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Does Expressing Emotions Enhance Perceptual Accuracy of Negative Emotions During Relationship Interactions?

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Partners' negative emotions communicate social information necessary for individuals to respond appropriately to important relational events. Yet, there is inconsistent evidence regarding whether partners' emotional expression enhances accurate perceptions of partners' emotions. The current studies make methodological and theoretical extensions to the extant literature by directly assessing whether partners' emotional expression during relationship interactions predicts 2 types of accuracy relevant to the theorized interpersonal functions of negative emotions: tracking accuracy and directional bias. In Studies 1 and 2, both members of recruited couples reported on their own negative emotions, disclosure of emotions, and perceptions of their partners' negative emotions during relationship interactions at the end of each day for 21 days. In Study 3, couples engaged in an emotionally relevant discussion in the laboratory. Participants immediately reviewed their discussions and rated their own negative emotions and perceptions of their partners' negative emotions within each 30-s segment of the discussion. Independent coders rated the degree to which each person expressed their emotions during the discussion. In all three studies, partners' greater emotional expression predicted perceivers more accurately tracking partners' negative emotions (greater tracking accuracy). High levels of partners' emotional expression also predicted perceivers overestimating partners' negative emotions (greater directional bias). This expression–perception pattern should support the interpersonal function of negative emotions by orienting perceivers to important emotional events that would be costly to overlook. The results, considered in the context of prior research, highlight the importance of matching methodological approaches with the theoretical processes under investigation.

Keywords: emotion perception, emotion expression, accuracy, bias, relationship interactions

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Prior research on perceptions of emotion has primarily focused on how perceivers judge the emotions of strangers, often with the target appearing in a posed photograph or film (e.g., Ekman et al., 1987; Yeh, Geangu, & Reid, 2016) or, more rarely, in a video-recording (Zaki, Bolger, & Ochsner, 2008). Yet, emotions most frequently occur (Berscheid & Ammazzalorso, 2001), and are most often disclosed and expressed (Rimé, 2009; Von Culin, Hirsch, & Clark, 2018), within close relationship interactions. Perceiving emotions are particularly important in close relationships because of the communicative function emotions serve. Hurt feelings signal the need for reconciliation, anger can convey to partners that undesirable behavior must change, and sadness and anxiety often elicits care and support (Clark & Brissette, 2000; Fischer & Manstead, 2008; Graham, Huang, Clark, & Helgeson, 2008; Hareli & Hess, 2012; Keltner & Haidt, 1999; Lemay, Overall, & Clark, 2012; Van Kleef, 2009, 2010). Thus, accurately perceiving these types of negative emotions is central to resolving interpersonal dilemmas and to responding to partners' needs, whereas failing to detect partners' negative emotions may exacerbate problems, limit responsiveness, and breed dissatisfaction (Clark & Brissette, 2000; Fletcher & Kerr, 2010; Howland, 2016;

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Overall, Fletcher, & Kenny, 2012; Overall, Girme, Lemay, & Hammond, 2014).

Recognizing the importance of accurately perceiving emotions within relationships, a surge of recent research has examined whether people can accurately detect their partners' (mostly negative) emotions (e.g., Clark, Von Culin, Clark-Polner, & Lemay, 2017; Dutra et al., 2014; Gadassi, Mor, & Rafaeli, 2011; Howland & Rafaeli, 2010; Kouros & Papp, 2019; Overall, Fletcher, Simpson, & Fillo, 2015; Papp, Kouros, & Cummings, 2010; Sanford, 2012; Sened, Yovel, Bar-Kalifa, Gadassi, & Rafaeli, 2017). As with the bulk of research examining perceptual accuracy in relationships (see Fletcher & Kerr, 2010), the primary focus of these prior studies involved how perceiver-related characteristics (e.g., attachment insecurity, depression) and processes (e.g., assumed similarity) influence perceptions of partners' emotions. Yet, to serve their interpersonal functions, negative emotions need to be sufficiently expressed to ensure perceivers accurately detect and, in turn, respond to negative emotions in appropriate ways (Clark, Fitness, & Brissette, 2001; Chervonsky & Hunt, 2017; Van Kleef, 2009, 2010). Indeed, an underlying theoretical assumption guiding investigations of the interpersonal effects of emotional expression is that expressing negative emotions elicits support and relationship maintenance efforts because individuals more accurately perceive and understand their partners' emotions (e.g., Aragón & Clark, 2018; Graham et al., 2008; Iida, Seidman, Shrout, Fujita, & Bolger, 2008; Lemay et al., 2012; Overall et al., 2014, 2015; Yoo, Clark, Lemay, Salovey, & Monin, 2011).

In sum, theoretical accounts specifying that negative emotions communicate social information necessary to sustain relationships rest on an interpersonal expression–perception process: expressing negative emotions facilitates partners' accurate perception of those emotions. Yet, remarkably, direct tests of whether emotional expression enhances perceptual accuracy in relationship interactions has been overlooked. Moreover, although some studies have provided indirect evidence by examining how target rather than perceiver characteristics shape accuracy (reviewed below), recent direct tests revealed null associations between partners' reports of having expressed emotions and perceivers' accuracy in judging those emotions (Clark et al., 2017). In the current studies, we address important methodological limitations of prior studies by repeatedly assessing the experience, expression and perception of negative emotions across couples' daily life and specific interactions. We also extend prior research by testing whether partners' emotional expression predicts two types of accuracy relevant to the theorized interpersonal functions of negative emotions: levels of accuracy in (a) tracking partners' negative emotions across days or moments of an interaction (tracking accuracy), and (b) perceiving the intensity of partners' negative emotions (directional bias).

Emotion Expression and Perceptual Accuracy

General models of interpersonal perception also include the proposition that perceptual accuracy should be determined by the degree to which relevant cues are expressed in interactions. Although focused on judgments of personality traits, Funder's (1995) realistic accuracy model highlights that the accuracy of judging others' personality depends on relevant verbal and nonverbal behavioral cues being available (i.e., expressed). Applying this insight to perceptions of emotions, Zaki et al. (2008) found that motivated perceivers were more accurate in judging strangers' emotions when targets reported a greater tendency to express emotions. Zaki et al. (2008) examined how perceptions of strangers who were video-recorded discussing negative and positive events varied as a function of targets' self-reported trait-level expressivity. Given the interpersonal function of negative emotions described above, this interpersonal expression–perception process should be more evident and substantial for perceptions and expression of emotions within actual relationship interactions.

The existing research within close relationships, however, provides inconsistent and contradictory evidence that greater expression or disclosure of emotions enhances accuracy. Some studies have provided indirect support. Thomas and Fletcher (2003) reported that couples were more accurate in inferring each other's thoughts and feelings during a conflict interaction when observers rated that the behavior expressed during that interaction provided greater cues to the targets' thoughts and feelings. Other research has provided (albeit mixed) evidence that dispositions theoretically linked to expression predict accuracy. Individuals tend to be more accurate in perceiving the negative emotions experienced by partners high in attachment anxiety, who are more likely to express emotions (Overall et al., 2014), whereas they tend to be less accurate in perceiving the negative emotions experienced by partners high in attachment avoidance, who are less likely to express emotions (Sadikaj, Moskowitz, & Zuroff, 2017).

Despite assuming an interpersonal expression–perception process, none of these prior studies have included direct assessments of the effects of emotion expression on perceptions of emotions. Moreover, recent tests that have directly assessed this interpersonal link did not find supporting evidence. In two dyadic studies, Clark et al. (2017) asked partners to report on the degree to which they experienced and expressed to their partner a range of (mostly negative) emotions over the prior 2 weeks (Study 1) or 3 months (Study 2). Perceptions of partners' emotion and partners' reports of those emotions were highly correlated revealing high levels of perceptual accuracy. However, partners' reports of having disclosed or expressed their emotions (verbally or through facial and voice tone) did not typically enhance perceivers' accuracy, with only two of 15 tests revealing significant moderating effects.

These null findings have important theoretical implications given they might be taken to challenge central propositions of models of interpersonal perception (e.g., Funder, 1995; Thomas & Fletcher, 2003; Zaki et al., 2008), as well as interpersonal processes pivotal to the theorized interpersonal functions of negative emotions in relationships (e.g., Clark et al., 2001; Van Kleef, 2009, 2010). Rather than contradicting these theoretical models, we point out two methodological reasons why the links between recalled emotion expressions and perceptions reported by Clark et al. (2017) may not precisely test whether emotional expression enhances perceptual accuracy within relationship interactions. First, Clark et al. (2017) asked participants to report their experiences, expressions, and perceptions of emotions over the prior two weeks or three months. General reports aggregated across the past are subject to the vagaries of memory and may be insufficiently precise to offer reliable tests of the effects of partners' expression on accurately perceiving partners' emotions. Emotions are expressed and perceived within relationship interactions, and so emotional expression and perceptual accuracy should be more

reliably associated when examined in the context of couples' daily exchanges and actual social interactions.

