

The Effects of Brief Feedback and Motivation Interventions on Couples' Empathic Accuracy and Relationship Quality

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Abstract

Empathic accuracy (EA) is the ability to infer another person's emotions, thoughts, and other mental states, and is related to constructs such as mentalizing and theory of mind. It is associated with more satisfying close relationships and other beneficial outcomes. Several methods have been found to increase people's EA when inferring emotions in pre-recorded videos of strangers; however, no method has been shown to increase EA when inferring emotions in live interactions with actual relationship partners. In two pre-registered studies, we examined the potential of two brief interventions – increasing motivation and providing feedback – to improve partners' empathic accuracy. We also examined whether these effects would lead to relational benefits. Study 1 (N=68 couples, 136 individuals) examined the effects of both interventions on EA following lab-based support discussions. Study 2 (N=52 couples, 104 individuals who completed daily diaries every day for three weeks) examined the feedback intervention in daily life. Both interventions significantly increased EA, although the effects of the feedback intervention were more pronounced. The interventions had no significant direct effects on relationship satisfaction and perceived partner responsiveness, but post-intervention EA was associated with increased relationship satisfaction (in Study 1) and perceived partner responsiveness (in both studies), even when controlling for pre-intervention EA. This work introduces simple and replicable interventions which can be used in future studies, demonstrates that empathic accuracy is malleable even within long-term relationships, and suggests possible mechanisms underlying existing couples therapy methods.

Keywords: Social perception, Mentalizing, Theory of Mind, Empathy, Close Relationships

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It would be difficult to imagine a functioning society, not to mention close interpersonal relationships, without humans' ability to accurately perceive and infer the mental states of their peers. Empathic accuracy (EA; Ickes & Hodges, 2013) refers to the extent to which individuals use this ability to arrive at accurate inferences. Studies of EA have explored its neural substrates (Zaki et al., 2009), its association with hormones (particularly oxytocin, e.g., Bartz et al., 2010), and its development from childhood precursors (Yaniv et al., 2021), through adolescence (Kunzmann et al., 2018), to early and late adulthood (Blanke & Riediger, 2019).

As an ability, EA is closely related to (and in some contexts synonymous with) mentalizing and theory of mind (Ickes, 2009). A large number of studies exploring EA or similar constructs find them to be tied to salubrious aspects of various relationships (e.g., within psychotherapy: Atzil-Slonim et al., 2019; within sports coaching: Lorimer & Jowett, 2009). But perhaps the most widely studied relationships have been romantic bonds (for review, see Ickes & Hodges, 2013). With respect to such bonds, a recent meta-analysis (Sened et al., 2017) found EA to be positively associated with relationship satisfaction (though it also noted important caveats – e.g., EA being detrimental in severe conflicts; Simpson et al., 1995).

The primary aim of the current study is to establish simple, brief, and replicable means for improving EA within actual interpersonal relationships. One benefit of such means would be their potential to help test causal claims regarding EA. Specifically, extant studies of EA within romantic relationships have been correlational. Thus, it is unclear whether EA

causes relationships to improve, or whether it is merely a byproduct of good relationships. If, indeed, it can improve relationships, it may also be a useful means for affecting salubrious down-stream personal and relational consequences (e.g., stress buffering: Røsand et al., 2012; better physical and mental health: Beach & Whisman, 2012; Robles et al., 2014; Slatcher & Schoebi, 2017).

A few small studies have documented the possibility of improving EA within romantic relationships, but these have relied on multi-session interventions (Ahmad, 2012; Dalton, 2005; Long et al., 1999). Such complex interventions often target multiple processes, and as such may introduce confounds when evaluating causal claims regarding EA. Moreover, they are relatively cumbersome and therefore not easy to implement outside of clinical settings.

Could briefer interventions be possible? A meta-analytic review examining various kinds of training methods in the broader person perception literature has indeed found that brief interventions may be as effective as long ones in improving accuracy (Blanch-Hartigan et al., 2012). Similarly, in other fields of relationship research, some very brief interventions have been shown to have lasting effects on couples (e.g., practicing emotional reappraisal for 21 minutes once a year; Finkel et al., 2013). Finally, when considering EA outside of close relationships, several studies have successfully utilized briefer interventions; to date, however, such brief interventions have focused exclusively on improving inferences regarding strangers' thoughts or feelings from videotaped or otherwise pre-recorded interactions, a capacity we will refer to as "video-based EA". Improvements in video-based EA have been achieved by providing monetary rewards (Klein & Hodges, 2001) or feedback (Marangoni et al., 1995) and by increasing motivation (Weisz et al., 2020).

Moving beyond video-based EA is crucial for understanding EA's role within actual relationships. After all, EA, like other social-cognitive phenomena, may operate differently in vivo vs. in-vitro. As Schilbach et al. (2013) note, social perception is an interactive phenomenon; inferring emotions from pre-recorded videos could obscure differences in participants' ability to actively obtain emotional information (e.g., by steering the conversation in various ways), and interventions focused exclusively on improving video-based EA may address only a subset of social perception processes (Quesque & Rossetti, 2020). Moreover, as Schilbach and colleagues (2013) emphasize, individuals are likely to be less detached and more engaged in *live* interactions. Using such interactions in lieu of video-based methods may be especially consequential in exploring EA given its sensitivity to motivational factors (Zaki, 2014).

Feedback and Motivation

Two factors found to be particularly effective in changing emotion perception are feedback (Bas-Sarmiento et al., 2020) and motivational factors (Weisz & Zaki, 2017). Below, we expand on these factors and on their implications for the proposed intervention.

Feedback. One main component of the proposed intervention involves the use of feedback. Surprisingly, few studies have explored feedback with respect to EA. However, a meta-analysis by Blanch-Hartigan and colleagues (2012) on (broader) person perception training, which included only a handful of EA training studies, did examine the efficacy of various combinations of instruction, practice, and feedback. The inclusion of practice and/or feedback within training programs resulted in larger effects, whereas the inclusion of simple instruction resulted in reduced effects. The authors argue that instruction might reduce accuracy by making automatic processes conscious, thus requiring more effortful processing from the perceiver.

Based on an extensive review of the feedback literature, Kluger and DeNisi (1996) established Feedback Intervention Theory (FIT), which posits that feedback interventions work best when they direct attention to specific intricacies of the task or task-motivation levels (e.g., the sequencing of steps within a task; the effort expended towards particular tasks), and not the meta-task level (i.e., their overall performance or personality). To achieve that, they suggest using *correct response feedback* – i.e., feedback that provides the participant with the correct answer or process. They also recommend that feedback should be written or computerized rather than administered by a person, as the latter directs attention to social standing, which again pulls towards the meta-task level.

As noted earlier, few studies have attempted to use feedback in EA training, and all seem to have applied Kluger and DeNisi's (1996) suggested principles (Barone et al., 2005; Marangoni et al., 1995). For example, Marangoni et al.'s (1995) early study managed to increase participants' video-based EA using recorded rather than live feedback about correct responses. Thus, the feedback component of the proposed intervention adapts the procedure suggested by Marangoni and colleagues for use with romantic couples.

Motivation. Another main component of the proposed intervention involves perceivers' motivation to be accurate. A recent review of empathy-building interventions (Weisz & Zaki, 2017) has stressed the role of motivation as a driving force. Numerous studies have demonstrated that accuracy motivation is indeed tied to greater video-based EA (e.g., Hall et al., 2009; Klein & Hodges, 2001; Weisz et al., 2020). For example, Weisz and colleagues increased video-based EA by convincing college students that empathy is malleable, socially normative, and desirable. Moreover, in their meta-analysis of correlational EA studies, Ickes et al. (2000) reported that motivation differences might underlie the gender differences that sometimes emerge in EA.

In a recent review, Zaki (2014) explored mechanisms underlying the influence of low motivation on empathy. One key mechanism is perceivers' tendency to avoid cues signifying the targets' negative affect: knowing that a close person is upset is itself upsetting at times. To overcome such mechanisms, Zaki suggests reframing the negative affect involved. He also suggests harnessing the motivational effects of social norms, successfully used in motivational interventions within other fields (e.g., Schultz et al., 2007). Thus, the motivational component of the proposed intervention will include psychoeducation regarding the adaptive role of accepting negative emotions (e.g., Tamir, 2009) as a route towards mutual understanding, alongside a social-norms statement to the effect that romantic partners typically try to understand each other and, in so doing, improve their relationships.

Study overview

To test these proposed methods for improving EA, we conducted two preregistered studies (Study 1- https://osf.io/7ah6y/?view_only=59adb44dbbfc44b99a06f597a026ebb0, Study 2- https://osf.io/jx5mv/?view_only=1d4a2cc30d19414db46e771c6f29a48e). Full data, code and methods are provided at https://osf.io/xbmgh/?view_only=5352e753339148e291adf927517cad11.

Study 1, conducted with a sample of dating couples, examining the effects of feedback and motivation interventions on EA following lab-based couple. The study utilized a 2x2 experimental design (feedback/no feedback, motivation/no motivation). An overview of Study 1 procedure appears in Figure 1 Panel A. Study 2 was conducted as part of a larger study on unemployed couples. The study utilized daily diary methods (Bolger et al., 2003), thus offering greater ecological validity than Study 1. However, due to limited funding, it tested only the feedback intervention utilizing a treatment/no-treatment design. An overview of Study 2 procedure appears in Figure 1 Panel B. Both studies examined the interventions'

effects on relationship satisfaction and on perceived partner responsiveness (PPR), which has been found to be an important measure of relationship quality and intimacy (Reis et al., 2004). The studies' pre-registration also included an exploratory examination of the roles of EA's malleability and of empathic effort (Schumann et al., 2014); these exploratory results can be found in the supplementary material.

Study 1

Method

Participants. Seventy-two mixed-sex couples, in a relationship for at least a month, were recruited by the pre-registered deadline through the university research participation system. Mean age was 24.0 for men ($SD = 2.3$) and 22.6 for women ($SD = 1.8$). Mean relationship length was 2.3 years ($SD = 1.8$). Three couples did not complete the lab session, and for one couple, EA data from the second discussion session was lost, leaving full results for sixty-eight couples and partial results for one additional couple. Participants who were students received course credit for their participation, and their non-student partners received a breakfast gift certificate. Couples were randomly assigned to the feedback ($N = 19$ couples), motivation ($N = 18$ couples), feedback + motivation ($N = 17$ couples), or no intervention ($N = 18$ couples) groups.

