs memory (Dunn, Billotti, Murphy, & Dalgleish, 2009; Richards & Gross, 2000), predicts psychopathology (Haga, Kraft, & Corby, 2007; John & Gross, 2004; Moore, Zoellner, & Mollenholt, 2008), elicits maladaptive physiological responses (Gross, 1998a; Gross & Levenson, 1997; Hagemann, Levenson, & Gross, 2006; Peters, Overall, & Jamieson, 2014), and leads to feelings of inauthenticity (English & John, 2013; Impett, Le, Kogan, Oveis, & Keltner, 2014), to name a few. Suppression also has negative social-interactive consequences, such as reducing access to social support resources, lowering "social satisfaction," and harming the quality of close relationships (Srivastava, Tamir, McGonigal, John, & Gross, 2009). More long-term, engaging in suppression predicts weaker social connections, interpersonal isolation, and lower life satisfaction (English, John, Srivastava, & Gross, 2012; Jordan et al., 2011).

Taken together, the extant literature—with notable exceptions, including regulation flexibility (Bonanno & Burton, 2013), specific cross-cultural comparisons (Butler, Lee, & Gross, 2007, 2009), adjustment to trauma (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; Seery, Silver, Holman, Ence, & Chu, 2008), and highly interdependent people (Le & Impett, 2013)—suggests engaging in suppression can have negative consequences for affective regulators.

On the other hand, comparatively less research has examined effects of emotion suppression in regulators' interaction partners (i.e., targets). This is an important endeavor because expression of emotion is crucial for communication and when disrupted can negatively impact social interactions (Ben-Naim, Hirschberger, Ein-Dor, & Mikulincer, 2013; Butler et al., 2003; Butler, Wilhelm, & Gross, 2006; Christenfeld et al., 1997; Glynn, Christenfeld, & Gerin, 1999; Impett et al., 2012, 2014; Lepore, Allen, & Evans, 1993; Peters et al., 2014; Smith, 1992). In the context of close relationships husbands exhibiting "stonewalling" behavior (akin to expressive suppression) predicts lower martial satisfaction for *both* partners (Gottman & Levenson, 1988; Levenson & Gottman, 1985), whereas expressing emotion elicits support and increases intimacy (Graham, Huang, Clark, & Helgeson, 2008). Furthermore, when romantic couples discussed a sacrifice, suppressive regulators reported feeling less positive and more negative emotions. However, no significant negative consequences were found for suppression targets in the lab, but suppression targets did report more negative emotion and lower life satisfaction in their daily lives (Impett et al., 2012). Moreover, in that research suppression targets described partners as inauthentic, which predicted poorer relationship quality 3 months later. The research presented here seeks to extend research on dyadic emotion regulation processes in close relationships to include online physiological measurement and a novel behavioral intimacy outcome.

## The BPS Model of Challenge and Threat in Dyadic Emotion Regulation

Specifying emotion regulation processes in relationships requires understanding cognitive and motivational processes that have implications for health and behavior. For example, different types of high arousal, negative valance affective states (e.g., anger and anxiety) vary as a function of approach and avoidance motivation (anger = approach; anxiety = avoidance) that correspond to vastly different physiological responses, behaviors, and decisions (e.g., Jamieson, Koslov, Nock, & Mendes, 2013; Jamieson, Valdesolo, & Peters, 2014). Thus, an individual in a romantic relationship who perceives reduced responsiveness in their partner can respond with approach-motivated behaviors (e.g., reassurance seeking or questioning) or avoidance-motivated behaviors (e.g., "silent treatment" or reduced partner contact). Although any of these responses might predict subsequent negative outcomes, the affective mechanisms are very different. Thus, understanding dyadic emotion regulation necessitates an assessment of *motivationally tuned* measures.

We hypothesize that partner effects of emotion regulation stem from the stressful or demanding nature of interactions. Regulators expend resources monitoring and suppressing affective signals while targets seek to evaluate the (lack of) affective displays. The BPS model of challenge and threat offers a theoretical framework for understanding how cognitive and situational factors interact to shape responses in demanding social situations (see Blascovich, 2008; Blascovich & Mendes, 2010; Blascovich & Tomaka, 1996, for reviews).

A fundamental principle of the BPS model of challenge threat is the idea that appraisals of situational demands and coping resources interact to elicit challenge and threat responses in situations that present acute demands that require instrumental responding (see Blascovich & Mendes, 2010; Seery, 2011, for reviews). It is important to note, however, that challenge and threat are best conceptualized as anchors along a continuum of stress responses rather than as dichotomous stress states.

When coping resources are appraised as exceeding perceived situational demands, individuals experience challenge-type affective responses. Threat manifests when perceived demands are appraised as exceeding resources. The specific content of the resource and demand appraisals, however, varies across situations and people. For instance, appraisals of resources may fluctuate independently from appraisals of demands (i.e., resource and demand appraisals can be distinct constructs). To illustrate, resource appraisals might include perceptions of knowledge, ability, or skills that are independent of perceptions of demands such as danger, difficulty, or effort—which is particularly relevant for suppressing affective displays. Alternatively, resource and demand appraisals may also index *bipolar* factors. Dimensions of familiarity/uncertainty or safety/danger, for instance, impact resources *and* demands: As familiarity increases (relative to uncertainty) resources can be appraised as increasing and demands appraised as decreasing (Blascovich, 2008). In the context of the current research, monitoring and regulating demands associated with suppressing affective displays increases perceptions of demands, shifting suppressive regulators toward threat. For partners interacting with suppressive regulators, uncertainty processes and efforts required to decode their partners' uncertain affective cues promote threat responses.

In the BPS model of challenge and threat cognitive appraisal processes are directly tied to specific physiological response patterns. Both challenge and threat states are accompanied by increases in sympathetic arousal. Challenge states activate the sympathetic-adrenal-medullary (SAM) axis, and downstream lead to increased cardiac efficiency and dilation of the vasculature. On the other hand, threat is associated with relatively greater activation of the hypothalamus-pituitary-adrenal (HPA) axis—the end product of which is cortisol secretion from the adrenal glands—and is associated with decreased cardiac efficiency, and increased vascular resistance downstream (see Seery, 2011, for a review). Motivationally, physiological responses observed during challenge states signal an *approach* orientation, whereas threat responses signal an *avoidance* orientation (e.g., Jamieson, Koslov, et al., 2013; Mendes, Blascovich, Hunter, Lickel, & Jost, 2007; Mendes, Major, McCoy, & Blascovich, 2008).

Recent emotion regulation research with unacquainted (i.e., stranger) dyads suggests suppression of affective signals can elicit threat responses for regulators *and* targets despite the suppressed emotions being negative (Peters et al., 2014). The studies presented here build on this and other previous dyadic BPS research (Mendes, Reis, Seery, & Blascovich, 2003; Murray, Lupien, & Seery, 2012; Scheepers, Röell, & Ellemers, 2015). For instance, past BPS research with stranger dyads found that participants who anticipated and prepared for an emotional conversation, but were instructed to first discuss a nonemotional topic (thus, requiring them to suppress anticipated emotions) exhibited threat-type physiological responses (Mendes et al., 2003). Moreover, research with romantic dyads found that when working memory capacity is depleted, individuals high in impulsive trust exhibited resilient, challenge-type cardiovascular responses in the face of partner-criticism, but individuals low in impulsive trust exhibited threat-type cardiovascular reactivity (Murray et al., 2012). However, limited research exists on emotion regulation processes (as specified by Gross' process model or extended process model) and physiological responses in romantic dyads.

## Research Overview

These studies integrated research on BPS models of challenge and threat and dyadic emotion regulation to provide a comprehensive examination of response-focused emotion regulation in romantic couples. Achieving this goal requires elucidating both expectations of and responses to interactions involving suppression. Toward this end, two experiments were planned and designed to address beliefs about and reactions to response-focused regulation in regulators *and* targets interacting with regulators. Experiment 1 assessed expectations surrounding response-focused emotion regulation by having members of romantic dyads simulate interactions and then measuring appraisal processes. Experiment 2 then manipulated emotion regulation and measured affective, cognitive, physiological, and behavioral processes.

For regulators, we hypothesized that both simulating and engaging in expressive suppression would have negative outcomes relative to emotion expression (Experiments 1 and 2). For partners interacting with regulators, we predicted no significant effects as a function of simulated regulation (Experiment 1), but expected targets would experience negative physiological and relational outcomes during actual interactions with suppressive regulators (Experiment 2). We also hypothesized dyads in which one romantic partner was suppressing her/his emotions would lead to lower levels of perceived responsiveness (in both partners) and less physical intimacy after an emotionally laden conversation (Experiment 2).