Second, the retrospective method used by Clark et al. (2017) only provided single measures of the experience, expression, and perception of emotion. Most recent assessments of accuracy examine repeated assessments of emotions, which increases statistical power and assesses the detection of emotions as emotions occur and vary across time (e.g., Gadassi et al., 2011; Howland & Rafaeli, 2010; Overall et al., 2015; Sadikaj et al., 2017; Sened et al., 2017). In dyadic interactions and across daily life, people are confronted with partners' changing emotions: negative emotions might be low one day, very intense the next day, and then moderate the following day. Thus, accuracy does not involve just a single judgment at a given time point but involves tracking how partners' negative emotions go up and down as daily life and social interactions unfold. Assessing tracking accuracy is important because appropriately responding to relationship threats (as signaled by partners' hurt or anger) or partners' need for support (as signaled by partners' sadness or distress) requires detecting when partners' negative emotions are more versus less intense and then adjusting relationship maintenance and support accordingly (Clark, Oullette, Powell, & Milberg, 1987; Fletcher & Kerr, 2010; Graham et al., 2008; Gregory, Anderson, & Gable, 2019; Overall et al., 2012).

In the current research, we address the various methodological limitations of prior studies by (a) directly testing the effects of emotional expression on perceptions of emotions and (b) repeatedly assessing the experience, expression and perception of negative emotions across couples' daily life (Studies 1 and 2) and specific interactions (Study 3). Using these methods, we predicted that partners' greater disclosure or expression of emotions would enhance perceivers' tracking accuracy of those negative emotions. We also make additional theoretical and methodological extensions to prior research by examining whether partners' emotional expression predicts another important form of accuracy that is relevant to the interpersonal functions of negative emotions: levels of directional bias.

Emotional Expression and Directional Bias

The prior research reviewed above has focused on the degree to which perceptions of emotions are correlated with partners' experiences of emotions, which is informative with regard to tracking accuracy (see Fletcher & Kerr, 2010). However, another form of accuracy relevant to the interpersonal significance and motivational relevance of expressing and perceiving negative emotions involves accurately assessing the overall intensity of partners' negative emotions. Levels of directional bias index the degree to which perceivers generally underestimate, overestimate, or accurately (no bias) assess the level or intensity of partners' negative emotions (Fletcher & Kerr, 2010; West & Kenny, 2011). Of importance, tracking accuracy and directional bias are often independent and have different implications (Fletcher & Kerr, 2010; Overall et al., 2012). For example, perceivers may accurately assess that partners' negative emotions are relatively high versus low on days partners' experiences are relatively high versus low, but, nonetheless, generally underestimate the intensity of those negative emotions. Even if high levels of tracking accuracy prompt responsiveness to partners' varying emotional experiences, underestimating negative emotions may produce responses that are inadequately tailored to the intensity of need and are thus less effective.

The interpersonal costs associated with underestimating partners' needs is likely why recent studies have shown that, on average, perceivers tend to overestimate partners' negative emotions during daily and laboratory-based interactions (Dutra et al., 2014; Overall et al., 2015; Sadikaj et al., 2017). These findings also are consistent with biases in other judgments that signal relationship-relevant information, such as a tendency to overestimate partners' poor regard or lack of forgiveness (see Fletcher & Kerr, 2010; Overall et al., 2012). A central explanation proffered for this pattern of directional bias is that underestimating negative emotions is particularly costly: by failing to trigger relationship maintenance or support when needed, underestimating partners' negative emotions poses the greatest risk of partner dissatisfaction and subsequent rejection (Haselton & Buss, 2000). Thus, the costs of missing the social information that negative emotions convey promotes a vigilant, cautious perceptual pattern involving high levels of tracking accuracy and a tendency to overestimate negative emotions (Fletcher & Kerr, 2010; Overall et al., 2012).

Research guided by this theoretical perspective has been focused on processes within the perceiver that amplify the meaning of negative emotions (e.g., Overall et al., 2012, 2015). Yet, consistent with the interpersonal functions of negative emotions as communicating social information necessary to sustain relationships, this theoretical perspective also indicates partners' emotional expression will influence levels of directional bias in perceivers' judgments of partners' emotions. In particular, greater expression of emotions should amplify the tendency for perceivers to attend to partners' negative emotions, which should not only produce greater tracking accuracy but possibly also a greater overestimation of the intensity of the negative emotions partners are experiencing. In the current studies, we provide the first tests of whether greater emotional expression is associated with both tracking accuracy and directional bias in perceptions of partners' negative emotions.

Current Research

An interpersonal process that links partners' emotional expression to greater perceptual accuracy of partners' emotions should be critical to the interpersonal functions of negative emotions. Yet, prior research has provided little direct evidence that emotional expression enhances perceptual accuracy. We addressed the various methodological limitations of prior studies by repeatedly assessing the negative emotions participants experienced, perceived, and expressed during relationship interactions as reported at the end of each day for 21 days (Studies 1 and 2), or as participants reviewed a recorded interaction they just had with their partner (Study 3). We also make theoretical and methodological extensions to prior research by assessing both tracking accuracy and directional bias.

Studies 1 and 2 involved both members of couples in ongoing relationships reporting on their own negative emotions, perceptions of their partners' negative emotions, and the degree to which they disclosed their feelings to each other every day for 21 days. In Study 3, we video-recorded couples discussing one partner's stressful challenge, which is an emotionally relevant context that

should motivate couples to attend to each other's negative emotions. Each couple member immediately reviewed the recorded discussion and, for every 30-s segment of the discussion, participants rated their own negative emotions and perceptions of their partner's negative emotions. Later, independent coders rated the degree to which participants expressed their emotions during the discussion.

To test the links between partners' expressions of emotions and perceivers' accuracy of partners' negative emotions, we followed established statistical procedures designed to assess both tracking accuracy and directional bias (West & Kenny, 2011; also see Lemay, Pruchno, & Feild, 2006; Overall et al., 2012). Using the partners' reports of their own emotional experiences as the benchmark of accuracy, we assessed whether partners' expression of emotions reported by participants (Studies 1 and 2) or rated by independent observers (Study 3) predicted the degree to which participants accurately tracked their partners' emotions (tracking accuracy). Compared to the measures by Clark et al. (2017) that revealed null associations between partners' reports of expressing emotions in recent days and perceivers' accuracy in judging those recently felt emotions, we expected that our repeated contemporaneous assessments would offer a more precise and powerful test of the expected link between partners' greater emotion expression and enhanced tracking accuracy in perceptions of partners' emotions. We also theorized that emotional disclosure or expression should strengthen the interpersonal signal conveyed by partners' negative emotions, and therefore partners' emotional expression also might increase the degree to which perceivers overestimate the intensity of partners' negative emotions (directional bias).

Studies 1 and 2

Studies 1 and 2 involve two samples of couples previously used by Overall et al. (2015) to examine the links between attachment insecurity and perceptions of partners' negative emotions. In both studies, both dyad members rated (a) their own emotions and (b) perceptions of their partners' negative emotions every day for 3 weeks. The assessment of negative emotions focused on relationship-related emotions particularly relevant to the interpersonal functions of negative emotions (e.g., hurt, anger, sadness). Participants also reported the degree to which they disclosed their feelings to their partner each day, which allowed a direct test of whether greater disclosure of emotions by partners increased the degree to which people accurately tracked their partners' actual negative emotions across days (a measure and question not examined by Overall et al., 2015).[1]

Method

Studies 1 and 2 included two independent studies of couples collected at different universities in different cities. Study 1 was designed and collected first, and then Study 2 was designed to replicate the design and procedure of Study 1 so as to offer direct replication of bias and accuracy processes in daily life. Given each study followed the same procedures, we present the methods and results for each study jointly for concision.

Participants. In both studies, samples were recruited via advertisements posted across large city-based universities and affiliated organizations (e.g., employment agencies and health centers). Advertisements invited heterosexual couples who had been involved for at least one year to participate in research examining daily life in relationships.[2] Couples were reimbursed $70NZD for completing the procedures described below. Ethics approval was given by the University of Auckland (2010/527 for Study 1) and the Victoria University of Wellington School of Psychology (#19287 for Study 2) Human Participants Ethics Committees.

Study 1. Seventy-eight couples completed the daily sampling procedure. Participants were 22.44 years old on average (SD = 4.81) and were involved in serious relationships (43.6% married or cohabiting) that averaged 2.57 years in length (SD = 1.96).