Procedure. One participant within each couple was randomly assigned (counterbalanced for gender) to be a "support recipient" and the other to be a "support provider". After completing a background online survey, participants were invited to a lab session in which they took part in an adapted version (Verhofstadt et al., 2016) of the dyadic interaction paradigm (Ickes et al., 1990). In this version, couples were asked to hold two discussions about two "things the [support recipient] wishes to change about themselves, their lives or their relationships with others (excluding the relationship with their partner)".

Following the first discussion, the partners were led to separate rooms; each partner reviewed the recording of the discussion, split into nine 40-second long segments. After each segment, they were asked to report their thoughts and feelings during that segment.

At this point, participants in the motivation as well as the feedback + motivation groups saw a motivational paragraph encouraging them to be accurate in identifying their partner's feelings. Afterwards, all participants (regardless of group) reviewed the recordings of the discussion again, this time answering the same set of questions with reference to how they thought *their partners* felt during each of the segments. Subsequently, participants in the feedback as well as the feedback + motivation groups were shown their partner's own ratings for that segment. To examine the persistency of the interventions' effects, each couple took part in the second discussion (focused on the support recipient's second topic), and then completed self- and partner-rating tasks identical to those completed following the first discussion. This time, no group saw a motivational slide nor received any feedback. A week later, participants completed an online follow-up questionnaire.

Measures. Besides demographic information, we assessed the following variables:

Relationship Satisfaction. General relationship satisfaction was assessed in a background questionnaire, at the beginning and end of the lab session and at the 7-day follow-up, using the 16-item version of the Couple Satisfaction Inventory (CSI; Funk & Rogge, 2007). The questionnaire includes items rated on 6-point Likert-type scales (except for the first item, which is rated on a 7-point Likert-type scale). Cronbach's alpha was .89 for the background questionnaire, .92 at the beginning of the lab session, .94 at the end of the lab session, and .94 at follow-up, indicating high reliability across the board.

Perceived Partner Responsiveness. PPR was assessed using a brief, 3-item scale developed by Maisel and Gable (2009), which was administered in a background

questionnaire, before and after each of the two discussions, and in the 7-day follow-up questionnaire. Importantly, the post-discussion PPR was assessed *before* the review procedure. The questionnaire includes items rated on a 7-point Likert-type scale. Cronbach's alpha was .50 for the background questionnaire, .59 before the first discussion, .81 after the first discussion, .79 before the second discussion, .78 after the second discussion, and .82 at follow-up, indicating medium to good reliability except for the background questionnaire, which we neither used nor planned to use in the current study.

Emotions. During the review procedure, participants were asked to report (using freeform text) any thought or feeling they had in each 40-sec segment, and also reported the degree to which they felt "angry", "anxious", "sad", "happy", "calm", and "energetic" during that segment; these feelings were rated on a 7-point Likert-type scale from 1 (not at all) to 7 (extremely).

Empathic accuracy. Several measures of EA were computed for each discussion. **Negative EA** (i.e., EA with regards to negative emotions) was calculated as the average correlation between self and partner reports of the three negative moods (angry, anxious, sad) over the 9 segments. Cronbach's alpha was .36, indicating very low reliability. **Overall EA** was measured as the average correlation between self and partner reports of all six moods over the 9 segments. Cronbach's alpha was .44, indicating low reliability. **Profile EA** was measured as the average correlation between self and partner of all nine segments (i.e., one correlation for each segment) over the six moods. Cronbach's alpha was .91, indicating very high reliability. For these three EA indices, we used Fisher's r-to-z transformation before calculating their mean so that the resulting variable would be normally distributed. In the rare cases of $r=1.0$ or -1.0 , which would be transformed to infinity, we replaced positive/negative infinity with the highest/lowest non-infinity value in the set, respectively. We also ran analyses without these transformations and obtained similar results.

Observer-rated EA was obtained using ratings by three coders, blind to couple condition and to study hypotheses, using the coding scheme developed by Ickes (1990) for analyzing similarity between self and partner textual reports. All coders rated 20% of discussions, with an ICC of .66. This was deemed high enough to allow the other 80% of discussions to be rated by one coder each.

Interventions. The participants were randomly assigned to none, one or both of the following intervention groups. Importantly, both participants in each couple were always assigned to the same intervention group. This was done to preserve blinding, and to avoid ethical issues which might arise when one participant's reports are revealed to their partner, but their partner's reports are not revealed to them.

Feedback. Following Marangoni et al. (1995), after support providers in the feedback and feedback + motivation groups rated their partner's thoughts and feelings for a given 40-second segment, their partner's own self report of the same items was automatically displayed. On average, the intervention lasted 170.5 seconds, or 7.9% of the average duration of the review task.

Motivation. Following the principles outlined by Zaki (2014), before starting the second viewing of each discussion and after seeing a slide explaining the task, support providers in the motivation and feedback + motivation groups saw a slide explaining that accurate understanding of one's partner can be associated with greater satisfaction (Appendix A). The slide also explained that while inferring a partner's negative feelings might be difficult, it can be especially important. On average, this slide prolonged the instructions by 6.8 seconds, or 0.3% of the average duration of the review task.

Hypotheses and analyses. In our first study, the following hypotheses guided our work:

1a. (Main Hypothesis). Because support providers often take an active role in understanding their partners so as to provide them with appropriate support, we expected them to be the main beneficiaries of our interventions. Consequently, our main hypothesis concerned providers' EA levels after the second discussion (in which no intervention is provided). WE expected these levels to be higher among providers who receive the motivation and/or feedback interventions during the first discussion, compared to those who received no intervention. We focused on the second discussion as it provides a more stringent test of our prediction. Our analyses adjusted for background relationship satisfaction.

1b. (Secondary Hypotheses). Alongside our focus on providers, we expected the same intervention effects to also be present among support recipients in the second discussion; moreover, we expect the intervention effects to be present (for both providers and recipients) in the first discussion, as well.

2. (Exploratory Hypothesis). We explored the longer-term effects of the two interventions on relationship satisfaction measured 1-week following the interactions, while adjusting for background relationship satisfaction.

3. (Exploratory Hypothesis). We also explored the two interventions' effects on PPR measured immediately after the second discussion, adjusting for background PPR.

Power Analysis. Assuming a medium effect size ($f^2 = .15$), with three predictors (motivation [yes/no], feedback [yes/no], and their interaction), 76 participants are required to achieve a power of .80 in multiple regression. Unfortunately, due to the 2020 coronavirus pandemic, recruitment was cut short, and only 72 couples were recruited (out of 100 planned). The power to detect the post-hoc effect sizes found ($f^2 \sim 0.12$) was .774.

Statistical analysis. The pre-registered main hypothesis (Hypothesis 1a) had no repeated variables, as it dealt only with data from the support providers in the second discussion. Thus, it was analyzed using simple multiple regression. All other analyses aggregated data from both partners and both discussions using multilevel regression analyses, with a random intercept effect for each discussion for each couple, to account for shared variance among partners and among the repeated discussions. In all analyses, dichotomous variables (e.g., presence/absence of feedback) were coded as 0.5 for “yes” and -0.5 for “no”. The multilevel regression equations were as follows:

$$\begin{aligned}
 EA_{ijk} = & \beta_{00} + \beta_{10} * Feedback_i + \beta_{20} * Motivation_i + \beta_{30} * Feedback_i * Motivation_i + \beta_{40} * \\
 & * Provider_j + \beta_{50} * Provider_j * Feedback_i + \beta_{60} * Provider_j * Motivation_i + \\
 & \beta_{70} * Provider_j * Feedback_i * Motivation_i + \beta_{80} * Discussion_k + \beta_{90} * Discussion_k * Feedback_i + \\
 & \beta_{100} * Discussion_k * Motivation_i + \beta_{110} * Discussion_k * Feedback_i * Motivation_i + \beta_{120} * \\
 & Discussion_k * Provider_j + \beta_{130} * Discussion_k * Provider_j * Feedback_i + \beta_{140} * \\
 & Discussion_k * Provider_j * Motivation_i + \beta_{150} * Discussion_k * Provider_j * Feedback_i * Motivation_i + \beta_{ik} \\
 & + e_{ijk}
 \end{aligned}$$

with EA_{ijk} as EA for participant j in couple i during discussion k, $Feedback_i$ and $Motivation_i$ coded 0.5 if couple i received each intervention and -0.5 otherwise, $Provider_j$ coded 0.5 for support providers and -0.5 for support recipients, and $Discussion_k$ coded -0.5 for the first discussion and 0.5 for the second discussion. β_{ik} is the random effect for couple i during discussion k, and e_{ijk} is the remaining error for participant j in couple i during discussion k.

For both regular multiple regression analyses and multilevel regression analyses, when interaction terms were significant ($p < .05$) we performed simple slope analyses. Alpha was set to .05, except for pre-registered directional hypotheses for intervention effects in

which we performed one-tailed significance tests. To avoid confusion, we report two-tailed p values but regard results with $p < .1$ as significant when testing these effects. As most analyses were performed four times, once for each EA measure, we summarize each set of four analyses by reporting p values adjusted with the relatively conservative Bonferroni correction – simply multiplying the unmodified p values for those analyses by 4. Due to the large number of analyses, we detail only the hypothesized effects in the text (though all appear in the tables).

Results

Descriptives. Means, standard deviations, and quartiles for all study variables are reported in Table 1.1. Descriptives divided by intervention group are reported in Table 1.2.

Main Hypothesis (1a). We tested the effects of both interventions in four multiple regression analyses, one for each EA measure assessed for the support providers in the second discussion. Full statistics for all analyses are reported in Table 1.3.

Negative and overall EA. No significant effects were found.

Observer-rated EA. The motivation intervention had a significant effect on observer-rated EA ($p = .007$; f^2 effect size .124). The feedback intervention had a significant effect only in a one-tailed significance test (which we deemed appropriate given the pre-registered directional hypothesis; $p = .086$; f^2 effect size .05). The feedback-by-motivation interaction was non-significant.

Profile EA. The feedback intervention had a significant effect on profile EA ($p = .007$; f^2 effect size .12). No significant effects were found for the motivation intervention or for its interaction with feedback.

Adjusting for multiple comparisons. Two results remained significant after implementing a Bonferroni correction. The motivation intervention was associated with higher observer-rated EA (adjusted $p = .029$), and the feedback intervention was associated with higher profile EA (adjusted $p = .029$).