## Experiment 1

Although research suggests suppression has negative consequences, why do romantic partners use this regulatory strategy? Part of the answer may lie in a possible "belief-experience" discrepancy. For example, regulators often *deliberately plan* to suppress affective signals to avoid negatively impacting their partners. That is, people may believe that expressing negative affect to their partner will have a harmful effect on them (Green et al., 2013). However, research suggests *expressing* affect—even negative affect—benefits relationships (Clark & Finkel, 2005; Impett et al., 2014). In fact, individuals in romantic relationships *expect* and *welcome* partners' negative emotional expressions, and the expression of even negative affect has beneficial effects on relationship processes (Clark & Finkel, 2005; Clark, Fitness, & Brissette, 2001; Clark & Lemay, 2010; Clark & Taraban, 1991; Sanford & Rowatt, 2004).

To begin to untangle expectations and experiences of response-focused regulation in the context of BPS models, appraisals of regulators and targets is needed in simulated scenarios. Research on affective forecasting has shown people have difficulties mentally simulating future emotional responses (Fox, Russo, Bowles, & Dutton, 2001; Wilson & Gilbert, 2003). However, few studies have examined partners' *predictions* of responses to emotionally laden situations (Green et al., 2013; Pollmann & Finkenauer, 2009). In one notable study, Green and colleagues (2013) observed romantic partners overestimated the relational impact of predicted transgressions for their partners, and importantly, effects were *role specific*. Whereas people accurately predicted feeling sadder if they were the perpetrator (i.e., regulator) of the transgression than if they were the victim (i.e., target), they incorrectly predicted partners would feel sadder in the victim/target role rather than the perpetrator/regulator role. Thus, at least in terms of relationship transgressions, there exists a belief-experience discrepancy. Applying a similar approach to dyadic emotion regulation, Experiment 1 sought to first explicate beliefs regarding response-focused emotion regulation strategies from the perspective of two roles: the person engaging in the emotion regulatory strategy (regulator) and the target of regulation.

To establish belief profiles, individuals who indicated being in a romantic relationship for at least 3 months were randomly assigned to mentally simulate engaging in one of four hypothetical interactions that varied as a function of role (regulator or target) and type of response-focused emotion regulation strategy (suppression or expression). Participants then reported their appraisals and expected outcomes resulting from the simulated scenario. Participants who simulated being suppressors were expected to report negative appraisals and predict negative relationship outcomes compared with expressers. However, consistent with past research (Green et al., 2013), targets of suppression were not expected to report predicted negative outcomes compared with targets of expression.

### Method

**Participants.** There were 532 adult U.S. citizens (340 women; $M_{age}$ = 30.1, range = 18–61; 428 White, 37 Black, 26 Asian, 13 Hispanic, 25 Mixed, and 3 Other) who indicated being currently involved in a romantic relationship for at least 3 months were recruited from *ResearchMatch*, a national health volunteer registry supported by the U.S. National Institutes of Health as part of the Clinical Translational Science Award (CTSA) program with the primary aim of connecting researchers with volunteers. Twenty-six participants were excluded from analyses for responding incorrectly to an inattentiveness question (Maniaci & Rogge, 2014). As is standard on *ResearchMatch*, respondents were given no monetary compensation.

**Procedure.** Participants first read a brief overview of the study and then were asked to mentally simulate a conversation with their significant other about a shared emotional event (e.g., watching a sad film):

> You just watched a very sad movie with your romantic partner about the bombing of Hiroshima during WWII. You see the bomb explode, citizens being vaporized, turned to carbon, or thrown around like a ball. Additionally, you see people suffering from radiation poisoning and mothers crying, unable to rescue their burning children from the rubble. Shortly after the movie, you and your partner discuss each of your emotional responses to viewing the movie.

Immediately after the video description, participants were randomly assigned to read one of four prompts that contained information of emotion regulation. Prompts were randomized across two dimensions: Condition (suppression vs. expression) and Role (regulator vs. target). Individuals assigned to the role of regulator and the suppression condition (i.e., *suppressors*) read: *Imagine that during this conversation you suppress your emotional displays so that your partner cannot easily tell what you are feeling. That is, you do not express your emotions outwardly. You keep stoic even when speaking about your feelings.*

Those assigned to the role of regulator and the expression condition (i.e., *expressers*) read: *Imagine that during this conversation you actively display your emotions so that your partner can easily tell what you are feeling. That is, you express your emotions outwardly by using expressive gestures and facial expressions.*

Individuals assigned the role of target and the suppression condition (i.e., *suppression targets*) received slightly modified prompts such that one's significant other (instead of oneself) was engaging in suppression or expression: *Imagine that during this conversation your romantic partner behaves in such a way that you cannot tell what s/he is feeling. That is, your partner is not expressing emotions outwardly. Your partner keeps stoic even when speaking about his or her feelings.*

Finally, individuals assigned to the role of target and the expression condition (i.e., *expression targets*) read: *Imagine that during the conversation your partner actively displays his or her emotions so that you can easily tell what s/he is feeling. That is, your partner expresses his or her emotions outwardly using expressive gestures and facial expressions.*

After reading the prompt, participants were instructed to write at least five sentences detailing their feelings and thoughts on how the conversation would go with their romantic partners. After the writing exercise, participants completed a battery of measures (see below) designed to assess appraisal and attribution processes.

**Measures.**

***Core affect.*** Consistent with conceptualizations of core affective state (e.g., Barrett, 2006), participants rated how they would feel if they had just had the conversation with respect to (a) affective arousal (0 = low arousal, 2 = neutral, 4 = high arousal) and (b) affective valence (0 = very displeased, 2 = neutral, 4 = very pleased) on 5-point scales. The two items were analyzed individually.

***Stress appraisals.*** Participants completed two items that assessed anticipated challenge/threat appraisals. Specifically, participants were asked to what extent the hypothetical discussion would be a threat, "*I would feel threatened by this conversation*," or positive challenge, "*I feel that the discussion would challenge me in a positive way*," on 7-point Likert scales (1 = *strongly disagree*, 7 = *strongly agree*), and a threat-challenge ratio was created by dividing threat by challenge. These two items were adapted from longer challenge-threat scale (e.g., Beltzer, Nock, Peters, & Jamieson, 2014; Mendes, Gray, Mendoza-Denton, Major, & Epel, 2007). Previous research indicates these single items correlate well with composite measures of challenge/threat appraisals ($r$s $>$ .80; Beltzer et al., 2014; Jamieson, Nock, & Mendes, 2012, 2013; Jamieson et al., 2014).

***Perceived Partner Responsiveness (PPR).*** Perceived partner responsiveness was measured using Reis and colleagues' Perceived Partner Responsiveness (PPR) scale (Reis, Maniaci, Caprariello, Eastwick, & Finkel, 2011). Participants were given the following prompt, "*Compared to other experiences I've had with romantic relationships, in this hypothetical discussion my partner would*:" with 12 items that examined the extent to which individuals perceived their partner as understanding, validating, and caring (e.g., ". . . *understand me*," ". . . *be responsive to my needs*"). Items were completed on 5-point scales (1 = not at all true, 3 = somewhat true, 5 = very true) and averaged to form a PPR composite (Cronbach's $\alpha$ = .957).

***Inattentiveness.*** One item embedded within the questionnaires stated, "*Research has shown that adding questions like this one to online surveys helps to make sure computers are not taking these surveys. Answer this question by giving the answer of '−1'.*" Participants who incorrectly responded to this question ($N$ = 26) were excluded from analyses.

## Results

**Data analysis plan.** Unless otherwise noted, data were analyzed in 2 (Condition: suppression vs. expression) × 2 (Role: regulator vs. target) between subject analysis of variances (ANOVAs). The hypothesized Condition × Role interactions were decomposed using simple contrasts determined by a priori predictions (Kirk, 1995). Specifically, we planned to examine effects of emotion regulation condition in regulators (−1 = suppressors, 1 = expressers) and targets (−1 = suppression targets, 1 = expression targets).

Although we did not anticipate sex differences in Experiment 1, we contrasted coded sex and entered it along with interactions between Sex, Condition, and Role. The pattern of results was consistent regardless of whether sex was entered into the models or not. For consistency across Experiments 1 and 2, the models reported below include sex, but effects of sex are not discussed further as no meaningful sex differences were observed. Moreover, main effects of Role are reported but not discussed as these do not inform hypotheses or map onto theoretically meaningful processes given a priori hypotheses. All means, *SD*s, and 95% confidence intervals (CIs) are listed in Table 1.[1]

**Core affect.** A main effect for role manifested in our analysis of affective valance, $F(1, 498) = 16.38$, $p < .001$, $r = 0.18$. Regulators indicated they would expect to feel more negative affect ($M = 1.71$, $SD = 1.01$) relative to targets ($M = 2.14$, $SD = .96$). No main effects of Condition or its interactions with Role were observed for the arousal and valence items, $ps > .22$.