Study 2. Seventy-three couples completed the daily sampling procedure. Participants were 23.61 years old on average (SD = 6.87) and were involved in serious relationships (47% married or cohabiting) that averaged 3.20 years in length (SD = 3.56).

Sample size and power. The sample size of Study 1 was determined based on prior research underpinning the multiple aims of a broad project on daily relationship dynamics, including assessing biases in perceptions of partners' emotions and behavior. The target was 80 couples accounting for attrition due to noncompliance with the daily sampling procedure, which balanced funding with the aim to have adequate statistical power to detect small effects. Study 2 was designed to replicate the procedures in Study 1 for our research on bias and accuracy in relationship perceptions. At the time of funding, design, and data collection of both studies, no established practices for calculating power for dyadic repeated measures designs were available and so, a priori, power analyses were not conducted. The number of dyads (n = 78 and 73) and repeated assessments (3,276 and 2,786) is similar to or exceeds recent studies examining perceptual accuracy of negative emotions in daily life (mean n of dyads = 61.5; mean n of repeated assessments = 2,068; Gadassi et al., 2011; Howland & Rafaeli, 2010; Kouros & Papp, 2019; Sened et al., 2017; Sadikaj et al., 2017).

Materials and procedure. During an initial session, couples were given detailed instructions for completing a 3-week daily diary. Starting the following day, both partners completed a web-based record reporting on (a) their own and (b) their perceptions of their partner's negative relationship-related emotions when interacting with their partner that day, and the degree to which they had disclosed their feelings and opinions to their partner each day. On average, participants completed 19.3 (Study 1) and 19.1 (Study 2)

[1] Analyses of these data have been previously reported by Overall et al. (2015), demonstrating that greater attachment avoidance was associated with greater directional bias. However, this prior publication did not report analyses of the potential moderating effect of partners' expression of negative emotions on individuals' accuracy in perceiving their partners' negative emotions. Moreover, rerunning the models presented in the current article controlling for attachment avoidance and anxiety revealed that the links between attachment avoidance and directional bias remained significant and were independent of the effects of partners' disclosure in the current studies. Moreover, controlling for perceivers' own and their partners' attachment avoidance or anxiety did not alter any of the effects reported in Tables 2–5. Thus, the effects presented in the current article are completely independent of the links between attachment insecurity and perceptions of partners' negative emotions.

[2] Recruitment across studies focused on heterosexual couples for a separate set of research aims focused on gender roles and sexist attitudes that specifically apply to heterosexual relationship contexts.

daily records providing 3,276 (Study 1) and 2,786 (Study 2) diary entries on which analyses were based.

Negative emotions. Participants rated how much they felt a series of relationship-related emotions when interacting with their partner each day, including feeling "angry at my partner," "frustrated with my partner," "hurt by my partner," and either "sad about our relationship" in Study 1 or "disappointed by my partner" in Study 2 (1 = *not at all*, 7 = *very much*). Items were averaged (R_{1F} = .75 and .80; R_c = .86 and .90 for Study 1 and 2, respectively; see Cranford et al., 2006, regarding reliability of repeated assessments).

Perceptions of partners' negative emotions. Participants rated the same items reworded to assess their perceptions of their partner's negative emotions when interacting with their partner that day (e.g., "My partner was angry at me"; 1 = *not at all*, 7 = *very much*). Items were averaged (R_{1F} = .76 and .81; R_c = .87 and .90 for Study 1 and 2, respectively).

Disclosure. Participants also rated a single item assessing the degree to which they disclosed to their partner that day: "I shared and discussed my feelings and opinions with my partner" (1 = *not at all,* 7 = *very much*). This item regarding sharing and discussing feelings has been used to assess daily levels of emotional expression in prior research (Cameron & Overall, 2018) and aligns with Clark et al.'s (2017) assessment of emotional expression, which asked partners to rate the extent to which they had expressed emotions verbally or nonverbally. As we consider further below, assessing disclosure of feelings and opinions may capture other information that is not specific to emotions, but nonetheless provide insight into what partners may generally be experiencing that could also enhance perceptual accuracy.

Results

As shown in Table 1, descriptive statistics were similar across the two studies. We used multilevel modeling methods for analyzing repeated measures data within dyads (see Kenny, Kashy, & Cook, 2006) and followed the approach specified by West and Kenny (2011) to assess bias and accuracy in interpersonal perceptions. Both dyad members provided data as perceivers, allowing their perceptions of partners' negative emotions to be assessed against their partners reported negative emotions, and both partners provided corresponding benchmark data used to assess the veracity of their partners' perceptions of negative emotions. The model specified by West and Kenny (2011) is as follows:

$$\begin{aligned} P_{ij} = {} & b_{0j} + b_{1j}(\text{partner } j\text{'s actual negative emotions on day } i) \\ & + b_{2j}(\text{Partner } j\text{'s disclosure on day } i) \\ & + b_{3j}(\text{partner } j\text{'s actual negative emotions on day } i \\ & \times \text{partner } j\text{'s disclosure on day } i) + e_{ij} \end{aligned} \quad (1)$$

In this equation, perceptions of the partner's negative emotions (P) by perceiver j on a particular day (i) is a function of an: (a) intercept (b_0), (b) the effect of partners' actual self-reported negative emotions (b_1) that day (i), (c) the effect of the partners' disclosure (b_2) that day, and (d) the interaction between partners' actual self-reported negative emotions and partners' disclosure (b_3) that day, and an error term (e_{ij}) representing random error and all other unmeasured biases that influenced the perceivers' judgments.

As specified by West and Kenny (2011), perceptions of partners' negative emotions (the outcome variable) were centered on partners' actual negative emotions (as reported by the partner) by subtracting the grand mean of partners' self-reported emotions from the individuals' perceptions of partners' negative emotions each day. This strategy means that the intercept represents the average difference between partners' reported negative emotions and individuals' perceptions of partners' negative emotions (i.e., directional bias). A positive intercept indicates that, on average, perceivers generally were overestimating—and a negative intercept indicates perceivers generally were underestimating—partners' negative emotions.

The first predictor variable (b_1) assessing partners' actual negative emotions also was centered by subtracting the grand mean. The resulting coefficient assesses the degree to which perceptions of partners' negative emotions accurately tracked partners' actual negative emotions or tracking accuracy. A positive coefficient indicates that, on average, perceivers accurately tracked the degree to which partners' negative emotions varied across days.

The final two predictor variables test whether partners' disclosure (grand-mean centered)[3] predicts bias and accuracy of emotional perceptions. First, b_2 tests the main effect of partners' disclosure, and thus whether partners' disclosure predicts directional bias. A positive coefficient indicates that greater partners' disclosure is associated with perceiving partners' emotions as more negative. Second, b_3 tests whether partners' disclosure mod-

Table 1
Descriptive Statistics for Studies 1–3

Measures	*M*	*SD*	Range
Study 1: Daily measures			
Perceptions of partners' negative emotions	2.00	1.31	1–5.05
Partners' negative emotions	1.94	1.31	1–5.86
Partners' disclosure	5.51	1.64	2–7.00
Study 2: Daily measures			
Perceptions of partners' negative emotions	1.69	1.21	1–4.85
Partners' negative emotions	1.61	1.14	1–4.36
Partners' disclosure	4.42	2.12	1–7.00
Study 3: Discussion measures			
Perceptions of partners' negative emotions	2.61	1.62	1–6.32
Partners' negative emotions	2.46	1.59	1–6.55
Partners' observed expression	2.48	.85	1–4.55

Note. Daily measures represent averages across the 21 daily sampling assessments. Discussion measures represent averages across the 14 30-second segments of the discussion. The range displays the lowest and highest within-person averages across the sampling periods. The highest scores represent consistently high levels of negative emotions or disclosure across 21 days (Studies 1 and 2) or consistently high levels of negative emotions or emotion expression across 14 discussion segments (Study 3).

[3] Partners' disclosure was grand-mean centered because we wanted to compare differences across participants' level of directional bias and tracking accuracy at the same low versus high levels of partner disclosure. In addition, this approach is more consistent with the analyses in Study 3 involving observational assessments of expression that were specifically coded according to between-person difference (i.e., observers made judgments at each 30-s segment according to how much people were expressing emotions compared to other people), and thus grand-mean centering was more appropriate. Very similar results were obtained person-mean centering partners' disclosure (see the online supplemental material for results).

erates the effect of partners' actual emotions and thus predicts levels of tracking accuracy. A positive coefficient indicates that perceivers are more accurate at tracking changes in their partners' negative emotions when they have partners' who disclose more.