Secondary Hypotheses (1b). We tested the effects of both interventions for both participants in both the first and second discussion. We did this in four multi-level regression analyses, one for each EA measure (see Table 1.4). Results for support providers are also demonstrated in Figure 2.

Observer-rated EA. As in the main analysis, the motivation intervention was associated with increased observer-rated EA ($p = .002, f^2 = .05$) and the feedback intervention was associated with increased observer-rated EA (significant in a one-tailed test: $p = .057, f^2 = .02$). The effects of the feedback intervention significantly differed between providers and recipients ($p = .009, f^2 = .02$). Simple slope analyses showed a significant effect for the feedback intervention on support providers as illustrated in Figure 2 ($b(SD) = .148(.047)$, $t(64) = 3.114, p = .003, f^2 = .05$) but not on support recipients ($b(SD) = .001(.047)$, $t(64) = .028, p = .977, f^2 < 0$).

Negative EA. No effects were found for the intervention variables.

Overall EA. No main intervention effects were found. A significant interaction effect for motivation showed that motivation effects were more positive for support recipients than for support providers ($p = .039, f^2 = .02$). This interaction was qualified by a three-way interaction effect for feedback X motivation X participant role (support provider/recipient) showing that the effects of both interventions differed between recipients and providers, and according to whether the other intervention had been applied ($p = .005, f^2 = .03$). Simple slope analyses showed no significant effects for support recipients for either intervention. For

support providers, the motivation intervention had no significant effect on its own ($b(SD) = .083(.081)$, $t(64) = 1.02$, $p = .312$, $f^2 = 0$), but when added to the feedback intervention, resulted in *lower* overall EA ($b(SD) = -.264(.076)$, $t(64) = -3.468$, $p = .001$, $f^2 = .058$). The feedback intervention was associated with significantly higher overall EA on its own ($b(SD) = .205(.076)$, $t(64) = 2.682$, $p = .009$, $f^2 = .034$) but not when added to the motivation intervention ($b(SD) = -0.142(.082)$, $t(64) = -1.74$, $p = .086$, $f^2 = .012$).

Profile EA. No main intervention effects were found. A significant interaction showed that the effect of the motivation intervention was more positive during the second discussion than during the first one ($p = .006$, $f^2 = .01$). However, simple slope analyses found that effects during either discussion were not significant ($b(SD) = -0.096$, $t(64) = -0.699$, $p = .487$, $f^2 = 0$ for the first discussion; $b(SD) = .176$, $t(64) = 1.278$, $p = .206$, $f^2 = .01$ for the second discussion). Another significant interaction showed that the effect of the feedback intervention was more positive for support providers than for support recipients ($p = .004$, $f^2 = .015$). Simple slope analyses found that this intervention was associated with significantly more profile EA for providers ($b(SD) = .316(.137)$, $t(64) = 2.31$, $p = .024$, $f^2 = .05$) but not for recipients ($b(SD) = .056(.137)$, $t(64) = .407$, $p = .685$, $f^2 = 0$).

Adjusting for multiple comparisons. Several results remained significant after implementing a Bonferroni correction. The motivation intervention increased observer-rated EA for both partners across discussions (adjusted $p = .008$). For support providers, adding the motivation intervention to the feedback intervention *reduced* overall EA compared to feedback alone (adjusted $p = .004$). Finally, the effect of the motivation intervention on profile EA was stronger during the second discussion than during the first (adjusted $p = .024$) although both simple slopes were not significant.

The feedback intervention increased observer-rated EA for support providers, but not for support recipients, across discussions (adjusted $p = .012$). It also increased overall EA for support providers when the motivation intervention was not performed (adjusted $p = .036$). Finally, it increased profile EA for support providers across discussions (adjusted $p = .096$).

Exploratory Hypothesis (2). No effects were found for either intervention on relationship satisfaction at the 1-week follow-up, adjusting for relationship satisfaction assessed before the lab session (see Table 1.5). Still, to explore possible indirect intervention effects, we ran additional analyses (which were not pre-registered) to test whether relationship satisfaction at the 1-week follow-up was associated with EA. For each EA measure, we looked at both actor effects (i.e., did a participant's EA have an effect on their own satisfaction) and partner effects (i.e., did a participant's EA have an effect on their partner's satisfaction), using the Actor-Partner Interdependence Model (Kenny et al., 2006). All analyses adjusted for relationship satisfaction assessed before the lab session (see Table 1.6).

Observer-rated and overall EA. No association was found between EA and relationship satisfaction.

Negative EA. A significant interaction effect suggested that the association between participants' negative EA and their own relationship satisfaction at follow-up was more positive for support providers than for support recipients ($p = .029, f^2 = .05$). Simple slope analyses found a positive association between providers' negative EA and their relationship satisfaction which was significant in a one-tailed test ($b(SD) = .195(.109), t(59) = 1.792, p = .078, f^2 = .033$). No such effect was found for recipients ($b(SD) = -.148(.109), t(59) = -1.356, p = .18, f^2 = .02$). We did not perform a mediation analysis as neither intervention was associated with increased negative EA.

Profile EA. A significant association was found between participants' profile EA and their own relationship satisfaction at follow-up ($p = .002, f^2 = .06$). This association was qualified by a significant interaction ($p = .018, f^2 = .05$); simple slope analyses found a significant association for providers ($b(SD) = .248(.064), t(124) = 3.86, p < .001, f^2 = .11$) but not for recipients ($b(SD) = .007(.066), t(124) = .102, p = .918, f^2 < 0$).

Since feedback increased profile EA for support providers, we looked for an indirect effect of feedback on providers' relationship satisfaction, mediated by their own profile EA. This indirect effect was assessed using the Monte Carlo mediation calculator developed by Selig and Preacher (2008). As expected, a Monte Carlo simulation found a significant indirect effect of the feedback intervention leading to higher relationship satisfaction for support providers, mediated by their profile EA (95% CI .01, .168).

Adjustment for multiple comparisons. The association between support providers' profile EA and relationship satisfaction at follow-up remained significant after implementing a Bonferroni correction (adjusted $p < .001$).

Exploratory Hypothesis (3). No effects were found for either intervention on PPR after the second discussion, adjusting for PPR before the first discussion (see Table 1.7). Still, to explore possible indirect intervention effects, we ran additional analyses (which were not pre-registered) to test whether PPR after the second discussion was associated with EA. Again, for each EA measure, we looked at both actor and partner effects (see Table 1.8).

Observer-rated, Negative, and Overall EA. No association was found between EA and PPR.

Profile EA. Profile EA was associated with higher PPR after the second discussion for both participants ($p = .009, f^2 = .061$). As the feedback intervention led to increased profile

EA for support providers, we looked for an indirect effect of feedback on providers' PPR, mediated by their profile EA. As expected, a Monte Carlo simulation found a significant indirect effect of the feedback intervention leading to higher perceiver PPR, mediated by perceiver's profile EA (95% CI .003, .119).

Adjustment for multiple comparisons. The association between support providers' profile EA and PPR at follow-up remained significant after implementing a Bonferroni correction (adjusted $p = .036$).

Discussion

Our results show that both the motivation and the feedback interventions were effective, albeit to different extents. The feedback intervention increased observer-rated as well as profile accuracy for support providers in both discussions. It also increased overall accuracy for support providers in both discussions when applied alone (i.e., without the motivation intervention). Finally, there is also exploratory evidence suggesting that the feedback intervention indirectly increased support providers' perceptions of partner responsiveness at the end of the discussion session, as well as their relationship satisfaction at a 1-week follow-up; both of these indirect effects were mediated by profile EA.

The motivation intervention increased observer-rated EA for both participants across discussions but reduced overall EA for support providers when applied alongside the feedback intervention. Other than that, it had no effects on any EA index.

Study 2

Introduction

Study 2 was designed to replicate the findings of Study 1 with respect to the feedback intervention, and to do so outside the lab using daily diaries. In daily diary EA studies (e.g.,

Howland & Rafaeli, 2010; Wilhelm & Perrez, 2004), participants report their own and their partner's moods every day. The congruence between these reports (which may be calculated using various methods, including within-dyad correlations or discrepancy scores) can be seen as a measure of daily-life EA.

Daily diary EA studies have been used to explore diverse subjects, such as the links between EA and relationship satisfaction (Rafaeli et al., 2017), depression (Gadassi et al., 2011; Overall & Hammond, 2013) and emotion differentiation (Erbas et al., 2016). Daily diaries attempt to evaluate accuracy in couples' daily lives over periods of days or even weeks; they do not require bringing couples to the lab or using video equipment, and thus, tend to emphasize ecological validity over internal validity. As such, they complement lab-based methods for assessing EA.

Method

Participants. The study was conducted as part of a broader project focused on couples in which one partner was unemployed. We recruited sixty mixed-sex and three same-sex female couples, cohabiting for at least six months, in which one participant had been unemployed and job-seeking for up to four months. Couples were recruited through targeted advertisement on Facebook and through flyers distributed at unemployment bureau branches. Three couples did not complete the background questionnaires, two left the study before its commencement, three were found not to meet inclusion criteria during the first visit, and three asked to stop completing the diary before the second week of daily diaries (in which the target intervention was implemented). This left fifty-two couples (forty-nine mixed-sex and three same-sex female couples) with valid diary data. One couple opted not to complete the three-month follow-up, leaving 51 couples with valid follow-up data.

The participants' mean age was 35.9 for men (SD = 8.2) and 33.5 for women (SD = 8.18). Their mean relationship length was 7.6 years (SD = 6.38). The current study focused on the evening diary questionnaires, which were completed by participants 1976 out of 2184 possible times (90.5%). Couples were paid the local equivalent of 25 USD for the first visit, an additional 60 USD for completing the diary, and 40 USD for completing the follow-up questionnaires.

Notably, the preregistered deadline for recruitment was October 18, 2019. However, by May 2019, we realized that recruitment was progressing at a slower pace than expected, and asked our funding agency for an extension to permit recruitment through February 2020. Other than this change, the pre-registered protocol for ending recruitment was followed. We did not examine the data themselves before requesting the change.

Two couples were randomly assigned to the feedback group but did not receive the feedback intervention due to technical problems; consequently, they were re-assigned to the control group. In each couple, both participants were always in the same condition to improve blinding and to avoid possible ethical issues.