**Stress appraisals.** Participants simulating regulating affective displays (regulators) reported a lower threat to challenge ratio ($M = 0.82$, $SD = 1.02$) relative to targets simulating interacting with regulators ($M = 0.54$, $SD = 0.63$), $F(1, 498) = 13.76$, $p < .001$, $r = 0.33$. However, this main effect was qualified by a Condition × Role interaction, $F(1, 498) = 6.56$, $p = .011$, $r = .11$. Participants who simulated suppressing affective displays reported a higher threat to challenge ratio than expressers, $F(1, 498) = 4.17$, $p = .042$, $r = .09$, but suppression targets did not significantly differ from expression targets ($p = .15$).

This pattern suggests that individuals believe suppressing outward displays of emotion is relatively more threatening compared with expressing emotions and is consistent with extant research suggesting suppression has negative affective consequences for regulators (Dunn et al., 2009; Haga et al., 2007; Peters et al., 2014). Conversely, but consistent with similar findings (Green et al., 2013), suppression targets did not expect the interaction to be significantly more threatening than expression targets.

**Perceived Partner Responsiveness (PPR).** Main effects for Condition, $F(1, 497) = 7.70$, $p = .006$, $r = .12$, and Role $F(1, 497) = 27.51$, $p < .001$, $r = .23$, were qualified by a Condition × Role interaction, $F(1, 497) = 9.60$, $p = .002$, $r = .14$.

As shown in Figure 1, suppressors (vs. expressers) expected their romantic partners to be less responsive, $F(1, 497) = 16.72$, $p < .001$, $r = .18$; whereas suppression targets did not differ significantly from expression targets, $F(1, 497) = 0.21$, $p = .646$, $r = .02$. Consistent with predictions, only when participants simulated themselves as suppressors did they believe it would lead to less positive relationship-oriented outcomes like PPR. An interesting find was that participants who simulated being targets of suppression did not think their partner would be significantly less responsive than expression targets.

Table 1
*Self-Reports in Experiment 1 as a Function of Condition and Role*

| | Emotion regulation condition | | | | | |
|---|---|---|---|---|---|---|
| | Suppression | | | Expression | | |
| Measure | *M* | *SD* | 95% CI | *M* | *SD* | 95% CI |
| Core affect | | | | | | |
| Arousal | R: $1.86_a$ | 1.40 | 1.60, 2.13 | R: $1.99_{ab}$ | 1.35 | 1.74, 2.24 |
| | T: $2.10_{ab}$ | 1.15 | 1.91, 2.29 | T: $2.21_b$ | 1.10 | 2.02, 2.39 |
| Valance | R: $1.65_a$ | 1.10 | 1.44, 1.86 | R: $1.76_a$ | .93 | 1.59, 1.93 |
| | T: $2.16_b$ | .91 | 2.01, 2.31 | T: $2.12_b$ | 1.01 | 1.95, 2.29 |
| Stress appraisals | R: $.94_a$ | 1.09 | .74, 1.15 | R: $.72_b$ | .95 | .54, .89 |
| | T: $.47_c$ | .40 | .40, .53 | T: $.61_{bc}$ | .81 | .47, .75 |
| PPR | R: $3.03_a$ | 1.13 | 2.82, 3.25 | R: $3.56_b$ | .98 | 3.38, 3.74 |
| | T: $3.84_c$ | .85 | 3.69, 3.98 | T: $3.79_{bc}$ | .90 | 3.63, 3.94 |

*Note.* Means not sharing a subscript within a measure differ at $p < .05$. R = regulator; T = target; CI = confidence interval.

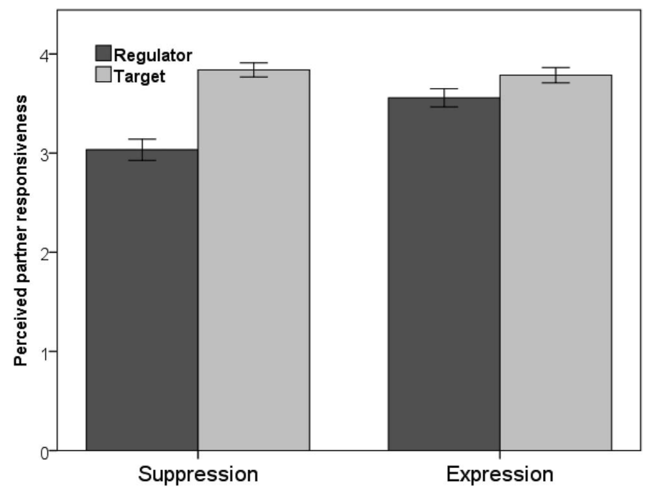


*Figure 1.* Participants' expectations regarding perceived partner responsiveness from Experiment 1 as a function of Condition (suppression vs. expression) and Role (regulator vs. target) in the simulated conversation.

## Discussion

Experiment 1 instructed participants to simulate an interaction with their romantic partners in which one individual engaged in response-focused emotion regulation. Participants who envisioned themselves suppressing (vs. expressing) their affective displays appraised the conversation as more threatening and predicted that it would lead to negative relationship outcomes (reduced PPR). However, suppression targets—those instructed to simulate interacting with a suppressive romantic partner—did not anticipate negative outcomes relative to expression targets. Participants believed engaging in, but *not* perceiving, suppression would lead to negative outcomes. These findings are consistent with past research suggesting that people have difficulties mentally simulating future emotional responses (Fox, Russo, Bowles, & Dutton, 2001; Wilson & Gilbert, 2003), especially in the target role of interactional scenarios (Green et al., 2013).

Research also suggests that suppressing negative emotions has negative consequences for the regulator *and* target (Sanford & Rowatt, 2004). Study 1 is not inconsistent with that argument, but instead underscores the potential discrepancy between *beliefs* about perceiving suppression versus interacting with a suppressive partner in vivo. Whereas Experiment 1 provides essential insights into beliefs about response-focused emotion regulation, it does not provide evidence for how regulators and targets actually respond during interactions. To date, the only study of dyadic emotion regulation in romantic couples that measured online responses observed heightened physiological arousal levels in suppression targets (Ben-Naim et al., 2013). However, additional insights into motivational orientation or subsequent relationship behaviors are needed to more fully understand how regulating displays of affect impact romantic dyads. Toward this end, Experiment 2 immersed

[1] Because of the potential for common method biases across questionnaire, all self-reported data were reanalyzed applying a Bonferroni correction with a new critical α of $p = .0125$. All significant effects reported in the text were retained with the correction applied.

couples in emotional regulation scenarios and examined effects on affective, cognitive, physiological, and behavioral consequences.

## Experiment 2

There were two primary aims of Experiment 2. First, in conjunction with the pattern observed in Experiment 1, elucidating in vivo responses can provide insight into discrepancies between simulations and experiences of suppression. Second, research on emotion regulation in close relationships has yet to assess motivationally tuned (approach vs. avoidance) affective and physiological responses and explore how these processes shape subsequent relationship behaviors. Experiment 2 fills this gap using the BPS model of challenge and threat to organize predictions.

Suppressing affective displays requires explicit effort on the part of the regulator, and the uncertainty created by this suppression requires interaction partners to exert effort trying to decode regulators' affective responses. Thus, interactions in which one partner suppresses his or her affective displays are demanding and involve instrumental responding. Such situations would be expected to elicit sympathetic arousal in both dyad members. This is precisely the pattern observed previously (Ben-Naim et al., 2013; cf., Butler et al., 2003). However, sympathetic arousal cannot differentiate between challenge and threat stress responses, which have important consequences for affective and cognitive responses and downstream behavior and health (e.g., Jamieson, Nock, et al., 2013). A core tenet of the BPS model of challenge and threat is that cognitive appraisals of task demands and coping resources interact to determine responses. When resources exceed demands, individuals experience approach-motivated challenge responses. Threat manifests when demands exceed resources. We suggest expressive suppression increases the likelihood regulators *and* targets will experience threat in such contexts because of the demands suppression creates (i.e., effort and uncertainty) and the resources it saps (i.e., familiarity).

To gain insight into how threat appraisals and responses might lead to detrimental relationship outcomes, we examined responsiveness and physical intimacy. Regulators withholding affective displays deny partners a channel of affective feedback. Thus, by definition, suppressing affective displays should thwart the ability of regulators to be responsive. Targets must also expend effort attempting to decode suppressive partners' unfamiliar emotions, intentions, and attitudes in that context. Even if suppression targets make efforts to be responsive, these efforts may seem futile if partners remain stoic. Downstream, reduced perceived (and actual) responsiveness has been shown to undermine intimacy and closeness (Reis & Clark, 2013; Reis & Shaver, 1988).

To test hypotheses, couples first privately watched a sad film. After the video participants were told that they would discuss their emotional reactions to the film with their romantic partner (i.e., the same scenario participants mentally simulated in Experiment 1). One participant (the regulator) was instructed to suppress or express his or her facial and bodily displays of emotion, while his or her partner (the target) was given no instructions. Both members of the couple then prepared thoughts in anticipation of the conversation. Couples then engaged in videotaped conversations followed by a behavioral measure of intimacy. Cardiovascular and neuroendocrine responses were recorded throughout the experiment.