Our centering strategy follows the model outlined by West and Kenny (2011) and published demonstrations of this approach (e.g., Overall et al., 2012, 2015). The resulting bias and tracking accuracy assessments also are directly comparable to the large literature that has examined mean-level discrepancies and accuracy correlations to assess bias and accuracy in perceptions within close relationships (see Fletcher & Kerr, 2010; Gagné & Lydon, 2004). Moreover, important to our research aims, this centering strategy means that any differences arising from moderator analyses capture differences in levels of bias and tracking accuracy across people when comparing partners at the same levels of negative emotions and the same levels of disclosure. An alternative approach involves centering on each partner's own mean (person mean), which produced very similar results and conclusions (see the online supplemental material for results using a person centering approach).[4]

All analyses were conducted using the MIXED procedure in SPSS 22 (see Overall et al., 2012, for syntax). Accounting for the dependence in the data across dyad members, the model estimated the parameters pooled across men and women. All main and interaction effects of gender were included, which revealed no significant gender differences in any of the effects (all ts $= -1.61$ to 1.00, all ps $> .10$). Because the repeated measures were temporally ordered across time, we also followed the recommendations of Bolger and Laurenceau (2013) by controlling for the effect of day of assessment ($B = -.01$, $t = -2.54$, $p = .011$ and $B = -.01$, $t = -2.59$, $p = .010$, for Study 1 and 2). The model allowed the error variances to differ for men and women, errors for a given time to be correlated, and the intercept (i.e., directional bias), as well as the effect of partners' actual negative emotions (i.e., or tracking accuracy), to vary by male and female perceivers (i.e., to be random) and for these effects to covary within and across dyad members.[5]

Partners' disclosure and perceivers' accuracy. The fixed effects from analyses of Study 1 and Study 2 are presented in Table 2 (see the online supplemental material for random effects). The results were very similar across studies. The significant positive intercept shows that, on average, perceivers overestimated partners' negative emotions during couples' daily interactions across the 3-week assessment (directional bias). The significant effect of partners' negative emotions shows that participants, on average, accurately tracked the degree to which their partners felt more versus less negative emotions across the 3-week period (tracking accuracy). Partners' disclosure had a significant main effect revealing that perceivers whose partners disclosed their feelings more judged their partners to experience more negative emotions on average across days (greater directional bias). A significant interaction between partners' disclosure and partners' negative emotions (tracking accuracy) also revealed that perceivers more accurately tracked partners' negative emotions across days when they had partners who disclosed their feelings more.

To demonstrate the effect of partners' disclosure on bias and accuracy in perceptions of partners' emotions we calculated the levels of directional bias and tracking accuracy at different levels of partner disclosure (see Chang, Overall, Madden, & Low, 2018; Clark et al., 2017; Lemay & Neal, 2013, for similar approaches). As shown in Table 3, when levels of partners' disclosure were lower than the mean, perceivers exhibited no directional bias and were relatively accurate at tracking partners' negative emotions across days. At mean and higher levels of partners' disclosure, however, perceivers increasingly judged partners' emotions to be more negative (showing significant directional bias) and they became increasingly more accurate at tracking partners' negative emotions across days.

Alternative bias and disclosure processes. We also ran additional analyses to contrast the predicted effects of partners' emotional expression to another form of bias: assumed similarity

[4] A potential concern with the centering strategy we followed is that partners who experience greater negative emotions across the diary period might be easier to "read" accurately. In addition, variability in partners' negative emotions may reduce or increase the degree to which perceivers can accurately track partners' emotions. To examine these possibilities, we reran the primary models in each study including each partner's average levels of negative emotions and the interaction between each partner's average levels of negative emotions and tracking accuracy. Average levels of partners' negative emotions was not significantly or consistently associated with tracking accuracy across studies (Study 1: $B = -.02$, 95% confidence interval [CI] [−.10, .06], $t = -.50$, $p = .62$; Study 2: $B = -.12$, 95% CI [−.25, .02], $t = -1.72$, $p = .09$; Study 3: $B = -.03$, 95% CI [−.06, .01], $t = -1.49$, $p = .14$). Partners' variability in negative emotions across the sampling period also was not significantly associated with tracking accuracy in Study 1 ($B = .07$, 95% CI [−.07, .22], $t = .98$, $p = .33$), but greater variability did predict lower levels of tracking accuracy in Study 2 ($B = -.26$, 95% CI [−.48, −.04], $t = -2.41$, $p = .02$). A similar trend emerged in Study 3 ($B = -.11$, 95% CI [−.24, .01], $t = -1.84$, $p = .07$). Nonetheless, controlling for the main and interaction effects of each partner's within-person average and variability of negative emotions did not reduce the greater accuracy associated with partners' greater disclosure in Studies 1 and 2 ($B = .03$, 95% CI [.01, .04], $t = 3.75$, $p < .001$ and $B = .04$, 95%CI [.02, .06], $t = 4.24$, $p < .001$) or observed emotion expression in Study 3 ($B = .04$, 95% CI [.01, .07], $t = 2.14$, $p = .03$).

Similarly, perhaps partners' average levels or variability in disclosure or expression produce differences in tracking accuracy. Average levels of partners' disclosure or expression did not significantly or consistently predict greater levels of tracking accuracy across studies (Study 1: $B = -.05$, 95% CI [−.13, .02], $t = -1.38$, $p = .17$; Study 2: $B = -.01$, 95% CI [−.07, .06], $t = -0.65$, $p = .95$; Study 3: $B = -.09$, 95% CI [−.18, .01], $t = -1.88$, $p = .06$). Variability in partners' disclosure was also not significantly associated with tracking accuracy in Study 1 ($B = -.11$, 95% CI [−.23, .02], $t = -1.75$, $p = .08$, $B = -.09$) or Study 2 (95% CI [−.22, .05], $t = -1.27$, $p = .21$), but did predict greater tracking accuracy in Study 3 ($B = .43$, 95% CI [.17, .67], $t = 3.44$, $p < .01$). Nonetheless, controlling for the main and interaction effects of each partner's within-person average and variability of disclosure/expression did not reduce the greater accuracy associated with partners' greater disclosure in Studies 1 and 2 ($B = .02$, 95% CI [.01, .04], $t = 2.80$, $p < .01$, and $B = .04$, 95% CI [.02, .06], $t = 4.26$, $p < .001$) or observed emotion expression in Study 3 ($B = .04$, 95% CI [.01, .08], $t = 2.03$, $p = .04$).

[5] The covariance parameters are provided in the online supplemental material. We modeled the intercept (directional bias) and partners' negative emotions (tracking accuracy) as random following the specifications by West and Kenny (2011) and given the primary aim involved predicting differences in directional bias and tracking accuracy in perceptions of partners' negative emotions. The models did not converge when random effects were also added for partners' disclosure, and these additional models tended to reveal that variability in the effects of partners' disclosure tended to be small and nonsignificant indicating that the fixed effects were similar across dyads in these studies. As noted in the General Discussion, inferences based on these results may be limited to the same assessments of emotional expression and may not generalize to different assessments of emotional expression.

Table 2
The Effects of Partners' Disclosure on Directional Bias and Tracking Accuracy of Perceptions of Partners' Negative Emotions During Daily Interactions (Studies 1 and 2)

Bias and accuracy of perceptions of partners' negative emotions	Study 1				Study 2			
	B	95% CI	*t*	*r*	*B*	95% CI	*t*	*r*
Intercept (directional bias)	.08	[.03, .15]	2.84**	.34	.10	[.03, .17]	2.88**	.33
Partners' actual emotions (tracking accuracy)	.79	[.74, .84]	29.73**	.97	.77	[.69, .85]	19.27**	.94
Partners' disclosure	.02	[.01, .04]	2.06*	.25	.03	[.01, .05]	3.24*	.37
Partners' Disclosure × Partners' Actual Emotions (tracking accuracy)	.03	[.01, .04]	3.32**	.39	.04	[.02, .06]	4.20**	.53

Note. CI = confidence interval. Effect sizes (*r*) were approximated using Rosenthal and Rosnow (2007) formula: $r = \sqrt{(t^2/t^2 + df)}$.
* $p < .05$. ** $p < .01$.

or projection of one's own emotional experiences onto perceptions of partners' emotions (Clark et al., 2017; Overall et al., 2015). These additional tests were exploratory because we recognized one's own emotions are likely to serve as an automatic lens biasing perception of emotion regardless of the extent to which the emotion is expressed (see Clark et al., 2017). Adding individuals' own emotions and the interaction between partners' disclosure and own emotions into the primary models described above revealed that, consistent with prior research (e.g., Clark et al., 2017; Overall et al., 2015), participants' experiences of negative emotions were associated strongly with perceptions of partners' negative emotions ($B = .72$, $t = 34.16$, $p < .001$ and $B = .74$, $t = 21.05$, $p < .001$ in Studies 1 and 2). However, levels of projection did not vary according to partners' disclosure ($B = .01$, $t = .60$, $p = .549$ and $B = .01$, $t = 1.07$, $p = .285$ in Studies 1 and 2). Thus, projection could not account for the effects of partners' disclosure and controlling for projection did not substantively alter the directional bias and tracking accuracy effects shown in Tables 2 and 3.