Procedure. Couples were randomly assigned to a feedback or no-feedback group. After signing a consent, they received an online background questionnaire and were scheduled for a home visit by a research assistant¹. During this visit, participants completed additional questionnaires and were introduced to the diary procedure. They were instructed to complete three questionnaires (morning, afternoon, and evening) every day for 21 days. The current study utilizes data collected in the evening questionnaire, which was distributed every day at 19:00, and which participants could complete over the ensuing 12 hours. The feedback intervention was administered to couples in the feedback group during the second week. All

¹ Two couples conducted the home session through video conferencing because of local quarantine laws enacted due to the 2020 COVID-19 epidemic.

participants were asked not to discuss their entries with each other. If they failed to complete questionnaires for two days in a row, a research assistant contacted them and attempted to encourage them to resume completion. Three months after the 21-day period, all participants received an additional follow-up questionnaire.

Measures.

Emotions. Emotions were measured each evening using the same scale used in Study 1, but without the open-ended “thoughts and feelings” question.

Empathic Accuracy. Due to the smaller sample size, we sought to reduce the number of comparisons by examining only two EA indices. Observer-rated EA was irrelevant for this study, as there are no video-recorded interactions. Of the remaining three EA indices, overall EA and negative EA seemed to capture similar aspects of the constructs, and we opted to retain only the latter, alongside profile EA, at pre-registration (and prior to analyzing Study 1 data). Cronbach’s alpha for negative EA was .66. Cronbach’s alpha for profile EA was .74, indicating good reliability.

Relationship Satisfaction. Relationship satisfaction was measured in the baseline and follow-up questionnaires with the same scale used in Study 1. Cronbach’s alpha for the baseline questionnaire was .96, and for the follow-up questionnaire .97.

Perceived Partner Responsiveness. PPR was measured daily, using a measure similar to the one used in Study 1. Weekly measures were calculated as the mean of daily PPR measures throughout the week. Cronbach’s alpha for the weekly aggregate measures was .94, indicating high reliability.

Intervention. During the second week of the diary (days 8 to 14) participants in the feedback group received an e-mail immediately after both partners completed the surveys,

showing their own ratings of their partner's emotions alongside their partner's self-ratings (for an example, see Figure 3). As a reminder, the same information was displayed the next day before completing the relevant items on the subsequent evening's questionnaire. If either partner did not complete the evening questionnaire, no e-mail was sent that day and no additional information was displayed on the next day. On average, participants viewed the feedback embedded in the questionnaire for 21.5 seconds per survey, which amounted to 2% of the survey completion time. We could not measure the time spent reading the feedback e-mail.

Hypotheses. The following hypotheses guided our work:

1a. (Main Hypothesis). We expected partners receiving the feedback intervention in the third week (in which no intervention was provided) to show greater EA levels than those who received no feedback after adjusting for EA levels assessed in the first week (prior to any intervention). We focused on the third week as it provides a more stringent test of our prediction.

1b. (Secondary Hypothesis). We hypothesized that the same effects would be found with EA assessed during the second week (i.e., as the feedback was being received), with EA during the first week as a covariate.

2. (Exploratory Hypothesis). We examined the effects of the intervention on relationship satisfaction measured at a three-month follow-up, adjusting for baseline relationship satisfaction.

3. (Exploratory Hypothesis). We examined the effects of the intervention on PPR measured during the second and third weeks, adjusting for first week PPR.

Power Analysis. Assuming a medium effect size ($f^2 = .15$), with one predictor, 27 couples (54 participants) are required for a multilevel analysis to achieve a power of .8 (Ackerman et al., 2016). Due to the requirements of the larger project from which these data are drawn, a larger number of couples were pre-registered (N=50, after expected dropout) and recruited (actual N=52 couples, due to lower-than-expected dropout). We also ran post-hoc analyses to determine the power we had to obtain the actual results of the main and secondary analyses. The analyses were slightly underpowered – power for the main analysis effect of $f^2 = .057$, was .732, and power for the secondary analysis effect of $f^2 = .064$ was .774.

Statistical analysis. All analyses aggregated data from both partners using multilevel regression analyses, with a random intercept effect for each couple. Apart from the main analysis, data from the second and third weeks was pooled, with a random intercept for each week. In all analyses, the intervention variable (feedback yes/no) was coded as 0.5 for “yes” and -0.5 for “no”. Analyses were structured as they had been in Study 1, with the following changes: (a) The “Provider” variable (which had distinguished between support providers and recipients) was replaced with a “Seeking” variable, coded 0.5 for the job seeking participant and -0.5 for their partner; (b) The “Discussion” variable was replaced with a “Week” variable which was coded -0.5 for the second diary week and 0.5 for the third diary week. Variables from the first diary week were used only as covariates (for both the second and third week data) as the intervention had not yet begun during the first week.

Results

Descriptives. Means, standard deviations, and quartiles for all study variables are reported in Table 2.1. Descriptives divided by intervention group and presented separately for job seeking and non-job-seeking participants are in Table 2.2.

Main Hypothesis (1a). We tested the effects of the intervention on EA during the third week for both partners (see Table 2.3).

Negative EA. No significant intervention effects were found.

Profile EA. As expected, the feedback group manifested higher profile EA (which was significant with a one-tailed significance test, as appropriate for a directional hypothesis; $p = .055, f^2 = .057$). After applying a Bonferroni correction for two comparisons, the results did not remain significant (adjusted $p = .11$).

Secondary Hypothesis (1b). We tested the effects of the intervention on EA for both partners across the second and third weeks, with an interaction term to allow direct comparison of the separate weeks' results (see Table 2.4). The overall effects are displayed in Figure 4.

Negative EA. No significant effects were found.

Profile EA. The feedback group was associated with higher profile EA ($p = .008, f^2 = .064$). The results held when applying a Bonferroni correction for two comparisons (adjusted $p = .016$). No significant interaction was found for week ($p = .778, f^2 < .001$) indicating that the intervention effects for both weeks were similar.

Exploratory Hypothesis (2). No significant effects were found for the intervention on relationship satisfaction three months after the study, adjusting for relationship satisfaction at baseline (see Table 2.5). Still, as in the previous study, we wished to explore possible indirect intervention effects, and thus, ran additional analyses (which were not pre-registered) to test whether relationship satisfaction at follow-up was associated with EA. For each EA measure, we looked at both actor and partner effects. All analyses adjusted for baseline

relationship satisfaction (see Table 2.6). No significant effects were found for either negative or profile EA.

Exploratory Hypothesis (3). No significant effects were found for the intervention on PPR in the second or third weeks, adjusting for PPR in the first week (see Table 2.7). Still, to explore possible indirect intervention effects, we ran additional analyses (which were not pre-registered) to test whether PPR during the second and third weeks was associated with EA. For each EA measure, we looked at both actor and partner effects. All analyses adjusted for first week PPR (see Table 2.8).

Negative EA. No significant effects were found.

Profile EA. Both actor profile EA and partner profile EA were significantly associated with PPR ($p = .014, f^2 = .122$ for actor PPR, $p = .002, f^2 = .148$ for partner PPR). As in the previous study, we performed a Monte-Carlo simulation test for mediation. The feedback intervention had significant indirect actor and partner effects on PPR, mediated by profile EA (95% CI for actors: [.006, .111], 95% CI for partners: [.013, .136]).

Discussion

We set out to develop brief and effective interventions to increase EA between real-life romantic partners, which would also be feasible to implement in research settings. We also began using these interventions to explore causal effects of EA on relationship satisfaction. Our lab study (Study 1) demonstrated that both interventions – one providing feedback, the other using motivational enhancement – increased partners' accuracy, albeit to different extents. More exploratory results suggested that the increased EA may have also affected relationship outcomes. Our naturalistic study (Study 2) replicated most of these

findings with respect to the feedback intervention. Below, we detail these findings and discuss their implications, alongside several limitations and caveats.

The Interventions' Efficacy

We tested two interventions designed to increase EA. First, we tested a feedback intervention in both studies, finding it widely effective. In Study 1, it increased support providers' EA as assessed by most of the measures considered – observer-rated EA, overall EA (when the motivation intervention was not applied), and profile EA. These effects held even when applying a strict Bonferroni correction. In Study 2, the intervention increased both participants' EA as assessed by profile accuracy. Notably, when checking the third study week in isolation the effect was not significant after applying a Bonferroni correction; however, when considering the second and third week in the same analysis, increasing power, the effect was significant even after correcting for multiple comparisons, and no difference was found between the weeks. Thus, the effects of the feedback intervention were replicated across two studies with very different methods, in different context and on different timescales, demonstrating that it has a robust capability to increase EA.

We also hypothesized that by increasing EA, the interventions would lead to increased relationship satisfaction and PPR. Mediation analyses revealed that feedback increased profile EA leading to increases in PPR and relationship satisfaction which remained even a week after the intervention. Importantly, these findings were almost perfectly replicated in our naturalistic Study 2. However, while these findings provide some limited support to our exploratory hypothesis, no direct intervention effect was found. We tend to attribute this to the combination of our study aiming for minimal interventions at the expense of effect size (see below), as well as a limited sample size, resulting in low power; considering effect sizes for the effect of the feedback intervention on support providers'

profile EA and the association between their profile EA and relationship satisfaction, we'd expect a total effect of $f^2 = .005$, which our study was not powered to find. Still, these findings can only provide preliminary support to the hypothesis and additional examinations, with a larger sample size and more intense interventions, are required.

The motivation intervention was administered only in Study 1, which found it to be effective though to a lesser extent than feedback. Its clearest benefit was an increase in observer-rated EA in both discussions and for both participants. Importantly, unlike feedback, only the motivation intervention increased *recipients'* EA; This might stem from the fact that support recipients had lower empathic effort scores than support providers, possibly due to lower initial motivation, making a motivational intervention particularly appropriate for them. On the other hand, other analyses found less pronounced effects for the motivation intervention, which actually reduced overall EA when administered jointly with the feedback intervention.

Several factors may mitigate these weaker results. First, the motivation intervention was completely novel, unlike the feedback intervention which was closely modeled on previous video-based EA studies (Barone et al., 2005; Marangoni et al., 1995). Future studies could tweak this motivation intervention further, altering the precise wording used or testing the effects in wholly different ways. Second, while both interventions were brief, the motivation intervention was markedly briefer, lasting only a few seconds. Longer or repeated exposure to the same ideas may generate stronger effects. The fact that such a short intervention had any effect on actual longstanding relationships shows the potential effect of motivational approaches for empathy training, as was demonstrated in video-based EA studies (Weisz & Zaki, 2017; Zaki, 2014). Finally, motivation intervention encouraged participants to fully experience diverse emotions, including negative ones; the instructional nature of this encouragement (Blanch-Hartigan et al., 2012) might have led participants to

focus too intently on negative emotions; the expansive nature of the open-ended EA task (i.e., observer EA) might have countered this effect. Future studies could examine these possibilities by testing whether participants who underwent a motivation intervention were characterized by certain biases, as well as by comparing different wordings of the motivational text.