Suppressors (vs. expressers) were expected to appraise the situation as more threatening and exhibit physiological responses diagnostic of the experience of threat. Suppressive regulators were also expected to be less responsive (as measured via behavioral coding), report more negative attributions of the conversation, and perceive their partners as less responsive.

Suppression targets (vs. expression targets) were hypothesized to exhibit the same general pattern of cognitive, physiological, and behavioral responses as suppressive regulators: Threat appraisals, physiological threat responses, reduced responsiveness behavior, negative attributions, and negative perceptions of partner responsiveness.

After the conversation, dyads in which one person suppressed his or her affective displays were predicted to display less physical intimacy as measured with a novel hand-touching task.

### Method

**Sample size estimation.** An a priori power analysis was used to estimate the number of participants needed to test hypotheses. Effect sizes were culled from emotion suppression studies that included physiological measures and which were available at the time of study design to obtain an effect size estimate (Butler et al., 2003, 2006; Mendes et al., 2003). Using an averaged effect size from these studies ($d = .53$) and a target power level of .80, a minimum of 45 regulators and targets were required at each level of the emotion regulation condition (minimum total $N = 180$ participants in 90 dyads).

**Participants.** There were 180 participants in 90 dyads who completed this study, however, after data collection two dyads reported to the lab that they were not actually involved in a romantic relationship and were excluded from analyses, resulting in a final sample 176 participants (93 women; 86 White, 57 Asian, 13 Hispanic, 8 Black, and 12 mixed/other; $M_{age} = 20.63$, $SD = 2.56$, 18–38) in 88 dyads (83 heterosexual dyads; relationship length: $M = 14.71$ months, $SD = 13.5$, 3–76).

Participants were recruited via an online study pool (SONA) and flyers posted in the area and instructed not to exercise or consume foods with live cultures for 2-hr before the scheduled study session. Participants were prescreened and excluded for physician diagnosed hypertension, the presence of a cardiac pacemaker, medications with cardiac side effects, consuming caffeine or dairy products within 2 hr of participating, and pregnancy/breast-feeding. These factors have been associated with perturbations in the cardiovascular system and the diurnal rhythm of cortisol or interfere with immunoassay (e.g., Blascovich, Vanman, Mendes, & Dickerson, 2011). Participants were compensated $10 or 2-hr of course credit for their participation.

**Procedure.** Couples were escorted to individual, private testing rooms where they provided consent and completed intake questionnaires. Participants then provided a baseline saliva sample (1 ml, T0). The experimenter then affixed physiological sensors and participants relaxed for a 5-min autonomic baseline recording. After baseline measures, participants remained in their private testing rooms and watched an 11-min film clip from a documentary about World War II that originally aired on the BBC, "*Hiroshima: BBC History of World War II*" (from Minutes 46:54 to 57:54), to induce negative affect. Similar videos have been used previously in dyadic emotion regulation paradigms for this purpose (see Butler et al., 2003, 2006; Peters et al., 2014).

Adapting a standardized paradigm from the dyadic emotion regulation literature (Ben-Naim et al., 2013; Butler et al., 2003, 2006; Peters et al., 2014), participants were instructed they would soon discuss their emotional reactions to the video with their romantic partner. One member of the couple (the regulator) was randomly assigned to receive emotion regulation instructions. Sex and Role were counterbalanced across dyads. Instructions paralleled those presented in Experiment 1, with minor modifications. Regulators were instructed to talk about their feelings regarding the video, but to either express or suppress displays of affect. Targets, unlike in Experiment 1 where they were explicitly told the emotion regulation strategy of their partner, remained unaware of the manipulation delivered to the regulators. Targets were simply told to discuss emotional reactions to the video (please refer to the Supplemental Material for complete manipulation instructions).

After receiving interaction instructions, regulators and targets remained in their private testing rooms for a preparation period during which they were given 3-min to "gather their thoughts" and prepare for the conversation. After the preparatory period, a set of double doors that separated the two private testing rooms was opened to create one, large dyad room. Couples interacted for 5-min, after which time the experimenters returned and closed the doors to separate participants. Participants then provided a second saliva sample (T1), ~15–20 min after conversation instructions (i.e., stress onset).

After providing the second saliva sample, experimenters opened the doors and participants performed the behavioral intimacy task. This task was presented as an American Sign Language (ASL) communication game (Koslov, 2010; Stern & West, 2014). After the 5-min intimacy task, doors were again closed to separate couples while they completed posttask questionnaires. The final saliva sample (T2) was taken and timed to be 20-min after the second sample. Please refer to Figure 1 in the Supplemental Material for a visual depiction of study procedures.

**Physiological measures.**

***Cardiovascular.*** The following signals were collected at baseline and during the conversation: electrocardiography (ECG), impedance cardiography (ICG), and blood pressure (BP). ECG and ICG signals were collected at 1000 Hz, and integrated with a MP150 system (Biopac Systems Inc., Goleta, CA). ECG sensors were placed in a Lead II configuration. Noninvasive cardiac output hardware (NICO100C, Biopac Systems, Inc.) with band sensors was used to measure impedance magnitude (Zo) and its derivative (dZ/dt). This hardware has been validated for the assessment of the cardiovascular signals targeted here (e.g., Braun, Schnabel, Rauwolf, Schulze, & Strasser, 2005). Two band sensors were affixed at the base of participants' necks and on their torso just below the sternum to measure impedance cardiography.

BP readings were obtained using a Colin7000 ambulatory medical system (Colin Medical Instruments, San Antonio, TX). Cuffs were placed on participants' nondominant arm to measure pressure derived from the brachial artery. Recordings were taken at 2-min intervals during each epoch (baseline, preparation, and conversation), and initiated from a separate control room. The BP system recorded systolic and diastolic pressure (SBP and DBP), and mean arterial pressure (MAP). This system and method has been used frequently in the social psychophysiological literature (e.g., Cushman, Gray, Gaffey, & Mendes, 2012; Jamieson et al., 2012, 2014; Kassam, Koslov, & Mendes, 2009; Peters et al., 2014).

ECG and ICG signals were scored offline by trained personnel. First, signals were visually examined for artifacts, and ensemble averages were analyzed using Mindware software (IMP v3.0.21; Mindware Technologies, Gahanna, OH). One-minute segment times were analyzed. Software calculated B-points in the dZ/dt wave (opening of aortic valve) using the maximum slope change method. Q-Points in the ECG wave (start of left ventricle contraction) were also computed using the maximum slope method. R-Points in the ECG wave (left ventricle contraction) were also detected by Mindware software. Trained coders blind to condition assignment visually examined all B, Q, and R points and corrected erroneous placements when necessary (<3% of points).

As is standard in laboratory paradigms examining cardiovascular responses to stressful social situations, physiological reactivity scores were computed by subtracting scores taken during the last minute of baseline (i.e., the most relaxed period) from those collected during the first minute of target tasks (i.e., the most reactive period; see Llabre, Spitzer, Saab, Ironson, & Schneiderman, 1991, for psychometric justification on the use of change scores in psychophysiology; see Blascovich, Mendes, Hunter, & Salomon, 1999; Jamieson, Koslov, et al., 2013; Jamieson, Mendes, & Nock, 2013; Jamieson et al., 2012; Mendes, Blascovich, Lickel, & Hunter, 2002; Mendes et al., 2008; Peters et al., 2014; Yeager, Lee, & Jamieson, in press, for examples using this specific approach in BPS research). Raw baseline scores were also tested for condition differences that could interfere with reactivity analyses.

Analyses focused on pre-ejection period (PEP)—a measure of sympathetic arousal—and two measures that, in conjunction, allow distinction between approach-motivated challenge and avoidance-motivated threat states: Stroke Volume (SV) and total peripheral resistance (TPR).

PEP indexes the contractile force of the heart by measuring the time from the initiation of left ventricle contraction to aortic valve opening. Greater sympathetic activation is indicated by shorter PEP intervals.

SV is the amount of blood ejected from the heart during each beat. SV was calculated using the Kubicek method. An increase in SV indicates improved cardiac efficiency and is typically observed in challenge states, whereas a decrease or little change in SV is suggestive of threat. We assessed cardiac efficiency with SV rather than with the more common metric of cardiac output (CO) [CO = SV * HR] because of the possibility for sympathetic arousal effects driving CO effects. For instance, if the regulator role was more demanding than the target role, this could produce differences in PEP scores. If so, CO could increase because arousal increases. Thus, we opted to assess beat-to-beat cardiac efficiency (for another example of this approach see (Yeager et al., in press). In fact, SV may more directly indicate challenge/threat relative to CO because: (a) HR contributes little to the differentiation of challenge/threat, and (b) HR is affected by a complex interaction of neural, sympathetic, parasympathetic, and endocrine processes (e.g., Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001). Thus, observed effects in SV were not because of preload or afterload effects.