We also ran additional models adding individuals' disclosure of their own feelings and opinions and the interaction between own disclosure and partners' negative emotions. We had no a priori predictions, but we did want to ensure that the effects of partners' disclosure were not due to any processes arising from perceivers' disclosure to their partners. Perceivers' own disclosures were not consistently associated with perceptions of partners' negative emotions across studies (Study 1: $B = -.09$, $t = -6.65$, $p < .001$; Study 2: $B = .05$, $t = 4.26$, $p < .001$). Moreover, own disclosure did not predict tracking accuracy in either study (Study 1: $B = -.00$, $t = -.02$, $p = .982$; Study 2: $B = .02$, $t = 1.82$, $p = .069$). Thus, perceivers' own disclosures could not account for the effects of partners' disclosures in Tables 2 and 3.

Discussion

Studies 1 and 2 tested whether partners' disclosure of emotion predicted tracking accuracy and directional bias in dyadic studies that repeatedly assessed the experience, expression, and perception of negative relationship-related emotions during couples' daily exchanges across a 3-week period. Perceivers showed high levels of accuracy in tracking partners' negative emotions across days regardless of levels of partners' disclosure. As expected, however, perceivers became increasingly more accurate in tracking partners' daily emotions the more that partners disclosed their feelings to perceivers. Perceivers also, on average, tended to overestimate the intensity of partners' negative emotions, but significant directional bias only occurred when partners' disclosure was at mean levels and higher. This pattern of findings indicate that partners' greater expressions of negative emotions enhance both accurate detection and biased overestimation of negative emotions, which should

Table 3
Levels of Directional Bias and Tracking Accuracy at Different Levels of Partners' Disclosure (Studies 1 and 2)

Directional bias and tracking accuracy	Levels of partners' disclosure				
	2 *SD* below mean	1 *SD* below mean	Mean	1 *SD* above mean	2 *SD* above mean
Study 1					
Directional bias	.02	.05	.08**	.12**	.16**
Tracking accuracy	.71**	.75**	.79**	.83**	.87**
Study 2					
Directional bias	−.02	.04	.10**	.16**	.23**
Tracking accuracy	.60**	.69**	.77**	.85**	.93**

Note. Directional bias values over zero represent average perceptions of partners' negative emotions are higher than the average negative emotions reported by partners (i.e., overestimation of partners' negative emotions). Significance tests indicate whether values are above zero and represent significant directional bias. The unstandardized coefficients estimating tracking accuracy represent the unit increase in perceptions of partners' negative emotions that is associated with a one-unit increase in partners' reports of negative emotions.
** $p < .01$.

support the interpersonal function of negative emotions in relationships.

One potential weakness of Studies 1 and 2 was that the assessment of emotional expression involved partners' disclosure of feelings and opinions. Given this assessment focuses on verbal expressions of emotions, and thus may miss other forms of nonverbal expression, the effects found in Studies 1 and 2 might underestimate the degree to which emotional expression enhances perceptual accuracy of emotions. On the other hand, this assessment also captured the partners' disclosure of opinions, and disclosing opinions also provides relevant and valuable cues to partners' emotions, potentially providing stronger effects than just focusing on emotional expressions. In Study 3, we focus more specifically on verbal and nonverbal expressions of emotions as objectively observed during couples' interactions.

Study 3

In Study 3, we tested whether the associations between partners' emotion expression and both tracking accuracy and directional bias in Studies 1 and 2 replicated amid a specific laboratory-based interaction involving one dyad member discussing their most significant, ongoing personal stressor with their partner. Although the topic discussed was not related to the relationship and focused on a current challenge experienced by only one dyad member, discussions of stressful issues can involve high levels of negative emotions for both the person facing the challenge discussed and the person who observes and may respond to their partner's stressor (Stephens, Martire, Cremeans-Smith, Druley, & Wojno, 2006). Negative emotions can arise in partners because of the burden of providing help and support (Shin et al., 2018), the impact that partners' challenges or ineffective responses have on the interaction and relationship (Stephens et al., 2006; see Monin, Feeney, & Schultz, 2012), or through a variety of other dyadic processes, such as empathy (Main, Walle, Kho, & Halpern, 2017), emotional contagion (Hatfield, Cacioppo, & Rapson, 1994), or mimicry of partners' emotions (Carr, Iacoboni, Dubeau, Mazziotta, & Lenzi, 2003; Niedenthal, 2007). Moreover, both roles—discussing one's own or partner's stressor—should motivate accurate assessments of partners' negative emotions in order to help navigate the challenge and to meet each other's needs. Indeed, seeking, providing, and accepting support, sustaining closeness, and problem solving all involve understanding each other's negative emotions. Thus, we assessed both dyad members' emotions and perceptions of partners' emotions (also see Dutra et al., 2014).

To collect repeated measures of the experience and perception of emotions across couples' interactions, participants reviewed a recording of their interaction and at 14 specified time-points (every 30 s) rated how much they (a) felt negative emotions and (b) perceived their partner was feeling negative emotions within each preceding 30-s segment. The emotions assessed were designed to parallel those negative emotions examined in Studies 1 and 2, including feeling sad, hurt, and angry. Trained coders then independently rated the degree to which each person expressed their emotions to their partner during each 30-s segment. Using the same analytic procedures in Studies 1 and 2, we tested whether partners' greater expression of emotions predicted the degree to which perceivers accurately tracked partners' negative emotions across the interaction (tracking accuracy) and accurately perceived the intensity of their partners' negative emotions (directional bias).

Method

Participants. Eighty-five heterosexual couples were recruited from advertisements posted across a university campus and in community newspapers and were compensated NZ$80 for completing the procedures described below (see Footnote 2). Approval was given by the University of Auckland Human Ethics Committee (8781). Couples were married (42.4%), cohabiting (36.5%), or in serious dating relationships (20%). Mean relationship length was 7.82 years (SD = 10.15), and mean participant age was 33.05 (SD = 13.55) years. As in Studies 1 and 2, a priori power analyses were not conducted; the number of dyads and repeated assessments (2,380) is similar to or exceeds prior studies examining perceptual accuracy of emotions.

Materials and procedure. On arrival at the laboratory, couples were given general information about the study. Each participant was then asked to identify and rank in order of importance three current, ongoing personal stressors they were experiencing that were not related to their relationship. Participants rated the extent to which each personal issue was a current and significant source of stress (1 = *not at all*, 7 = *extremely; M* = 6.12, *SD* = .96 for topics discussed). Couples then had a discussion involving a stressful personal issue experienced by one of the couple members. Participants' ratings and ranking of the importance of each issue was used to determine the topic of each couple's discussion. The person who reported the most stressful issue was selected to discuss their most significant personal challenge with their partner. When couple members reported equal stress (53.1%), we randomly assigned whose topics was discussed. The personal issues discussed included problems with health, employment, conflict with family/friends/colleagues, and career or study performance.

After a short warm-up discussion, each couple engaged in a 7-min discussion about the identified source of stress. Both partners were told to discuss the issue as they normally would. Immediately following the discussion, both couple members privately and independently reviewed the recording of their discussion and, at specified time-points spaced by 30 s, rated their (a) experience of negative emotions and (b) their perceptions of their partners' negative emotions during the discussion. The review procedure was similar to other widely used procedures used to assess subjective experiences and perceptual accuracy during couples' interactions (see Ickes, 2001; Welsh & Dickson, 2005). Moreover, these repeated assessments provided 2,380 ratings of partners' experience of negative emotion and perception of partners' negative emotions on which analyses were based.