Importantly, no efficacy differences were found between immediate tests of the interventions (i.e., within the first discussion in Study 1, or in the second week of Study 2) and subsequent tests of their effects (i.e., within the second discussion in Study 1, or the third week of Study 2). This suggests that the effects remain for some time.

Validity

The study was designed with both validity and generalizability in mind. To maximize internal validity, both interventions were designed minimally, and included only the core components under study. Indeed, the interventions took no more than several minutes in total, were administered with no direct interaction with the research team, and were provided with no additional context (e.g., any suggestion that they should lead to change). This minimalism strengthens our confidence that the obtained effects are due to the hypothesized mechanisms of feedback provision and motivational encouragement, and not to confounds. As we note below, it also means that implementing these interventions in less constrained ways would likely lead to much greater effects.

To maximize external validity, we followed calls for more naturalism in studies examining interpersonal emotional perception (Schilbach et al., 2013; e.g., Shamay-Tsoory & Mendelsohn, 2019) and tested the effects of these interventions on participants who inferred the emotions of actual long-term partners (rather than standard stimulus targets) with whom they had actual live interactions (rather than passive observation of videos). In other words,

the interventions had effects on people who have years of experience inferring each other's emotions; presumably, the interventions may have even larger effects in other contexts (e.g., on new acquaintances or less established couples). It also means that the results are highly generalizable, as demonstrated by replicating the feedback intervention's effects in an ecologically valid study outside of the lab.

Measurement and Statistical Issues

Our EA measures included observer ratings or simple correlations between self-reports and partner inferences of emotions. Unfortunately, our decision to use only one item to measure each emotion, intended to reduce the burden placed on participants, backfired: we found very few results when considering negative and overall EA (and poor reliability for these indices, at least in Study 1). This is likely to be the reason that the established association between relationship satisfaction and EA for negative emotions (Sened et al., 2017) was not replicated.

Observer-rated EA performed better and allowed us to detect both interventions' effects. The robustness of this measure is reflected in its frequent use in dyadic EA studies (Ickes & Hodges, 2013). Interestingly, profile EA was also highly reliable and helped detect many of the effects. Profile measures are widely used in personality psychology (Biesanz, 2018; Furr, 2008), and have begun to make their way into the study of interpersonal emotional phenomena as well. For example, in a study of romantic couples, Levavi-Francy and colleagues (2019) used profile measures to demonstrate that similarity between romantic partners' emotion profiles heightens the effects of relational events (e.g., conflict) on relationship outcomes. Our findings suggest that future studies should consider using profile EA as a key indicator.

An additional reason why both profile and observer-rated EA might have shown stronger effects is that they map the participants' task more closely. In Study 1, participants saw a segment of the discussion and were then asked to infer their partner's thoughts and feelings, and to rate six possible emotions for that specific segment, which is exactly what both of these EA measures track. This is quite distinct from, say, asking participants to watch the whole discussion six times, each time rating a single emotion; this would be more in line with the way negative and overall EA are calculated, and could be an intriguing direction for further research.

Beyond the measures themselves, it is worth noting that power calculations for both studies were based on expected medium effects. Post-hoc analyses revealed that the studies were slightly underpowered ($.73 < 1-\beta < .8$) to detect the the actual effects found. Still, since the main hypotheses were pre-registered and, at least for the feedback intervention, the results replicated across both studies, we do not see this as a major concern.

Addressing Alternative Explanations

Though our participants were randomly assigned to intervention groups, which helps rule out reverse causation, additional alternative explanations should be addressed. First, there is the possibility of expectancy effects due to limited blinding. Several measures were taken so that participants and observational coders would be as blind as possible to the random allocation and to study hypotheses, and that experimenters would be blind to the allocated condition of each participant. Indeed, the couples themselves were not aware that this was an intervention study at all; still, to get appropriate ethical consent, they were notified of the possibility that they might be provided with each other's emotional ratings at some point in the study (though these were not construed as "feedback" nor tied to improved accuracy).

Importantly, our EA indices, though based on self-reported data, are ultimately objective measures created using mathematical calculations (for a discussion of the use of derived measures to avoid overly relying on self-report, see Sened et al., 2018). Expectancy effects (or “placebo” effects; Hróbjartsson & Gøtzsche, 2001) are generally less pronounced when outcomes are assessed using objective measures. Additionally, as motivation is a key element in expectancy effects (Price et al., 2008), we would expect them to be stronger following the motivation intervention, which was not the case: the interventions were roughly comparable with some advantage for feedback over motivation.

Another alternative explanation for our findings could be that the feedback intervention simply provides participants with direct information about their partner’s emotions, rather than improving their ability to infer this information by themselves. However, if this were the case, we would expect the effects to decline rapidly after the intervention was completed. In both studies, that was not the case: the effects did not significantly differ between the intervention period and the subsequent period (i.e., the first vs. second empathic inference tasks in Study 1; the second vs. third week in Study 2).

Because both partners served as both perceivers and targets and were subjected to the same intervention, a final alternative explanation could be that the obtained effects stem from the interventions causing targets to become more expressive or readable. While target expressivity certainly plays a role in EA (Marangoni et al., 1995; Zaki et al., 2008), we believe it is unlikely to be responsible for the majority of the results, as the intervention effects on EA were evident even in the first discussion (Study 1) which preceded the application of either intervention (in the review phase). Importantly, in clinical applications of these findings, clearly delimiting increases in partner A’s inference capability from increases in partner B’s expressivity would not be essential, as long as partners in the specific couple infer each other’s emotions more accurately.

Implications

The findings reported have important implications for EA research and for applied work with couples. From a theoretical perspective, the mere efficacy of these interventions demonstrates that EA is malleable, even in the context of existing longstanding close relationships. Pragmatically, the interventions themselves are extremely brief and can be administered in less than an hour in a lab setting, or by adding a few minutes to experience sampling or daily questionnaires. Thus, they can help researchers examine causal hypotheses about the role played by accuracy in interpersonal relationships. Our findings lend preliminary support to one such causal hypothesis – that EA **causes** better relationship outcomes and is not simply a by-product of good relationships.

Our findings show that easy-to-apply methods can improve participants' ability to infer the emotions of their partner, whom they have known intimately for years. This has important implications for couples' work. First, with minor adaptation, these interventions could be applicable in the real world. Additionally, they can be easily scaled up; for example, instead of the one-week timeframe examined here, a smartphone app might ask people in close relationships to report their emotions daily for long periods of time and send feedback to their partners automatically. Of course, such interventions require additional investigation.

Second, feedback and motivation might be potent mechanisms underlying existing couples therapies or interventions. For example, in Imago therapy (Muro et al., 2016), couples are encouraged to discuss their emotions, and provide each other with feedback about their mutual emotional understanding. The roles of feedback and of motivation for accuracy can be assessed as possible treatment mechanism. Conversely, the brief interventions tested here may offer convenient ways to study these mechanisms without running full therapy programs.

Limitations and Future Directions

These two studies have some notable limitations. First, as mentioned above, the minimalistic design may have caused the effects to be somewhat weaker than expected. To obtain stronger effects, future studies could employ expanded versions of the interventions - e.g., administering them for longer periods of time, personally instead of automatically, and while providing the intervention recipients with more contextual information. In such studies, improved emotion questionnaires could be broadened to including several for each emotion.

Second, the studies were conducted in one Western country ([REDACTED FOR BLIND REVIEW]). Study 1 was conducted with students and their romantic partners, a relatively affluent population. Even though Study 2 did recruit less-affluent couples (unemployed job-seekers), it is still not a representative sample. Additionally, most couples were in long-term heterosexual relationships. A wider range of romantic relationships in other cultural, socio-economic, ethnic, and gender contexts should be studied in future research.

Third, in both intervention studies, partners in each couple received the same intervention, to avoid ethical and blinding issues which may arise if a participant realizes that their partner is undergoing a different procedure. As we noted earlier, this may confound the intervention effects on each specific participant. One way to deal with this would be to use a control intervention so that participants wouldn't know which one of them is receiving the "real" intervention. Alternatively, one partner could be designated as the target and another as the perceiver who does (or does not) receive the intervention; importantly, making this choice would make the study design less relevant ecologically or clinically.

Fourth, future studies could go beyond our reliance on self-reported relational outcomes to assess status changes (e.g., moving in together, getting married, breaking up), or relationship behaviors which can be rated by external observers (cf. Gottman, 2013).

Finally, while both studies dealt with romantic couples, it will be important to see whether the effects found in the present study generalize to other types of relationships. As mentioned above, previous studies (Barone et al., 2005; Marangoni et al., 1995) have examined feedback effects on the EA of clinical psychology trainees by using videotapes of psychotherapy patients. Similarly, future research should examine the effects of such an intervention on therapists inferring their actual clients' emotions, and on therapeutic outcomes. The effects of these interventions can also be examined within other relationships (e.g., parents and children, educators and students, or coaches and athletes).

Conclusion

The current study aimed to develop a brief intervention to increase romantic couples' EA, to advance research on EA in couples beyond correlational findings. We tested two possible intervention mechanisms – providing feedback on empathic inferences and increasing participants' motivation to be empathic. We tested both interventions using a lab paradigm and replicated findings on the feedback intervention in a more naturalistic setting using daily diaries.

Our study found that (a) interventions using both feedback provision (in the lab or in daily life) and motivation (in the lab) can increase EA, and (b) that EA was associated with increased relationship satisfaction and PPR up to a week later, which may indirectly reflect an effect of the interventions (though our study was under-powered to fully test this). Taken together, these findings provide basic empirical support for the malleability and impact of

EA, and demonstrate easy-to-apply interventions which can increase couples' ability to identify each others' emotions.