TPR is a measure of overall vascular resistance. When threatened, vascular resistance increases, limiting blood flow to the periphery and producing high TPR scores. On the other hand, vasodilation (i.e., reduced TPR) accompanies challenge states so as to facilitate delivery of oxygenated blood to the brain and periphery. TPR was calculated with the following validated formula: TPR = (mean arterial pressure/CO) * 80 (Sherwood et al., 1990).

***Neuroendocrine.*** To measure HPA activation, we assessed cortisol levels using three 1-ml saliva samples. Baseline samples (T0) were collected when participants arrived for the study after an acclimation period. A postconversation sample (T1) was taken after the dyadic conversation task and timed to occur 15–20 min after the initial description of the task (i.e., stress onset). A third, recovery sample (T2) was then taken 20-min after T1. All sessions were scheduled between 11:00 a.m. and 7:00 p.m., and time since waking was included in all analyses.

Samples were collected with IBL SaliCap sampling devices, which require participants to expectorate 1 ml of saliva into a cryovial via a plastic straw. Participants were allowed a maximum of 7-min to provide samples. If they had not provided 1 ml of saliva after 7-min, the experimenter collected the sample and continued on with the study.

Saliva samples were stored immediately after collection at −30 °C until they were shipped overnight on dry ice to a laboratory in Brandeis, MA, where they were assayed for salivary-free cortisol using commercial immunoassays kits (IBL-Hamburg, Germany). Intra- and interassay coefficients of variance were less than 10%.

**Self-report measures.**

***Manipulation checks.*** After the conversation, participants completed partner attribution measures to assess perceptions of their partners' emotion regulation strategies. Participants rated the extent to which their partners made eye contact, communicated emotions using different hand positions and movements, expressed emotion, and would make an excellent communicator on 9-point scales (−4 = *strongly disagree*, 0 = *neither agree nor disagree*, 4 = *strongly agree*). These four items were summed to form a partner attribution composite ($\alpha$ = .723). Higher scores reflected more expressive affective displays.

Participants also rated the extent to which they held back their own emotions, the intensity of the conversation, how uncomfortable the interaction was, and how difficult the conversation was on 9-point scales (−4 = *strongly disagree*, 4 = *strongly agree*). These four items were averaged to form an interaction attribution composite ($\alpha$ = .627). Higher values represented more negative attributions of the conversation.

***Stress appraisals.*** As in Experiment 1, participants completed two items assessing challenge and threat appraisals and a threat/challenge ratio was analyzed.

***Perceived Partner Responsiveness (PPR).*** Perceived partner responsiveness was measured using the same scale described in Experiment 1 but modified to refer to the conversation participants had just completed. The composite was reliable: $\alpha$ = *.957*.

**Responsiveness behavior.** Two coders blind to condition assignment and hypotheses independently rated the responsiveness behaviors of regulators and targets during the conservation in 30-s epochs. Responsiveness (i.e., understanding, validating, and caring) was rated using a coding scheme modeled after that used previously (see Maisel, Gable, & Strachman, 2008). Full coding schemes and instructions are presented in the online Supplemental Material.

Specifically, coders rated the extent to which participants "understood their partner" (e.g., demonstrated comprehension, clarified partner's thoughts and feelings, listened attentively), "validated their partner" (e.g., agreed with partner, acknowledged partner's thoughts and feelings, expressed respect), and "demonstrated caring" (e.g., expressed warmth, conveyed support, emphasized the relationship, and conveyed shared experience) on 7-point scales (1 = *low*, 4 = *moderate*, 7 = *high*). As is standard with research using this coding scheme, understanding, validating, and caring codes were combined (intraclass correlations: understanding = .79, validating = .93, caring = .95) to create a responsiveness composite ($\alpha$ = .649).

**Physical intimacy.** Couples were instructed they would play a touch-based communication game in which they were to use American Sign Language (ASL) to spell three-letter words. Participants sat at a table facing each other and were each given an ASL alphabet guide. On the table was a box with holes in each side. Participants placed their dominant hands in the box. The regulator from the conversation task was assigned to role of "signer" and was given a list of three letter words to sign (e.g., *sky*, *big*). The signer spelled out a word with his or her dominant hand inside the box out of view (note: signers were instructed to continue to express/suppress affective displays). The target from the conversation task was assigned to the role of "guesser," and had to feel the hand of his or her romantic partner to determine what letters he or she formed. Signers verbally indicated whether guesses were correct or not. The task continued for 5-min after which time the experimenter returned (see Koslov, 2010; Stern & West, 2014, for a similar task).

Touching the skin causes substantial electrical interference in the impedance cardiography (ICG) signal, clearly distinct from noise associated with movement artifacts. Thus, we were able to quantify the amount of time couples touched each other's hands in the box by recording the cumulative amount of signal interference. To do so, two trained coders blind to condition assignment scored interference in the ICG signal ($\alpha$ = .969) in AcqKnowledge software (v4.2). The primary dependent measure was the total amount of time couples spent touching one another's hands across the 5-min communication game.

## Results

**Data analysis plan.** To account for statistical dependence inherent in dyadic data, we followed guidelines established by Kenny, Kashy, and Cook (2006) and analyzed dyadic models using the MIXED procedure in SPSS 22 where dyads were distinguished by sex (same-sex couples members were randomly assigned to member 1 or 2). We tested for relations between Condition and Role by regressing scores on (a) a contrast code that indexed Condition (−1 = suppression, 1 = expression), (b) a contrast code that indexed whether participants were a regulator or a target of emotion regulation (−1 regulator, 1 = target), and (c) the Condition × Role interaction, which tested whether the predicted Condition effects varied as a function of Role. For significant Condition × Role interactions, simple slopes were calculated with the effects of Condition reported separately for each Role.

As in Experiment 1 main effects of Role were reported but not discussed. Because of sex differences in cognitive and physiological responses (Hyde, Fennema, Ryan, Frost, & Hopp, 1990;

Kirschbaum, Kudielka, Gaab, Schommer, & Hellhammer, 1999; Neff & Karney, 2005; Quigley, Barrett, & Weinstein, 2002; Ratliff-Crain & Baum, 1990; Taylor et al., 2000), models planned a priori also included the main effect of sex and its interactions. However, no notable sex differences were observed in analyses and are not discussed further.

**Cardiovascular reactivity.** We observed no baseline differences as a function of Condition. See Table 2 for a summary of reactivity scores (all raw means and *SD*s are presented in Table 1 in the Supplemental Material).

***Cardiovascular reactivity: Anticipation of conversation.***

*Pre-ejected period (PEP).* As expected, all participants exhibited sympathetic arousal (PEP reactivity $<0$) in anticipation of the conversation relative to baseline ($M = -2.77$, $SD = 6.20$, 95% CI [$-3.71$, $-1.84$]), $t(172) = -5.88$, $p < .001$, $r = .41$. However, no significant differences were observed for anticipatory PEP reactivity scores as a function of Condition, Role, or their interaction, $p$s $> .17$, $r$s $< .15$.

*Stroke Volume (SV).* No effects of Condition, Role, or their interaction were observed, nor did reactivity scores differ significantly from baseline, $p$s $> .46$, $r$s $< .08$.

*Total peripheral resistance (TPR).* A main effect of Role was observed, $B = -21.19$, $t = -2.09$, $p = .040$, $r = .22$, 95% CI [$-41.33$, $-1.04$], which was qualified by a marginal Condition × Role interaction, $B = 19.68$ $t = 1.94$, $p = .055$, $r = .21$, 95% CI [$-0.47$, 39.83] (see Figure 2). Regulators who anticipated suppressing their affective displays exhibited increases in vascular resistance compared with regulators in the expression condition, $B = -34.91$, $t = -2.39$, $p = .018$, $r = .19$, 95% CI [$-63.75$, $-6.08$]. However, the emotion regulation manipulation had no significant effect on targets during anticipation ($p = .761$, $r = .02$) as they had yet to interact with regulators and were unaware of Condition instructions.

***Cardiovascular reactivity: Conversation.***

*Pre-ejected period (PEP).* Similar to conversation anticipation, all participants exhibited increased sympathetic activation during the conversation relative to baseline, $t(172) = -11.73$, $p < .001$, $r = .67$, 95% CI [$-8.37$, $-5.96$]. Analyses also revealed a marginal effect of Role, $B = 1.13$, $t = 1.89$, $p = .063$, $r = .20$, 95% CI [$-.06$, 2.32]. Regulators exhibited marginally lower PEP reactivity scores (i.e., more arousal) than targets (see Figure 3a).