Negative emotions and perceptions of partners' negative emotions. The video-recording was stopped at 14 specified time points (every 30 s), and at each point participants rated three items based on how they had felt during that 30-s segment of the discussion, including the degree to which they felt "sad/unhappy," "hurt/rejected," and "angry/annoyed" (1 = *not at all*, 7 = *very much*). Participants then rated how they thought their partner had felt during each 30-s segment of the discussion, including the degree to which they thought their partner felt "sad/unhappy," "hurt/rejected," and "angry/annoyed" (1 = *not at all*, 7 = *very much*). Items were averaged to index participants' own negative

Table 4
The Effects of Partners' Expression of Emotion on Directional Bias and Tracking Accuracy of Perceptions of Partners' Negative Emotions During Couples Discussions of Personal Stressors (Study 3)

Bias and accuracy of perceptions of partners' negative emotions	*B*	95% CI	*t*	*r*
Intercept (directional bias)	.14	[−.07, .34]	1.34	.15
Partners' actual emotions (tracking accuracy)	.23	[.18, .29]	8.94**	.83
Partners' expression	.06	[−.01, .13]	1.69†	.19
Partners' Expression × Partners' Actual Emotions (tracking accuracy)	.04	[.01, .07]	2.10*	.33

Note. CI = confidence interval. Effect sizes (*r*) were approximated using Rosenthal and Rosnow (2007) formula: $r = \sqrt{(t^2/t^2 + df)}$.
† $p = .09$. * $p < .05$. ** $p < .01$.

emotions ($R_{1F} = .90$, $R_c = .69$) and perceptions of partners' negative emotions ($R_{1F} = .91$, $R_c = .69$) within each 30-s segment of the discussion.[6]

Observer ratings of partners' emotion expression. Six coders who were unaware of the researchers' aims for this study and participants' scores on all variables rated the level of each participants' expression of emotions. Coders all held an undergraduate (or higher) degree in psychology, with a background in social and/or clinical psychology, and completed the coding as part of a paid research assistant or internship position. Coders were extensively trained in observational coding practices using protocols outlined by Sillars and Overall (2016). Training of emotion expression involved reviewing and applying the coding description of emotion expression (summarized below) in a different archival sample of conflict discussions, which was supplemented with verbal descriptions and clarifications in group training meetings. Once trained, at least three of the six coders rated the degree to which each participant openly expressed emotions in the current sample of interactions.

Each participant was monitored via a separate camera that provided a close, clear view of participants' face and upper body. The distinct recordings of each dyad member were captured on a split screen that was used for coding purposes, which ensured a detailed view of participants' expression of emotions toward their partner in the context of couples' interaction with each other. Coders rated each participant within independent viewings and were instructed and trained to focus coding on the target participant. Observers watched each discussion and, for each 30-s interval, rated the degree to which the target person appeared to be openly expressing their emotions and feelings to their partner, regardless of the specific types of emotions expressed. Coders were instructed to consider facial expressions, body language, and gestures as well as verbal information and tone to assess the degree to which each person was expressing emotions to their partner. Coders' ratings were highly consistent (average intraclass correlation coefficient = .89) and were averaged to provide observer ratings of each partners' level of emotion expression within each 30-s segment of the discussion.

Results

Descriptive statistics are shown in Table 1. As in Studies 1 and 2, both dyad members provided reports of their own negative emotions and perceptions of their partners' negative emotions regardless of whether they were the person whose stressor or challenge was being discussed. Thus, as in Studies 1 and 2, both dyad members provided data as perceivers and both dyad members provided corresponding benchmark data used to assess the accuracy of perceptions of partners' negative emotions.[7] The analytic strategy and model were identical to those used in Study 1 (see Equation 1), with time-points (*i*) representing segments of couples' discussion rather than days, and observers' ratings of partners' expression of emotion in each 30-s segment replacing partners' reports of disclosure each day. As in Studies 1 and 2, we modeled all main and interaction effects of gender (no significant gender differences emerged; ts = −.23 to 1.70, all ps > .05) and we modeled the significant effect of time or segment of assessment ($B = -.01$, $t = -2.50$, $p = .013$).

Partners' emotional expression and perceivers' accuracy. The fixed effects are presented in Table 4. As in Studies 1 and 2, the intercept representing average directional bias was positive, but unlike Studies 1 and 2 this bias was not significant. Moreover, although the main effect of partners' greater expression of emo-

[6] In Studies 1 and 2, we only assessed negative emotions. However, in Study 3, participants also rated an item that referred to positive emotions: happy/hopeful. Analyses revealed that participants' accurately tracked partners' happy/hopeful experiences ($B = .24$, 95% CI [.18, .29], $t = 8.91$, $p < .001$), but partners' coded emotional expression did not predict levels of directional bias ($B = .01$, 95%CI [−.07, .10], $t = .31$, $p = .754$) or tracking accuracy ($B = .01$, 95% CI [−.03, .05], $t = .66$, $p = .511$) in perceptions of partners' happy/hopeful feelings. It might be that people are more likely to attend to and monitor partners' emotional expressions that indicate negative compared to positive emotions, particularly when people need to assess whether the partner needs support, the partner is finding support provision burdensome, or the partner is rejecting support provision and seeking attempts. However, we are hesitant to draw strong conclusions about these analyses given they were based on a single item that mixed an emotional (happy) with a more cognitive (hopeful) state. We discuss the need to further investigate positive emotions in the General Discussion.

[7] We treated dyads as distinguishable by gender to ensure the analytic strategy was identical to that applied in Studies 1 and 2. Moreover, although dyad members were also distinguishable by whose issue was discussed, prior research found no differences in tracking accuracy or directional bias across similar roles (Dutra et al., 2014). Additional analyses testing whether any of the effects differed across role revealed a trend for perceivers who were responding to their partners' stressful challenges to perceive greater negative emotion in their partner ($B = .18$, $t = 1.89$, $p = .063$). However, role in the discussion (whether participants were discussing their own or their partners' stressful issue) was not associated with tracking accuracy ($B = -.04$, $t = -1.32$, $p = .224$) and it did not moderate the effects of partners' emotional expression on directional bias ($B = .02$, $t = .41$, $p = .684$) or tracking accuracy ($B = .00$, $t = .19$, $p = .851$).

tions tended to predict perceiving greater negative emotions (i.e., directional bias), this effect was only marginal. By contrast, and consistent with Studies 1 and 2, perceivers accurately tracked the degree to which their partners felt more versus less negative emotions across couples' discussion (significant tracking accuracy) and, as predicted, the interaction effect testing whether perceivers more accurately tracked partners emotions when partners exhibited greater expression of emotions was significant.

As in Studies 1 and 2, to demonstrate the effect of partners' emotional expression on perceptions of partners' negative emotions we calculated the levels of directional bias and tracking accuracy at different levels of partners' expression. As shown in Table 5, when levels of partners' expression were lower than the mean, perceivers exhibited no directional bias and showed moderate levels of tracking accuracy. At mean and higher levels of partners' expression, perceivers increasingly judged their partners' emotions to be more negative, but only showed significant directional bias once partners' emotional expression was very high. Nonetheless, greater levels of partners' emotional expression were met with increasing tracking accuracy in partners' negative emotions.

Alternative biases and emotional expression processes. As in Studies 1 and 2, we also examined the role of assumed similarity or projection of one's own emotions onto perceptions of partners' emotions. Participants' own negative emotions were associated with perceptions of partners' negative emotions ($B = .26$, $t = 8.94$, $p < .001$), but as in Studies 1 and 2, levels of projection were not moderated by partners' level of emotional expression ($B = .03$, $t = 1.52$, $p = .129$). Thus, the results across all three studies suggest that partners' emotional expression may attract sufficient attention to and focus upon partners' emotional states to increase tracking accuracy and directional bias, but that emotional expression does not appear to alter the self-focused filter through which perceivers also see partners' emotions (also see Clark et al., 2017). As with perceivers' own disclosure in Studies 1 and 2, we also reran the analyses modeling perceivers' own expression of emotions as observed by objective coders, which did not significantly predict directional bias ($B = -.05$, $t = -1.27$, $p = .206$) or tracking accuracy ($B = -.02$, $t = -.98$, $p = .327$), and thus did not alter the effects shown in Tables 4 and 5.

Discussion

Study 3 tested whether partners' expressions of emotion predicted tracking accuracy and directional bias of partners' negative emotions when couples were engaged in an emotionally relevant discussion about one dyad members' stressful issue. We gathered repeated assessments of participants' experience of negative emotions and perceptions of partners' negative emotions as participants immediately reviewed their discussion. Observational coders also rated the degree to which participants openly expressed their emotions during the discussion. The results largely paralleled those of Studies 1 and 2. Perceivers showed evidence that they accurately tracked their partners' negative emotions across the discussion regardless of levels of partners' expression of emotions. However, as in Studies 1 and 2, perceivers became increasingly more accurate the more partners expressed their emotions as rated by independent observers. Unlike Studies 1 and 2, however, the evidence of directional bias was less clear, with partners' emotion expression only significantly predicting greater overestimation of partners' negative emotions at very high levels of emotion expression. We consider this difference across studies below.