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Table 1.1 Study 1 Descriptive Statistics

.Max	Q3	Median	Q1	.Min	Mean(SD)	
1.19	67.	56.	33.	0	(27.)53.	Observer-Rated EA After First Discussion
1.26	67.	44.	3.	0	(26.)48.	Observer-Rated EA After Second Discussion
1.65	61.	26.	03.-	63.-	(5.)32.	Negative EA After First Discussion
1.39	43.	07.	2.-	85.-	(45.)13.	Negative EA After Second Discussion
94.	41.	18.	01.	59.-	(31.)2.	Overall EA After First Discussion
99.	37.	18.	04.-	61.-	(3.)18.	Overall EA After Second Discussion
2.33	1.61	1.19	84.	1.12-	(58.)1.18	Profile EA After First Discussion
2.36	1.68	1.28	79.	89.-	(67.)1.19	Profile EA After Second Discussion
6.19	6.06	5.88	5.56	3.56	(45.)5.74	Relationship Satisfaction Before First Discussion
6.19	6.06	5.84	5.5	2.94	(56.)5.67	Relationship Satisfaction at 1-week Follow-up
5	5	4.67	4.33	3.33	(4.)4.68	PPR Before First Discussion
5	5	5	4.33	1.67	(6.)4.6	PPR After Second Discussion
8	7	6.17	5	1	(1.72)5.86	Empathic Effort After First Discussion
8	7.5	6.33	5.17	1.5	(1.62)6.12	Empathic Effort After Second Discussion
7.5	5.83	5	4.17	1.5	(1.4)4.91	Empathic Mindset at 1-week Follow-up

EA – Empathic Accuracy; PPR – Perceived Partner Responsiveness

Table 1.2 Study 1 Descriptive Statistics by Intervention Group

	Support Recipient M(SD)				Support Provider M(SD)			
	.No Int	Motivation	Feedback	.Both Int	.No Int	Motivation	Feedback	.Both Int
Observer-Rated EA After First Discussion	(24.)51.	(29.)66.	(25.)54.	(27.)57.	(22.)31.	(23.)48.	(29.)5.	(25.)67.
Observer-Rated EA After Second Discussion	(28.)47.	(27.)53.	(21.)5.	(36.)57.	(2.)34.	(23.)47.	(24.)41.	(24.)59.
Negative EA After First Discussion	(39.)2.	(46.)38.	(41.)12.	(54.)2.	(58.)31.	(63.)51.	(46.)52.	(45.)33.
Negative EA After Second Discussion	(25.)06.-	(55.)1.-	(48.)09.	(36.)13.	(45.)17.	(5.)46.	(37.)13.	(47.)06.
Overall EA After First Discussion	(3.)16.	(18.)19.	(24.)16.	(2.)14.	(42.)18.	(37.)25.	(33.)46.	(3.)08.
Overall EA After Second Discussion	(25.)13.	(29.)14.	(32.)07.	(27.)3.	(29.)14.	(33.)24.	(35.)27.	(29.)12.
Profile EA After First Discussion	(65.)1.3	(48.)1.21	(49.)1.3	(67.)1.21	(58.)1.01	(56.)97.	(42.)1.3	(76.)1.13
Profile EA After Second Discussion	(63.)1.07	(57.)1.38	(5.)1.32	(86.)1.33	(79.)72.	(65.)1.06	(48.)1.3	(72.)1.31
Relationship Satisfaction Before First Discussion	(0.26)5.79	(0.31)5.92	(0.41)5.8	(0.36)5.71	(43.)5.71	(33.)5.81	(68.)5.65	(62.)5.53

	Support Recipient M(SD)				Support Provider M(SD)			
	.No Int	Motivation	Feedback	.Both Int	.No Int	Motivation	Feedback	.Both Int
Relationship Satisfaction at 1-week Follow-up	(0.36)5.79	(0.49)5.79	(0.36)5.8	(0.45)5.59	(52.)5.56	(37.)5.79	(77.)5.64	(88.)5.38
PPR Before First Discussion	(32.)4.73	(44.)4.78	(2.)4.86	(36.)4.54	(43.)4.65	(35.)4.71	(45.)4.72	(5.)4.44
PPR After Second Discussion	(54.)4.61	(71.)4.61	(48.)4.7	(43.)4.6	(68.)4.47	(49.)4.69	(46.)4.7	(94.)4.38
Empathic Effort After First Discussion	(1.42)4.89	(1.9)5.13	(1.76)4.6	(1.5)4.86	(1.11)7.02	(1.18)6.84	(1.07)6.86	(1.21)6.73
Empathic Effort After Second Discussion	(1.08)5.39	(1.93)5.06	(1.76)5.33	(1.08)5.35	(1.01)7.24	(1.3)6.98	(1.53)6.92	(1.24)6.7
Empathic Mindset at 1-week Follow-up	(1.22)4.48	(1.63)4.51	(1.2)5.38	(1.43)4.85	(1.31)5.11	(1.64)4.92	(1.49)4.87	(1.28)5.08

EA – Empathic Accuracy; PPR – Perceived Partner Responsiveness

Table 1.3 Study 1 Hypothesis 1a – Multiple Regression Analysis of EA by Intervention Group for Providers in the Second Discussion with Relationship Satisfaction as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size
Observer-Rated EA				
Intercept	.36(.3)	1.21(62)	.230	.02
Feedback	.1(.06)	1.75(62)	.086†	.05
Motivation	.16(.06)	2.77(62)	.007**	.12
Feedback*Motivation	.02(.05)	0.29(62)	.770	0
Relationship Satisfaction Before First Discussion	.06(.11)	0.53(62)	.599	0
Negative EA				
Intercept	-.6(.88)	-0.68(41)	.500	.01
Feedback	-.22(.13)	-1.67(41)	.103	.07
Motivation	.09(.14)	0.67(41)	.507	.01
Feedback*Motivation	.14(.15)	0.92(41)	.364	.02
Relationship Satisfaction Before First Discussion	-.36(.27)	-1.37(41)	.179	.05
Overall EA				
Intercept	-.47(.47)	-0.99(56)	.328	.02
Feedback	.01(.08)	0.13(56)	.896	0
Motivation	-.03(.08)	-0.4(56)	.689	0
Feedback*Motivation	.12(.08)	1.39(56)	.169	.03
Relationship Satisfaction Before First Discussion	-.24(.16)	-1.51(56)	.137	.04
Profile EA				
Intercept	.03(.86)	0.04(63)	.969	0
Feedback	.45(.16)	2.78(63)	.007**	.12
Motivation	.18(.16)	1.14(63)	.257	.02
Feedback*Motivation	.19(.15)	1.24(63)	.219	.02
Relationship Satisfaction Before First Discussion	-.28(.32)	-0.89(63)	.379	.01

EA – Empathic Accuracy. Negative effect sizes indicate model without variable explains more variance than model with variable. †p < .1 **p < .01

Table 1.4 Study 1 Hypothesis 1b – Multilevel Regression Analysis of EA by Intervention Group Across Partners and Discussions with Relationship Satisfaction as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Discussions		
					t(DF)	p	f ² Effect Size
Observer-Rated EA							
Intercept	.41(.23)	1.84(126)	.068†	.01	-1.52(63)	.134	.01
Feedback	.07(.04)	1.94(64)	.057†	.02	-0.21(63)	.837	0
Motivation	.12(.04)	3.17(64)	.002**	.06	-0.24(63)	.809	0
Provider	-.07(.03)	-2.42(126)	.017*	.02	0.29(126)	.772	0
Feedback*Motivation	-.01(.08)	-0.18(64)	.854	0	0.73(63)	.469	0
Feedback*Provider	.15(.06)	2.65(126)	.009**	.02	-1.47(126)	.144	.01
Motivation*Provider	.09(.06)	1.58(126)	.116	.01	0.04(126)	.972	0
Feedback*Motivation* Provider	.08(.11)	0.76(126)	.451	0	-0.27(126)	.791	0
Relationship Satisfaction Before First Discussion	.02(.04)	0.41(126)	.680	0			
Negative EA							
Intercept	.32(.52)	0.61(61)	.543	0	-2.74(43)	.009**	.05
Feedback	-.03(.08)	-0.44(59)	.662	0	0.33(43)	.741	0
Motivation	.06(.08)	0.72(59)	.474	0	-0.14(43)	.888	0
Provider	.19(.07)	2.64(61)	.010*	.04	-0.12(61)	.906	< 0
Feedback*Motivation	-.19(.16)	-1.24(59)	.221	.01	0.36(43)	.720	0
Feedback*Provider	-.14(.14)	-0.96(61)	.340	0	-1.94(61)	.057†	.02
Motivation*Provider	0(.14)	0.01(61)	.991	0	0.86(61)	.393	0
Feedback*Motivation* Provider	-.37(.28)	-1.29(61)	.203	.01	-0.28(61)	.777	0
Relationship Satisfaction Before First Discussion	-.02(.09)	-0.2(61)	.843	0			
Overall EA							

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Discussions		
					t(DF)	p	f ² Effect Size
Intercept	.07(.27)	0.26(104)	.792	0	-0.65(59)	.517	0
Feedback	.02(.04)	0.48(64)	.636	0	0.16(59)	.874	0
Motivation	-.01(.04)	-0.32(64)	.753	0	1.58(59)	.119	.01
Provider	.06(.04)	1.54(104)	.126	.01	-0.65(104)	.518	0
Feedback*Motivation	-.13(.08)	-1.57(64)	.122	.01	1.49(59)	.141	.01
Feedback*Provider	.02(.07)	0.3(104)	.768	0	-0.93(104)	.355	0
Motivation*Provider	-.15(.07)	-2.1(104)	.039*	.02	0.14(104)	.888	0
Feedback*Motivation* Provider	-.43(.15)	-2.9(104)	.005**	.03	-0.17(104)	.867	0
Relationship Satisfaction Before First Discussion	.02(.05)	0.43(104)	.665	0			
Profile EA							
Intercept	1.32(.52)	2.55(126)	.012*	< 0	0.09(64)	.925	0
Feedback	0.19(.13)	1.44(64)	.156	.02	1.66(64)	.101	0
Motivation	0.04(.13)	0.31(64)	.758	0	2.84(64)	.006**	.01
Provider	-0.17(.05)	-3.65(126)	< .001***	0	-0.22(126)	.828	0
Feedback*Motivation	-0.2(.26)	-0.78(64)	.435	.01	-1.35(64)	.182	0
Feedback*Provider	0.26(.09)	2.96(126)	.004**	.01	0.41(126)	.680	0
Motivation*Provider	0(.09)	-0.05(126)	.958	0	0.14(126)	.888	0
Feedback*Motivation* Provider	-0.07(.18)	-0.38(126)	.702	0	0.38(126)	.705	0
Relationship Satisfaction Before First Discussion	-0.02(.09)	-0.27(126)	.786	< 0			