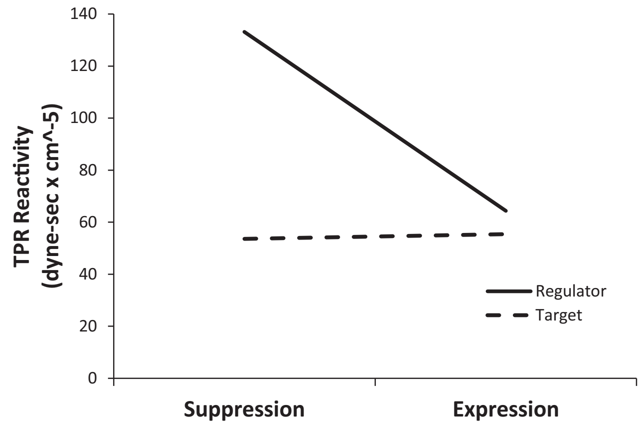


*Figure 2.* Total peripheral resistance (TPR) reactivity for participants during the preparation period by Condition (suppression vs. expression) and Role (regulator vs. target) in Experiment 2.

Table 2
*Means and SDs for Autonomic Reactivity Measures in Experiment 2 as a Function of Condition and Role*

| Measure | Preparation *M* | Preparation *SD* | Conversation *M* | Conversation *SD* |
|---|---|---|---|---|
| Pre-ejection period (PEP) | | | | |
| Suppressor | −3.70 | 5.34 | −9.76 | 9.04 |
| Expresser | −3.11 | 6.42 | −6.89 | 6.24 |
| Suppression target | −2.20 | 5.71 | −5.85 | 8.80 |
| Expression target | −2.07 | 7.12 | −6.22 | 7.62 |
| Stroke Volume (SV) | | | | |
| Suppressor | −.61 | 10.11 | −1.98 | 14.46 |
| Expresser | −.59 | 9.62 | −3.49 | 14.97 |
| Suppression target | −.95 | 8.60 | −9.02 | 12.34 |
| Expression target | .69 | 8.80 | −3.50 | 10.09 |
| Total peripheral resistance (TPR) | | | | |
| Suppressor | 133.44 | 151.79 | 159.96 | 165.34 |
| Expresser | 63.25 | 135.94 | 100.72 | 134.85 |
| Suppression target | 52.75 | 107.34 | 176.24 | 126.21 |
| Expression target | 60.44 | 130.93 | 126.30 | 147.62 |

*Stroke Volume (SV).* Analyses revealed a main effect of Role, $B = -1.93$, $t = -2.32$, $p = .023$, $r = .25$, 95% CI [$-3.59$, $-.27$], which was qualified by a Condition × Role interaction, $B = 1.74$, $t = 2.09$, $p = .040$, $r = .22$, 95% CI [.08, 3.40] (see Figure 3b). Although suppressors did not differ from expressers ($p = .723$), suppression targets ejected less blood per beat compared with expression targets, $B = 2.97$, $t = 2.11$, $p = .037$, $r = .17$, 95% CI [.19, 5.77].

*Total peripheral resistance (TPR).* Supporting hypotheses, the predicted main effect of Condition indicated dyads in the suppression condition (i.e., both regulators *and* targets) exhibited more vascular resistance during the conversation compared with dyads assigned to the expression condition, $B = -27.97$, $t = -2.30$, $p = .024$, $r = .25$, 95% CI [$-52.19$, $-3.75$] (see Figure 3c).

**Neuroendocrine reactivity.** No baseline differences in raw cortisol levels were observed as a function of condition assignment ($p > .417$, $r = .10$). Analyses of reactivity scores (that included time as a within-subjects variable—T1 reactivity vs. T2 reactivity—and time since waking as a covariate) revealed a main effect of Condition (see Figure 4 for graphical depiction of raw means).[2] Dyads assigned to the suppression condition (i.e., both suppressors and suppression targets) exhibited higher cortisol reactivity scores compared with dyads assigned to the expression condition, $B = -1.50$, $t = -2.90$, $p = .004$, $r = .23$, 95% CI [$-2.53$, $-.48$]. We also observed a significant effect for Role, $B = .72$, $t = 2.38$, $p = .019$, $r = .21$, 95% CI [.12, 1.33]. Targets exhibited higher cortisol reactivity than regulators.

The neuroendocrine data correspond nicely to the cardiovascular data: Suppressors and suppression targets experienced physio-

[2] Because of the potential for common method biases across questionnaire, self-reported data were reanalyzed applying a Bonferroni correction with a new critical α of $p = .0125$. Using this correction, two effects would no longer reach statistical significance: (a) The Condition × Role interaction for partner appraisals, and (b) the main effect of Condition on self-reported PPR.

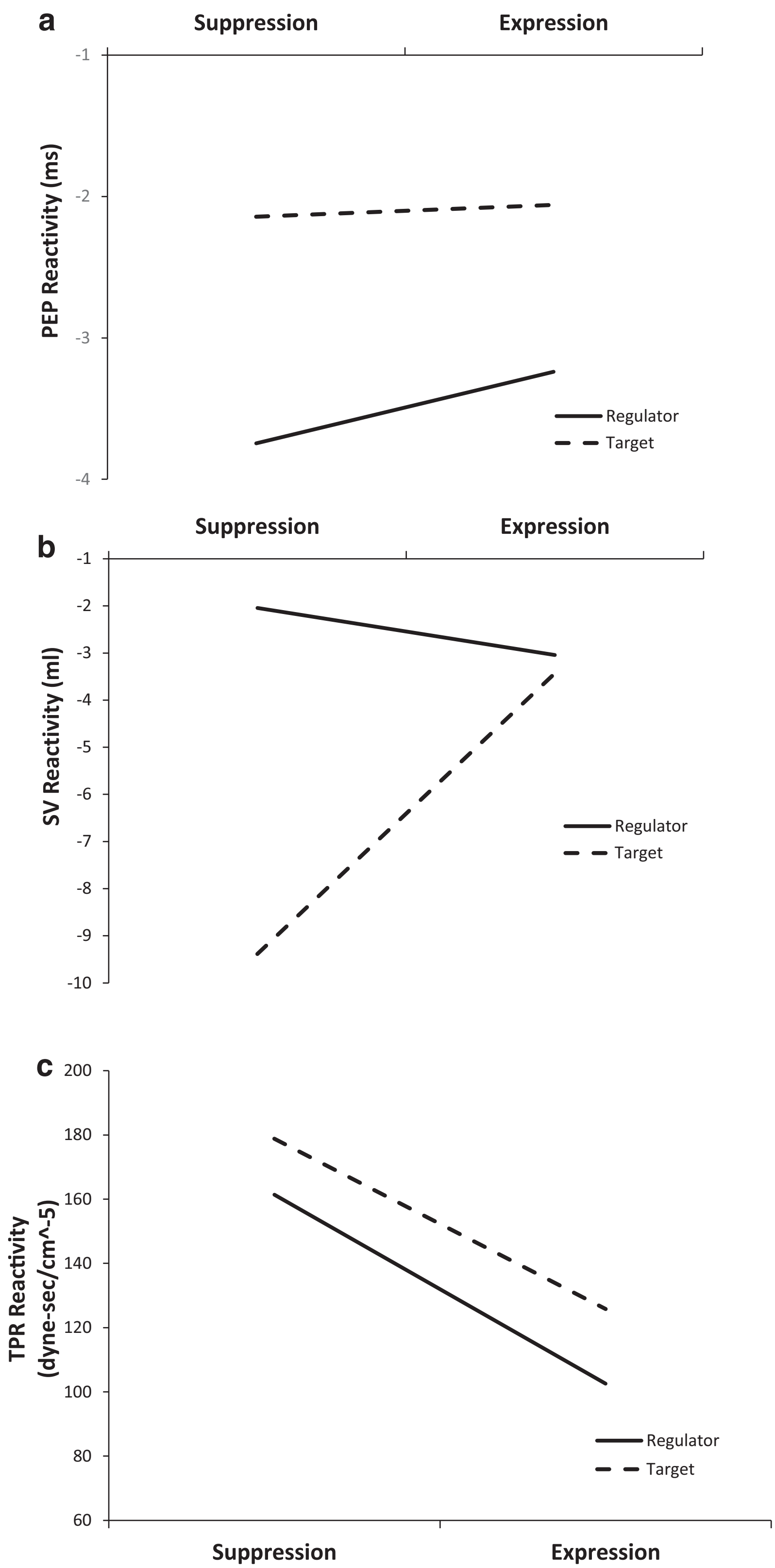


*Figure 3.* Cardiovascular reactivity during the conversation in Experiment 2 as a function of Condition and Role. PEP = pre-ejection period; SV = stroke volume; TPR = total peripheral resistance. Panel a: PEP; Panel b: SV; Panel c: TPR.

logical responses suggestive of the experience of threat relative to expressers and expression targets.

**Self-reports.** Please refer to Table 3 for all means and *SD*s.[3]

***Manipulation checks.*** Couples assigned to the suppression condition reported their *partners* engaging in more expressive suppression regulation strategies, regardless of role, than did couples in the expression condition, $B = .30$, $t = 2.73$, $p = .008$, $r = .28$, 95% CI [.08, .51]. In addition, we observed a marginally significant Condition × Role interaction, $B = .16$, $t = 1.67$, $p = .099$, $r = .18$, 95% CI [−.03, .35]. Whereas suppressors did not differ significantly from expressers in their partner-reports of suppression ($p = .479$ $r = .08$), suppression targets reported their partners engaging in more suppression than did expression targets, $B = .46$, $t = 3.15$, $p = .002$, $r = .24$, 95% CI [.17, .74].