General Discussion

Negative emotions, such as hurt, anger, and sadness, serve important communicative functions in relationships, including signaling that relationship threats need to be managed or partners' needs should be attended to (Clark & Brissette, 2000; Graham et al., 2008; Lemay et al., 2012; also see Fischer & Manstead, 2008; Hareli & Hess, 2012; Keltner & Haidt, 1999; Van Kleef, 2009, 2010). To serve these interpersonal functions, negative emotions need to be sufficiently expressed to ensure perceivers accurately detect and, in turn, respond to negative emotions in appropriate ways (Clark et al., 2001; Van Kleef, 2009, 2010). Yet, there is mixed and inconsistent evidence regarding whether expressions of emotions in relationship interactions enhances perceptual accuracy. The current studies make several theoretical and methodological extensions to the extant literature by (a) directly assessing the associations between partners' emotional expression and perceptions of partners' negative emotions within relationship interactions and (b) examining whether partners' expression predicts the level of two types of accuracy relevant to the theorized inter-

Table 5
Levels of Directional Bias and Tracking Accuracy at Different Levels of Partners' Expression of Emotion (Study 3)

Directional bias and tracking accuracy	Levels of partners' expression of emotion				
	2 *SD* below mean	1 *SD* below mean	*M*	1 *SD* above mean	2 *SD* above mean
Directional bias	.04	.09	.14	.19†	.24*
Tracking accuracy	.17**	.20**	.23**	.27**	.30**

Note. Directional bias values over zero represent average perceptions of partners' negative emotions are higher than the average negative emotions reported by partners (i.e., overestimation of partners' negative emotions). Significance tests indicate whether values are above zero and represent significant directional bias. The unstandardized coefficients estimating tracking accuracy represent the unit increase in perceptions of partners' negative emotions that is associated with a one-unit increase in partners' reports of negative emotions.
† $p = .08$. * $p < .05$. ** $p < .01$.

personal functions of negative emotions: tracking accuracy and directional bias.

Studies 1 and 2 consisted of two virtually identical but independent dyadic studies in which participants repeatedly reported their experience of negative emotions, perceptions of their partner's negative emotions, and disclosure to their partner during daily interactions for 21 days. Study 3 involved participants repeatedly reporting on their experience and perception of negative emotions across a recorded discussion they just had with their partner, and independent coders rating the degree to which partners openly expressed their emotions. The results across the three studies supported that partners' greater emotional expression enhances perceivers' accuracy in tracking partners' negative emotions across days and the course of a specific social interaction (greater tracking accuracy). High levels of emotional expression also tended to predict perceivers overestimating partners' negative emotions (greater directional bias). Below, we outline the theoretical and methodological contributions these studies make with regard to understanding the expression, perception, and theorized interpersonal function of negative emotions in relationships, and we consider important caveats and directions for future research.

Expressing and Perceiving Negative Emotions in Relationships: Theoretical and Methodological Insights

The expression–perception pattern that emerged within couples' relationship interactions should support the interpersonal function of negative emotions, including providing social information needed for individuals to respond appropriately to significant emotional events and thus sustain relationships (Clark et al., 2001; Van Kleef, 2009, 2010). First, across all three studies, partners' greater emotional expression amplified the degree to which perceivers accurately tracked partners' negative emotions across daily life and specific social interactions (greater tracking accuracy). Accurately detecting when partners' negative emotions are more versus less intense should facilitate perceivers appropriately responding to meaningful relationship events, including enacting relationship maintenance or responsive support when anger, hurt and sadness are more intense, and holding back relationship maintenance or support attempts when partners' negative emotions are relatively mild (Clark et al., 2001; Fletcher & Kerr, 2010; Overall et al., 2012).

Second, average and higher levels of partners' disclosure during daily interactions (Studies 1 and 2), and very high levels of emotional expression during a single interaction in the laboratory (Study 3), predicted perceivers overestimating the intensity of partners' negative emotions (greater directional bias). This directional bias aligns with prior research indicating that people generate cautious judgments of their partners' negative sentiments because of the disproportionate costs underestimating negative thoughts and emotions are likely to have (Fletcher & Kerr, 2010; Overall et al., 2012). In particular, underestimating negative emotions may produce responses that inadequately address the needs of the situation and thus, are not only ineffective, but ultimately risk partner dissatisfaction and rejection. This pattern and theorizing is consistent with more basic cognitive processes that indicate people perceptually exaggerate challenges and risks in their environments relevant to their well-being (e.g., Proffitt, Stefanucci, & Epstein, 2003; Witt, Proffitt, & Epstein, 2005), which again likely occurs to prevent overlooking threats to optimal functioning.

Taken together, the general pattern of associations between greater emotional expression and both greater tracking accuracy and directional bias support that partners' expression of emotions offers valuable information about the need to attend to important events that may disrupt the relationship. The result is that high levels of partners' emotional expression effectively orient perceivers to important emotional events that would be costly to ignore. Although this may often involve a tendency to think partners' negative emotions are more intense than they actually are, both greater tracking accuracy and directional bias should be functional in heightening responsiveness toward partners' feelings of hurt, anger, and sadness (Fletcher & Kerr, 2010; Overall et al., 2012, 2015). Indeed, when the source of negative emotions is particularly serious, upregulating expressions of emotion should enhance the degree to which perceivers are aware of the need to be responsive (Clark et al., 1987; Graham et al., 2008; Iida et al., 2008; Lemay et al., 2012; Overall et al., 2014).

The implications arising from the findings across the current studies highlight the theoretical relevance of the expression–perception link to understanding—and evaluating extant theory and research regarding—the communicative function of negative emotions in relationships. Comparing the current results to prior studies, for example, highlights the need to assess whether the methodological approach captures the theoretical process under investigation. Prior research showing null associations between partners' emotional expression and perceivers' accuracy of those emotions examined single retrospective reports that aggregated emotion experiences and perceptions across past weeks and months (Clark et al., 2017). By contrast, in addition to reducing potential memory errors, the repeated contemporaneous measures used in the current studies provide a fine-grained assessment of the expression–perception link as emotions are experienced, expressed, and perceived during couples' relationship interactions, which is exactly when the communicative function of emotions, and associated facilitation of interpersonal responsiveness, should occur.

Nonetheless, distinct methods may provide insights into different processes that are important to understanding how perceptions of emotions affect relationship functioning not just in the moment they occur but also as they are recalled across time. As the current results indicate, immediate perceptions of partners should be shaped by what is transpiring in the interaction, including partners' expressions of emotions, and more accurate perceptions should (given beneficent motivation) facilitate more appropriate responses to partners' negative emotions. By contrast, retrospective assessments aggregated across time might be more strongly influenced by processes that occur after specific interactions take place, such as later interpretations of the meaning or the outcome of emotional interactions. Despite these differences, both immediate and global perceptions of emotional experiences and expressions are likely to impact relationship functioning. Understanding these distinct processes requires assessing how perceptions develop across time as couples generate more global accounts of their emotional lives and testing how both contemporaneous and global perceptions of emotions shape couples' responses to each other and relationship evaluations.

Finally, methodological differences across the current studies also may provide theoretical insights into when and why expression is associated with accuracy and bias in relationships. Perceivers' directional bias, and the amplifying effect of partners' emotional expression, were greatest when examining perceptions of emotions during couples' daily exchanges (Studies 1 and 2) compared to when examining perceptions of emotions during an interaction that had just occurred (Study 3). Perhaps the observer ratings of emotional expression in Study 3 did not fully assess the varied ways partners intentionally disclose emotions as assessed in Studies 1 and 2, or they overlooked the idiosyncratic ways partners express emotions that are more evident to people inside the relationship (Sillars & Overall, 2016). Alternatively, in line with a functional account of the expression and perception of negative emotions, the differences may be the result of the relative threat of the context and specific emotions examined. Prior research has shown that perceivers tend to overestimate their partners' anger and hurt during couples' laboratory-based discussions about conflictual areas of the relationships, which is particularly threatening (Overall et al., 2015; also see Sened et al., 2017). Although detecting negative emotions during discussions of stressors external to the relationship should be important to ensure responsiveness to partners' needs, these emotions may not carry as much relational threat resulting in lower levels of tracking accuracy, directional bias, and perceptual sensitivity to partners' emotional expression. Despite providing a consistent picture of emotion-perception links, the slight variation in results across studies offer another illustration of how methods can differentially match and inform the theoretical process under investigation.