EA – Empathic Accuracy. Negative effect sizes indicate model without variable explains more variance than model with variable. *p < .05 **p < .01 ***p < .001

Table 1.5 Study 1 Hypothesis 2 – Multilevel Regression Analysis of Relationship Satisfaction at 1-week Follow-Up by Intervention Group Across Partners with Relationship Satisfaction Before First Discussion as a Covariate

	Estimate (SE)	t(DF)	P	f ² Effect Size
Intercept	.44(.44)	1.02(65)	.312	0
Feedback	-.01(.07)	-0.1(65)	.918	0
Motivation	-.06(.07)	-0.84(65)	.403	.01
Provider	-.03(.06)	-0.53(64)	.596	0
Feedback*Motivation	-.16(.14)	-1.11(65)	.271	.01
Feedback*Provider	-.01(.12)	-0.04(64)	.965	0
Motivation*Provider	.11(.12)	0.92(64)	.359	.01
Feedback*Motivation*Provider	-.29(.23)	-1.22(64)	.225	.01
Relationship Satisfaction Before First Discussion	.91(.08)	12.02(64)	< .001***	1.18

***p < .001

Table 1.6 Study 1 Hypothesis 2 – Multilevel Regression Analysis of Relationship Satisfaction at 1-week Follow-Up by EA Across Partners and Discussions with Relationship Satisfaction Before First Discussion as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Discussions		
					t(DF)	p	f ² Effect Size
Observer-Rated EA							
Intercept	.29(.26)	1.13(124)	.261	< 0	-.08(66)	.937	0
Actor EA	.05(.06)	0.87(124)	.387	0	-.45(124)	.654	0
Partner EA	-.03(.06)	-0.59(124)	.559	< 0	.58(124)	.565	0
Provider	-.16(.06)	-2.68(124)	.008**	.01	.68(124)	.497	0
Actor EA*Provider	.18(.11)	1.63(124)	.106	0	-.24(124)	.811	< 0
Partner EA*Provider	.19(.11)	1.72(124)	.088†	.01	-.41(124)	.679	0
Relationship Satisfaction Before First Discussion	.94(.04)	21.41(124)	< .001***	2.18			
Negative EA							
Intercept	.32(.48)	0.67(59)	.503	0	-1.63(18)	.121	.04
Actor EA	.02(.08)	0.3(59)	.763	0	1.1(59)	.278	.01
Partner EA	-.01(.08)	-0.17(59)	.868	0	1.48(59)	.144	.02

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Discussions		
					t(DF)	p	f ² Effect Size
Provider	-.1(.07)	-1.4(59)	.168	.01	-0.91(59)	.365	0
Actor EA*Provider	.34(.15)	2.24(59)	.029*	.05	0.81(59)	.423	.01
Partner EA*Provider	-.04(.15)	-0.26(59)	.798	0	1.04(59)	.303	0
Relationship Satisfaction Before First Discussion	.93(.08)	11.1(59)	< .001***	1.18			
Overall EA							
Intercept	-.03(.4)	-0.08(102)	.939	< 0	-.14(49)	.893	0
Actor EA	-.03(.08)	-0.41(102)	.682	0	.27(102)	.784	0
Partner EA	.01(.08)	0.11(102)	.912	< 0	-.18(102)	.856	< 0
Provider	-.07(.05)	-1.25(102)	.214	.01	-.28(102)	.783	0
Actor EA*Provider	.14(.17)	0.82(102)	.412	.01	.34(102)	.731	0
Partner EA*Provider	-.04(.17)	-0.22(102)	.828	0	-.1(102)	.924	0
Relationship Satisfaction Before First Discussion	.99(.07)	14.39(102)	< .001***	1.21			
Profile EA							
Intercept	.36(.34)	1.06(124)	.292	0	0.11(66)	.910	0
Actor EA	.13(.04)	3.09(124)	.002**	.06	-1.35(124)	.180	0
Partner EA	-.04(.04)	-0.91(124)	.363	< 0	1.2(124)	.233	0
Provider	-.34(.08)	-4.24(124)	< .001***	.04	0.38(124)	.707	0
Actor EA*Provider	.24(.1)	2.4(124)	.018*	.05	-0.44(124)	.658	0
Partner EA*Provider	.04(.1)	0.38(124)	.702	< 0	-0.07(124)	.945	< 0
Relationship Satisfaction Before First Discussion	.91(.06)	15.58(124)	< .001***	1.26			

EA – Empathic Accuracy. Negative effect sizes indicate model without variable explains more variance than model with variable. †p < .1 *p < .05 **p < .01 ***p < .001

Table 1.7 Study 1 Hypothesis 3 – Multilevel Regression Analysis of PPR After Second Discussion by Intervention Group Across Partners with PPR Before First Discussion as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size
Intercept	2.06(.58)	3.56(65)	.001***	.01
Feedback	.04(.11)	.39(65)	.697	0
Motivation	.01(.11)	.12(65)	.908	0
Provider	-.02(.08)	-.22(64)	.826	0
Feedback*Motivation	-.13(.23)	-.55(65)	.582	0
Feedback*Provider	-.06(.16)	-.39(64)	.700	0
Motivation*Provider	-.02(.16)	-.1(64)	.917	0
Feedback*Motivation*Provider	-.46(.32)	-1.47(64)	.148	.01
PPR Before First Discussion	.54(.12)	4.39(64)	< .001***	.16

PPR – Perceived Partner Responsiveness ***p < .001

Table 1.8 Study 1 Hypothesis 3 – Multilevel Regression Analysis of PPR After Second Discussion by EA Across Partners and Discussions with PPR Before First Discussion as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Discussions		
					t(DF)	p	f ² Effect Size
Observer-Rated EA							
Intercept	2.09(.34)	6.12(124)	< .001***	< 0	-.24(66)	.811	0
Actor EA	.02(.09)	.21(124)	.836	0	-.22(124)	.823	< 0
Partner EA	.1(.09)	1.11(124)	.271	.02	.65(124)	.519	0
Provider	.07(.1)	.68(124)	.500	0	-.22(124)	.827	0
Actor EA*Provider	-.03(.18)	-.18(124)	.855	< 0	.17(124)	.864	0
Partner EA*Provider	-.05(.18)	-.29(124)	.770	0	0(124)	.999	0
PPR Before First Discussion	.53(.07)	7.51(124)	< .001***	.27			

Negative EA

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Discussions		
					t(DF)	p	f ² Effect Size
Intercept	2.11(.52)	4.05(59)	< .001***	.01	-.42(18)	.683	0
Actor EA	-.01(.1)	-.07(59)	.948	< 0	.82(59)	.418	0
Partner EA	.06(.1)	.58(59)	.565	0	.13(59)	.899	< 0
Provider	.04(.09)	.48(59)	.631	0	-1.92(59)	.060 [†]	.01
Actor EA*Provider	.21(.2)	1.03(59)	.306	.01	1.42(59)	.159	.02
Partner EA*Provider	.13(.2)	.63(59)	.530	0	1.87(59)	.067 [†]	.03
PPR Before First Discussion	.53(.11)	4.83(59)	< .001***	.16			
Overall EA							
Intercept	2.1(.44)	4.83(102)	< .001***	0	.05(49)	.959	0
Actor EA	.02(.11)	.14(102)	.892	0	.6(102)	.548	0
Partner EA	.02(.11)	.14(102)	.886	0	-.35(102)	.725	< 0
Provider	-.06(.07)	-.86(102)	.394	0	.24(102)	.812	0
Actor EA*Provider	.24(.22)	1.06(102)	.292	.01	.09(102)	.928	0
Partner EA*Provider	.07(.23)	.33(102)	.742	< 0	.08(102)	.940	< 0
PPR Before First Discussion	.53(.09)	5.73(102)	< .001***	.13			
Profile EA							
Intercept	1.84(.4)	4.67(124)	< .001***	.02	.36(66)	.722	0
Actor EA	.16(.06)	2.65(124)	.009**	.06	-1.2(124)	.232	0
Partner EA	.09(.06)	1.55(124)	.123	.03	.84(124)	.405	0
Provider	-.08(.11)	-.73(124)	.468	0	.59(124)	.555	0
Actor EA*Provider	0(.15)	.01(124)	.995	< 0	-.45(124)	.655	0
Partner EA*Provider	.07(.15)	.5(124)	.616	0	-.1(124)	.924	< 0
PPR Before First Discussion	.52(.08)	6.36(124)	< .001***	.16			

EA – Empathic Accuracy. PPR – Perceived Partner Responsiveness. Negative effect sizes indicate model without variable explains more variance than model with variable. [†]p < .1 **p < .01 ***p < .001

Table 2.1 Study 2 Descriptive Statistics

	Mean(SD)	Min.	Q1	Median	Q3	Max.
First Week Negative EA	.26(.6)	-1.33	-.16	.27	.67	1.38
Second Week Negative EA	.28(.62)	-1.15	-.17	.17	.72	1.78
Third Week Negative EA	.32(.46)	-.74	-.06	.33	.72	1.32
First Week Profile EA	.96(.5)	-.16	.63	.92	1.27	2.19
Second Week Profile EA	1.07(.54)	-.17	.69	1.05	1.55	2.11
Third Week Profile EA	1.05(.54)	-.2	.68	1.1	1.48	2.28
Baseline CSI	4.69(0.63)	2.5	4.38	4.84	5.19	5.5
Follow-up CSI	4.59(0.73)	1.62	4.31	4.81	5.06	5.44
First Week PPR	4.68(1.06)	1.05	4.09	4.81	5.54	6
Second Week PPR	4.69(1.2)	1.04	4	4.92	5.67	6
Third Week PPR	4.6(1.3)	.22	4.04	4.87	5.67	6
Baseline Empathic Mindset	4.29(1.36)	1.33	3.5	4.17	5	7
Baseline Empathic Effort	5.75(0.99)	2.17	5.12	6	6.5	7
Follow-up Empathic Effort	5.45(1.24)	1	4.83	5.83	6.17	7

EA – Empathic Accuracy. PPR – Perceived Partner Responsiveness.