We also observed a Condition × Role interaction for conversation attributions, $B = .33$, $t = 3.10$, $p = .003$, $r = .32$, 95% CI [.12, .55]. Suppressors perceived the conversation more negatively than expressers, $B = -.57$, $t = -3.35$, $p = .001$, $r = .26$, 95% CI [−.91, −.23], whereas suppression targets did not differ significantly from expression targets ($p = .572$).

***Stress appraisals.*** Analysis of threat/challenge appraisals revealed a marginal main effect of Role, $B = .07$, $t = 1.93$, $p = .056$, $r = .20$, 95% CI [−0.00, 0.15], such that targets appraised relatively more threat to challenge than regulators.

***Perceived Partner Responsiveness (PPR).*** A main effect of Condition for PPR indicated couples (i.e., regulators *and* targets) assigned to the suppression condition perceived their partners as less responsive than couples assigned to the expression condition, $B = .21$, $t = 2.17$, $p = .033$, $r = .23$, 95% CI [.02, .40].

**Responsiveness behavior.** Analyses of responsiveness behavior revealed a Condition × Role interaction, $B = -.04$, $t = -2.28$, $p = .026$, $r = .25$, 95% CI [−.08, −.01] (see Figure 5). Suppressors were scored as being less responsive than expressers, $B = .09$, $t = 2.73$, $p = .007$, $r = .22$, 95% CI [.02, .15], whereas assessments of suppression targets' behavior did not differ significantly from expression targets ($p = .929$, $r = .01$).

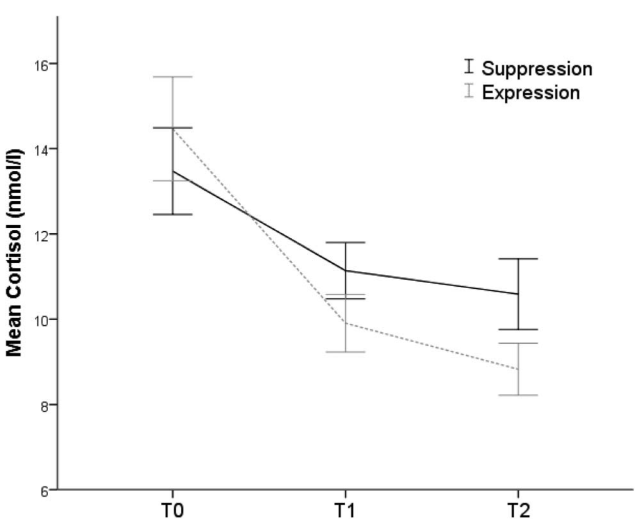


*Figure 4.* Raw cortisol means from Experiment 2 as a function of Time and Condition. T0 = baseline, T1 = postconversation (~15–20-min after stress onset), T2 = end of study (20-min after T1).

Table 3
*Means and SDs for Self-Reports in Experiment 2 as a Function of Condition and Role*

| | Emotion regulation condition | | | |
|---|---|---|---|---|
| | Suppression | | Expression | |
| Self-report measures | *M* | *SD* | *M* | *SD* |
| Partner attribution composite | R: 1.89 | 1.58 | R: 2.11 | 1.40 |
| | T: 1.70 | 1.40 | T: 2.62 | 1.00 |
| Interaction attribution composite | R: .08 | 1.40 | R: −1.00 | 1.56 |
| | T: −.86 | 1.77 | T: −.67 | 1.64 |
| Stress appraisals | R: .47 | .44 | R: .44 | .26 |
| | T: .74 | .95 | T: .50 | .39 |
| Perceived partner responsiveness (PPR) | R: 5.43 | 1.36 | R: 5.95 | .93 |
| | T: 5.43 | 1.08 | T: 5.83 | 1.06 |

*Note.* R = regulator; T = target.

**Intimacy behavior.** The amount of time couples spent touching each other could not vary within dyads—signal interference necessarily appeared in both members. Thus, the dyad was used as the unit of analysis in touch task analyses. An analysis of covariance (ANCOVA) with Condition as a between subjects' factor and prior ASL experience as the covariate were used to assess whether dyads in the suppression condition touched less than dyads in the expression condition.

Results supported hypotheses. Dyads assigned to the suppression condition touched for less time ($M = 137.08$ s, $SD = 57.21$, 95% CI [115.38, 155.74]) than couples assigned to the expression condition ($M = 169.33$ s, $SD = 62.24$, 95% CI [151.60, 189.81]), $F(1, 71) = 6.29$, $p = .014$, $r = .29$.[4]

## Discussion

Experiment 2 provided a multimethod examination of response-focused emotion regulation processes in romantic couples. There were several findings to note. First, the BPS-derived physiological measures assessed motivationally tuned affective processes in regulators *and* their partners (targets) in anticipation of and during interactions. Consistent with predictions, in anticipation of the conversation suppressors were more threatened—sympathetic arousal coupled with increased vascular resistance—compared with expressers. Then, during the conversation suppressors *and*

[3] As depicted in Figure 5, raw cortisol levels declined throughout the study, $B = -2.19$, $SE = 0.51$, $t = -4.33$, $p < .001$, $r = .29$, 95% CI [−3.18, −1.19]. Although this is pattern is consistent with diurnal declines in cortisol (e.g., Hucklebridge, Hussain, Evans, & Clow, 2005), social stress paradigms typically produce an increase in cortisol levels pre- to posttask (Dickerson & Kemeny, 2004). However, the decline observed here might have been associated with the longer-than-usual delay between T0 (baseline) and T1 (posttask) that resulted from affixing autonomic sensors and recording an autonomic baseline.

[4] Because touching hands was required to perform the task, touch time could potentially reflect effort rather than feelings of closeness. To help rule out this possibility, an exploratory analysis found no significant effect of condition on participants' reports of how much effort they exerted during the game, $F(1, 71) = 0.80$, $p = .373$, $r = .11$. Additionally, adding couple-averaged and target ratings of effort on the touch task as a covariate had no impact on findings: The main effect of emotion regulation condition remained significant in each, $F(1, 70) = 6.02$, $p = .017$, $r = .28$, and $F(1, 69) = 5.63$, $p = .020$, $r = .27$, respectively.

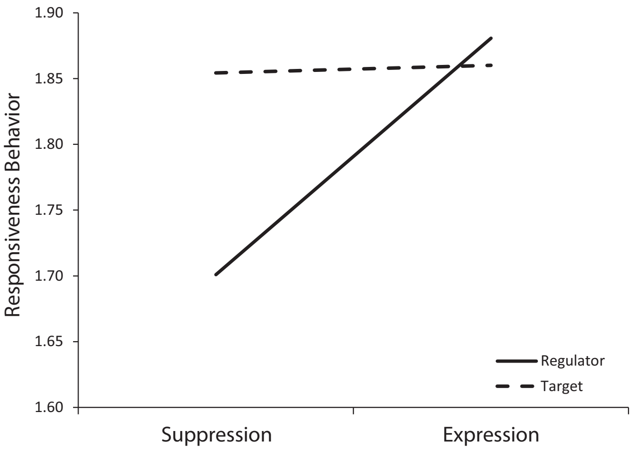


*Figure 5.* Observer ratings of participants' responsiveness during the conversation in Experiment 2 by Condition and Role.

suppression targets exhibited elevated threat responses compared with expressers or expression targets. Cardiovascular effects were corroborated by neuroendocrine findings. Suppressors and suppression targets exhibited higher cortisol levels compared with expressers and expression targets. Downstream, this pattern of reactivity can have important implications for relationships processes and health (e.g., Ditzen, Hoppmann, & Klumb, 2008; Loving, Crockett, & Paxson, 2009; Powers, Pietromonaco, Gunlicks, & Sayer, 2006).

Self-reported data also provided insight into potential downstream effects. Overall, expressive suppression had negative effects for relationship processes/outcomes. Suppressors believed the conversation did not go as well compared with other groups, and suppression targets appraised their partners more negatively than did expression targets. More important, suppressors *and* suppression targets indicated their partners were less responsive than expressers and expression targets. These findings are highly relevant for close relationships, as research emphasizes the centrality of responsiveness in intimacy and relationship health (Clark, Lemay, Graham, Pataki, & Finkel, 2010; Reis, Clark, & Holmes, 2004; Reis & Shaver, 1988). The partner responsiveness reports are also interesting in light of responsiveness behavior data: Only suppressors were identified as being less responsive compared with expression targets and suppression targets. Thus, engaging in expressive suppression might disrupt attention, particularly inhibition or response monitoring processes (e.g., Ochsner & Gross, 2008; Ochsner, Silvers, & Buhle, 2012), which could then lead to reduced perceptions of responsiveness in partners even if partners are actually being responsive. In other words, efforts required to engage in suppression could undermine the perception of responsiveness in others.