Caveats and Remaining Questions

The pattern of results generally replicated across three dyadic studies that made important methodological extensions by repeatedly assessing expressions and perceptions of emotion across relationships interactions. In addition to the theoretical importance of capturing these interpersonal processes as interpersonal interactions transpire, these designs provide more powerful tests than prior expression–perception investigations. However, despite the value of assessing emotions and expression in a specific interaction, Study 3 did not as powerfully or reliably capture changes in emotions and perceptions compared to Studies 1 and 2 in which the large number of repeated assessments captured diverse contexts and experiences across days. In addition, despite the effects replicating across partners' reports of emotional disclosure and observer ratings of emotional expression, we were not able to model random effects of all variables (see Footnote 5) and so the results may not generalize to different assessments of emotional expression. We also focused on a set of emotions relevant to the theorized function of negative emotions within relationships, but, as we consider next, the results may differ across different types of emotions and contexts.

Our investigation of the interpersonal expression–perception link focused on negative emotions of interpersonal significance, including feeling hurt, angry and sad with regard to the partner and relationship (Studies 1 and 2) or hurt, angry and sad during an important relationship interaction in which perceivers could receive or provide support (Study 3). As described above, these emotions are particularly relevant to being responsive to partners and maintaining relationships, and thus people in intimate relationships will typically be highly motivated to attend to the presence of these emotions. Indeed, perceivers demonstrated substantial tracking accuracy in the absence of emotional expression (also see Clark et al., 2017; Overall et al., 2015), demonstrating the importance of being hooked into these emotional states. Similar results may appear with other affective states that may be less connected to the relationship, although the stronger effects in Studies 1 and 2 might indicate that tracking accuracy and directional bias will be greater for emotions that communicate relationship threat. On the other hand, given the motivation to attend to relationship-focused emotions, it is possible that partners' expression plays a stronger role in enhancing accuracy of emotions external to the relationship that partners may not as closely attend to otherwise.

Despite the relative importance of perceiving partners' negative relationship-relevant emotions, it is also possible that very high levels of anger, sadness and hurt may alter the expression–perception pattern demonstrated across the current studies. Additional analyses revealed that differences in average levels or variability of partners' negative emotions did not generally alter tracking accuracy (see Footnote 4). However, consistently high levels of negative emotions or emotional expressions by partners may result in perceivers habituating to partners' emotional experiences and expressions, perhaps becoming less attentive to, or less motivated to detect and respond to, shifts in partners' emotions. Indeed, although the results across studies suggest that tracking accuracy may be greater for emotions that convey relationship threat, the experience, expression, and perception of very high levels of threatening negative emotions simply may create defensiveness and acrimony, reducing the degree to which partners accurately understand and are responsive to each other's emotions.

Levels of tracking accuracy and directional bias, and the role of partners' emotional expression, also may differ for positive compared to negative emotions. Prior research has tended to focus on perceptual accuracy of negative emotions in relationships, but studies that have included both negative and positive emotions indicate that perceivers typically show greater accuracy for negative emotions (e.g., Dutra et al., 2014; Howland & Rafaeli, 2010; also see Footnote 6). Although this pattern supports our arguments regarding the interpersonal significance of negative emotions, inaccurately perceiving partners' positive emotions could be just as consequential. Overestimating or missing drops in partners' positive emotions, such as love or gratitude, risks failing to enact needed relationship maintenance efforts (Fletcher & Kerr, 2010; Muise, Stanton, Kim, & Impett, 2016; Overall et al., 2012). Failing to perceive and capitalize on partners' positive emotions external to the relationship may also risk partners' hurt and dissatisfaction (Peters, Reis, & Gable, 2018). Thus, people should be motivated to attend to their partners' experience and expression of positive emotions, especially when those positive emotions provide important contextually relevant interpersonal information.

Considering the reasons why different patterns might emerge for different emotions emphasizes the motivational relevance of perceiving and expressing emotions, which is substantial in intimate relationships. Tracking accuracy, directional bias and expression of emotions may look different in interpersonal interactions between people who are less outcome dependent. For example, although they did not assess expression and perceptions within

actual interactions, Zaki et al. (2008) found that perceivers showed lower tracking accuracy of strangers' emotions when those strangers reported being generally less expressive even when perceivers were high in trait empathy. Thus, in contexts where there may be little need or motivation to understand another's emotions, such as judging strangers' emotions, perceivers may show little tracking accuracy or directional bias unless the relevance and importance of others' emotions is signaled by high levels of emotional expression. Accordingly, emotional expression may play an even stronger role in enhancing accuracy and bias when the interpersonal context does not already provide a strong motivational basis for these perceptual processes (as it does in intimate relationships).

Even within close relationships, however, differences in motivation to both detect and respond to partners' negative emotions will produce differences in perceptual accuracy (e.g., Overall et al., 2012, 2015) as well as whether perceptual accuracy in turn promotes relationship maintenance efforts or responsive support (Winczewski, Bowen, & Collins, 2016). The aims of the present studies tested one central theoretical assumption regarding the interpersonal functions of negative emotions: negative emotions need to be expressed to ensure perceivers (a) detect partners' negative emotions (the focus of the current studies) and then (b) appropriately respond to meaningful relationship events (not examined in the current studies). There does exist some evidence that more accurate perceptions of partners' emotions may facilitate responsive support (e.g., Gregory et al., 2019; Howland, 2016), but research also has shown that perceptual accuracy needs to be accompanied by sufficient motivation and care to produce appropriate responses (Winczewski et al., 2016). Indeed, detecting partners' emotions can lead to poorer responsiveness and more destructive behavior when people are more concerned about their own interests than caring for their partner (e.g., Overall et al., 2015; Winczewski et al., 2016). Thus, the expression–perception link demonstrated here provides the social information necessary to orient perceivers to the needs of the situation, but this link is not by itself sufficient to promote appropriate responses and sustain relationships. Measuring tracking accuracy and directional bias in couples' interactions, along with the delivery and impact of contextually relevant responses, is an important next step to test whether perceptual accuracy combined with the right motivation leads to more effective responses tailored to the needs of the situation.

Appropriate responses to partners' negative emotions also may require accurately perceiving the relative experience of different types of emotions rather than more negative emotional experiences in general. In the current studies, we assessed perceptual accuracy of a tightly associated set of negative emotions about the partner and relationship. We focused on general relationship-related emotions, rather than accuracy of specific emotions (e.g., anger, sadness), because (a) we assessed general expression of emotions rather than expression of specific emotions, (b) our single items of different emotions varied slightly across studies, and (c) we were wary of the reliability, power, and comparability of multiple analyses in the absence of clear predictions regarding general expression and the experience and perception of specific emotions. However, it is possible that perceivers may more accurately track and perceive expressions in terms of the general valence (negative vs. positive) of emotions but are less accurate at perceiving the experience and expression of specific emotions (see Clark et al., 2017). Assessing perceptual accuracy and expression across different types of emotions may reveal differences in the degree to which perceivers can clearly differentiate across emotional experiences, and the factors that moderate these perceptual process, such as perceivers' or targets' own emotional clarity (see Gregory et al., 2019). Moreover, greater accuracy in perceiving or differentiating across specific emotions will likely promote more helpful responses to emotionally relevant events in relationships.

Despite these caveats and remaining questions, our approach to match the methods with the theoretical process under investigation offers an important guide for future research examining the ways expression–perception processes vary across different levels or types of emotions and different contexts. We assessed motivationally significant emotions within interpersonal interactions relevant to the theorized interpersonal function of emotions in relationships. Similarly, the expression and perceptions of positive emotions may be most fruitfully examined within contexts where those emotions hold particular interpersonal significance (e.g., experiencing and sharing success, sacrifices, forgiveness). Moreover, extending the current methodological approach by directly assessing and comparing the pattern of results across different emotions (negative, positive, relationship-relevant, specific), different contexts (intimate vs. strangers, conflict vs. support), and different emotional climates (very high and stable levels of emotional expression or disclosure) will not only test the generalizability of the current results but also advance understanding of the motivational relevance and interpersonal functions of emotions. Finally, the methodological and theoretical contributions of the current studies provide an important foundation for investigating the degree to which tracking accuracy and directional bias interact with contextual, individual difference, and motivational factors to determine whether accurate perceptions produce more responsive and effective reactions to partners' emotions.

Conclusion

The current results provide new evidence that partners' expression of emotions enhances perceivers' accuracy in tracking partners' negative emotions (tracking accuracy) and amplifies the degree to which perceivers overestimate partners' negative emotions (directional bias). This expression–perception pattern is theoretically important because it should support the interpersonal function of negative emotions in relationships by orienting perceivers to important emotional events that would be costly to overlook. By focusing on negative emotions of interpersonal significance, and examining emotional expression, experience, and perception as they occur within relationship interactions, the current studies highlight the importance of matching the methodological approach with the theoretical process under investigation to advance understanding of how emotions are perceived and should ultimately affect social relationships.

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