Finally, we observed effects of emotion regulation on intimacy behavior. Specifically, we surreptitiously measured how long couples touched hands during a communication game. When one partner was instructed to suppress affective displays, this led to less touching between couples. Given problems of reactivity, norm adherence, and the lack of specificity inherent in self-reports (Stone et al., 2000), obtaining implicit measures of intimacy can benefit relationships research. For instance, researchers have assessed other behavioral indices of intimacy such as seating distance (Tomlinson, Aron, Carmichael, Reis, & Holmes, 2014). The touch task presented here provides another measure for assessing intimacy that has relevance for a common relationship practice: hand holding.

## General Discussion

The two experiments reported here examined response-focused emotion regulation processes in close relationships and were motivated by two questions: What are people's beliefs surrounding response-focused emotion regulation in relationships? And what is the impact of response-focused emotion regulation on regulators *and* their romantic partners? We suspected couples might have difficulties simulating relationship effects of suppressing affective displays from the perspective of the target (i.e., the person interacting with a suppressor). Experiment 1 assessed *beliefs* about emotion regulation and Experiment 2 examined the dyadic effects of response-focused regulation in vivo.

Consistent with hypotheses, Experiment 1 indicated regulators asked to simulate emotion suppression believed withholding affective displays would lead to worse interactions and cause their partners to be less responsive to them compared with regulators asked to simulate expressing emotion. However, suppression targets did not expect negative outcomes compared with expression targets. That is, individuals did not believe they would experience any negative effects if one's partner engaged in expressive suppression.

Experiment 2 suggested prospective beliefs outlined in Experiment 1 might be inaccurate. More important, the scenarios participants experienced in Experiment 2 were as similar as possible to the simulated scenarios from Experiment 1—both studies included a *shared emotional experience* (viewing a film) and a discussion of that experience. To inform hypotheses, we relied on the BPS model of challenge and threat because of the advantages it provides in using physiological responses to delineate motivational processes during demanding social situations (e.g., Jamieson, Koslov, et al., 2013; Jamieson et al., 2014; Mendes et al., 2008). Exploring motivationally tuned physiological responses is paramount for understanding downstream behavior and health outcomes. For example, imagine during an emotional interaction your romantic partner "holds back" his or her affective displays. You (the target) could respond with approach-motivated actions such as probing your partner with questions or making accusatory statements. Alternatively, you could be avoidant and suppress *your* affective displays or cut the conversation short. It is not hard to envision any of the above reactions producing negative outcomes, but the processes through which relationships are affected are very different for the approach and avoidance motivated actions. Without a clear understanding of these mechanisms, implementing methods to improve relationships is limited.

Supporting predictions, and consistent with prior unacquainted dyad research (Peters et al., 2014), engaging in *or* being the target of expressive suppression elicited physiological responses consistent with the experience of avoidance-motivated threat (sympathetic arousal, vascular resistance, and higher cortisol levels). Broadly, threat responses have been linked to negative health processes such as poor decision making in the short-term, and accelerated cognitive decline with age and cardiovascular disease over the long haul (e.g., Jefferson et al., 2010; Kassam, Koslov, & Mendes, 2009; Matthews, Gump, Block, & Allen, 1997).

Specific to relationship outcomes, threat responses are accompanied by avoidance behaviors, which can harm the quality of romantic relationships. This notion is supported by the responsiveness and physical touch data from Experiment 2: Couples in which one person suppressed affective displays reported that their partners were less responsive than expressive dyads, and suppressive regulators exhibited fewer responsiveness *behaviors* (a core component of intimacy) relative to others. Moreover, suppressive dyads engaged in less behavioral intimacy compared with expressive dyads as measured via the novel touch-task in a nonconversation context. Although one limitation of this study was a lack of longitudinal data, the combined physiological and behavioral data suggest potential mechanisms that might undergird observed long-term negative effects of expressive suppression in close relationships (e.g.,Impett et al., 2012).

The anticipatory effects observed in Experiment 2 should also not be overlooked. *Expecting* to suppress affective displays during an upcoming interaction with one's romantic partner produced physiological threat responses before the conversation (and hence suppressive behavior) had even begun. These anticipatory effects indicate that the experience of threat stemming from emotion suppression does not arise only from *enacting* suppression, but may also be driven by *expectations* regarding suppression. However, relatively little is known about the causes or consequences of anticipatory threat when expecting to suppress emotions during interactions with significant others. Couples' expectations regarding their partners' attachment behaviors could emerge as root causes of anticipatory challenge/threat responses (e.g., Mikulincer & Shaver, 2005).

Similarly, targets' perceptions of emotional regulators likely vary as a function of attachment style (Ben-Naim et al., 2013; Mikulincer & Shaver, 2008). Specifically, attachment theory indicates that individuals high in anxiety are vigilant for affective cues relevant for perceptions of responsiveness (e.g., Chris Fraley, Niedenthal, Marks, Brumbaugh, & Vicary, 2006). Thus, instructing regulators to suppress displays of affect should have a profound effect on anxiously attached partners' responsiveness perceptions. Likewise, regulators in a romantic relationship with an anxious partner may be aware of their partner's need for reassurance and thus experience aversive responses in anticipation of having to hide affective displays from their anxious partner (cf., Kane et al., 2007).

## Limitations and Future Directions

Although these data contribute to the dyadic emotion regulation literature in close relationships, limitations must be considered. First, to maximize experimental control and applicability to the emotion regulation literature, couples simulated (Experiment 1) and engaged in (Experiment 2) a nonrelationship focused discussion. The most relevant emotional interactions in relationship contexts, though, may be those in which partners discuss the relationship. For example, regulators may engage in suppression to mask negative partner evaluations (Lemay et al., 2013). In this case, the suppressed negative affect is directly tied to the romantic partner, and withholding those negative displays might benefit relationship processes. However, more long-term, emotion suppression in day-to-day interactions accumulate to produce negative consequences for regulators *and* targets (Impett et al., 2012, 2014). Additional research into suppression in relationship contexts will help clarify when suppression is best used.

Related to the above, suppression of different *types* of affective displays likely has different consequences. Here, couples watched and discussed a sad film. Sadness is a low-arousal, negative-valence affective state. We chose this induction because we were interested in examining sympathetic responses because of regulation. If we had used a high-arousal induction (e.g., anger, anxiety, and excitement), this could have obscured the source of arousal (i.e., regulatory situation or highly arousing film?). Similarly, we chose a negative affective state because we wanted to ensure hypothesized negative outcomes of suppression could not be attributed to withholding positive affective displays. Thus, this research does not argue that emotion suppression is universally negative. For example, minimizing displays of anger in relationship conflict scenarios may be beneficial (see Mikulincer & Shaver, 2005, for a review) or remaining flexible in regulation strategies positively predicts adjustment (Bonanno et al., 2004).

The experimental design used here could have led to alternative interpretations. Notably, *all* regulators were given explicit instructions. Similar to suppression, instructing participants to express affective displays might also require effort. Thus, the group-level emotion regulation comparisons may have *underestimated* effects of suppression. Along these lines, Robinson and Demaree (2009) found that exaggerating emotions during film viewing increased sympathetic arousal compared with expressive suppression. However, expression participants in this research were not instructed to exaggerate affective displays, and the data from Experiment 2 suggests this alternative is not likely: Expressive regulators exhibited a similar pattern of physiological reactivity during anticipation as targets who did not receive any instructions. On the other hand, suppressors exhibited increased vascular resistance, indicative of threat, compared with expressers in anticipation of the conversation (see Figure 2). Moreover, the manipulation instructions used here emphasized suppressing affective displays, thus allowing participants to discuss (expected) emotions. Being permitted to discuss (but not show) one's emotions could have contributed to why suppression targets in Experiment 1 did not expect negative outcomes. That is, suppression targets may have underestimated effects of withholding displays of affect because they (presumably) could rely on suppressors' verbal expressions to extract affective information.

## Conclusion

The two experiments reported here advance research on emotion regulation and close relationships in three primary ways. First, we demonstrate a disjunction between beliefs about and consequences of response-focused emotion regulation. This discrepancy may help explain why individuals in romantic relationships engage in expressive suppression when it has the potential to detrimentally impact relationship processes. Second, this research isolated motivationally tuned affective processes as a function of response-focused emotion regulation in regulators *and* targets during emotional interactions. Third, negative effects of suppressing affective displays manifested in a novel behavioral index of physical intimacy.

More broadly, the experiments presented here extend and replicate findings from the general dyadic emotion regulation literature. Notably, the correspondence between these findings and previous unacquainted dyadic regulation studies (e.g., Butler et al., 2006; Mendes et al., 2003; Peters et al., 2014) suggests that negative effects of expressive suppression in dyadic interactions is not buffered by, or limited to, close relationships.

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