Table 2.2 Study 2 Descriptive Statistics by Intervention Group

	Job Seeker M(SD)		Non-Seeker M(SD)	
	No Int.	Feedback	No Int.	Feedback
First Week Negative EA	.22(.79)	.37(.49)	.28(.54)	.18(.56)
Second Week Negative EA	.17(.66)	.24(.61)	.36(.69)	.31(.54)
Third Week Negative EA	.36(.51)	.39(.39)	.22(.47)	.3(.49)
First Week Profile EA	1.08(.46)	1.03(.37)	.88(.59)	.85(.53)
Second Week Profile EA	1(.63)	1.19(.53)	.94(.48)	1.16(.48)
Third Week Profile EA	.96(.54)	1.21(.5)	.98(.58)	1.08(.55)
Baseline Relationship Satisfaction	4.73(0.65)	4.76(0.49)	4.66(0.74)	4.62(0.63)
Follow-up Relationship Satisfaction	4.66(0.63)	4.58(0.79)	4.53(0.76)	4.57(0.77)

	Job Seeker M(SD)		Non-Seeker M(SD)	
	No Int.	Feedback	No Int.	Feedback
First Week PPR	4.6(1.26)	4.74(.94)	4.7(.98)	4.68(1.06)
Second Week PPR	4.58(1.35)	4.72(1.03)	4.75(1.25)	4.72(1.21)
Third Week PPR	4.42(1.55)	4.68(1.25)	4.57(1.2)	4.75(1.19)
Baseline Empathic Mindset	4.04(1.48)	4.63(1.36)	4.15(1.38)	4.39(1.22)
Baseline Empathic Mindset	2.54(1.48)	3.13(1.36)	2.65(1.38)	2.89(1.22)
Baseline Empathic Effort	5.67(1.32)	5.93(0.88)	5.8(0.8)	5.61(0.87)

EA – Empathic Accuracy. PPR – Perceived Partner Responsiveness.

Table 2.3 Study 2 Hypothesis 1a – Multilevel Regression Analysis of Third Week EA by Intervention Group Across Partners with First Week EA as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size
Negative EA				
Intercept	.35(.08)	4.68(36)	< .001***	.01
Feedback	.1(.14)	.69(36)	.496	.01
Seeking	.14(.1)	1.41(20)	.174	.01
Feedback*Seeking	-.13(.2)	-.64(20)	.529	0
First Week Negative EA	-.06(.1)	-.57(20)	.573	0
Profile EA				
Intercept	.48(.1)	4.72(50)	< .001***	.01
Feedback	.2(.1)	1.97(50)	.055 [†]	.06
Seeking	-.06(.07)	-.94(49)	.352	.01
Feedback*Seeking	.16(.13)	1.25(49)	.216	.01
First Week Profile EA	.61(.09)	6.7(49)	< .001***	.53

EA – Empathic Accuracy [†]p < .1 ***p < .001

Table 2.4 Study 2 Hypothesis 1b – Multilevel Regression Analysis of EA by Intervention Group Across Partners and Weeks with First Week EA as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Second and Third Week		
					t(DF)	p	f ² Effect Size
Negative EA							
Intercept	.28(.06)	4.42(41)	< .001***	.02	1.38(30)	.177	.01
Feedback	.06(.12)	.5(41)	.622	0	.31(30)	.761	0
Seeking	-.02(.08)	-.31(35)	.757	0	2.28(35)	.029*	.02
Feedback*Seeking	.1(.15)	.67(35)	.508	< 0	-1.47(35)	.149	0
First Week Negative EA	-.08(.08)	-.99(35)	.328	.01			
Profile EA							
Intercept	.53(.08)	6.96(98)	< .001***	.01	-.28(49)	.778	0
Feedback	.22(.08)	2.75(50)	.008**	.06	-.22(49)	.825	0
Seeking	-.06(.05)	-1.08(98)	.282	.01	.04(98)	.972	0
Feedback*Seeking	.07(.1)	.72(98)	.472	0	.91(98)	.367	0
First Week Profile EA	.56(.07)	8.13(98)	< .001***	.54			

EA - Empathic Accuracy *p < .05 **p < .01 ***p < .001

Table 2.5 Study 2 Hypothesis 2 – Multilevel Regression Analysis of Relationship Satisfaction by Intervention Group Across Partners and Weeks with Baseline Relationship Satisfaction as a Covariate

Difference Between Second and Third Week							
f2 Effect Size	p	t(DF)	f2 Effect Size	p	t(DF)	Estimate (SE)	
0.000	<.001	0.49	0.000	>.001	5.69 (97)	1.55 (27.)	Intercept
0.000	<.001	0.49	0.000	.795	0.26 (49)	0.03 (12)	Feedback
0.000	<.001	0.97	0.000	.759	0.31 (97)	0.01 (04.)	Seeking
0.000	<.001	0.97	0.01	†0.63	1.88 (97)	0.16 (09)	Feedback*Seeking
			1.53	>.001	11.37 (97)	0.65 (06.)	Baseline Relationship Satisfaction

EA - Empathic Accuracy. †p < .1 ***p < .001

Table 2.6 Study 2 Hypothesis 2 – Multilevel Regression Analysis of Relationship Satisfaction by EA Across Partners and Weeks with Baseline Relationship Satisfaction as a Covariate

Difference Between Second and Third Week							
f2 Effect Size	P	t(DF)	f2 Effect Size	p	t(DF)	Estimate (SE)	
							Negative EA
01.	719.	(16)0.37-	0 >	*019.	(42)2.43	45.)1.09 (	Intercept
0 >	962.	(42)0.05-	0	983.	(42)0.02	(08.)0	Actor EA
0	553.	(42)0.6-	0 >	371.	(42)0.9	09.)0.08 (	Seeking
04.	289.	(42)1.07	0 >	855.	(42)0.18	09.)0.02 (	Partner EA
0	911.	(42)0.11	0.02	488.	(42)0.7	21.)0.15 (	Actor EA*Seeking
01.	635.	(42)0.48-	0.02	380.	)0.89- (42	.)0.19- (21	Partner EA*Seeking
			1.5	*001. > **	(42)7.89	09.)0.74 (	Baseline Relationship Satisfaction
							Profile EA
0	997.	(49)0	0 >	*001. > **	(90)5.36	29.)1.53 (	Intercept
0 >	964.	(90)05.-	0.01	425.	(90)0.8	06.)0.05 (	Actor EA
0 >	553.	(90)6.	0	*016.	(90)2.45	11.)0.26 (	Seeking
0	949.	(90)06.	0.01	431.	(90)0.79	06.)0.05 (	Partner EA
0 >	761.	(90)31.-	0 >	547.	(90)0.6-	.)0.09- (14	Actor EA*Seeking

Difference Between Second and Third Week							
f ² Effect Size	p	t(DF)	f ² Effect Size	p	t(DF)	Estimate (SE)	
0.819	.23	1.90	0.02	.305	-1.03 (90)	-.015 (.14)	Partner EA*Seeking
1.5	>.001**	10.85 (90)			0.63 (.06)		Baseline Relationship Satisfaction

EA - Empathic Accuracy. *p < .05 ***p < .001

Table 2.7 Study 2 Hypothesis 3 – Multilevel Regression Analysis of PPR by Intervention Group Across Partners and Weeks with First Week PPR as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Second and Third Week		
					t(DF)	p	f ² Effect Size
Intercept	.57(.28)	2.06(98)	.042*	< 0	-1.43(49)	.158	0
Feedback	.1(.17)	.56(50)	.577	0	1.01(49)	.317	0
Seeking	.09(.07)	1.25(98)	.215	0	.14(98)	.891	0
Feedback*Seeking	.02(.14)	.14(98)	.893	0	.3(98)	.768	0
First Week PPR	.87(.06)	15.52(98)	< .001***	1.88			

EA - Empathic Accuracy. PPR - Perceived Partner Responsiveness *p < .05 ***p < .001

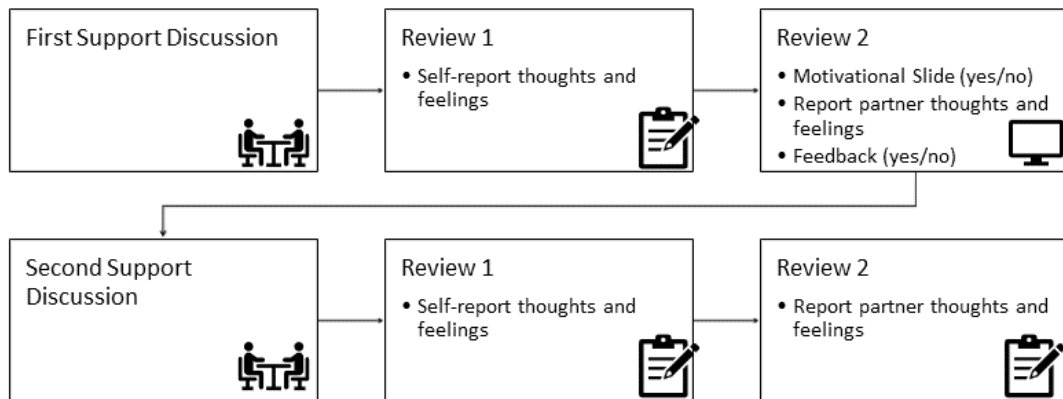
Table 2.8 Study 2 Hypothesis 3 – Multilevel Regression Analysis of PPR by EA Across Partners and Weeks with First Week PPR as a Covariate

	Estimate (SE)	t(DF)	p	f ² Effect Size	Difference Between Second and Third Week		
					t(DF)	p	f ² Effect Size
Negative EA							
Intercept	1.04(.42)	2.48(43)	.017*	< 0	-.38(16)	.707	< 0
Actor EA	-.12(.12)	-.97(43)	.336	< 0	-1.28(43)	.207	.03
Seeking	.13(.13)	1.01(43)	.319	0	.85(43)	.401	0
Partner EA	-.11(.12)	-.9(43)	.375	0	-.02(43)	.981	0
Actor EA*Seeking	-.25(.3)	-.84(43)	.408	< 0	-.83(43)	.410	< 0
Partner EA*Seeking	.11(.3)	.37(43)	.710	< 0	.28(43)	.782	< 0
First Week PPR	.78(.08)	9.27(43)	< .001***	1.68			
Profile EA							
Intercept	.26(.28)	.94(92)	.348	< 0	-1.81(50)	.077 [†]	.02
Actor EA	.22(.09)	2.49(92)	.015*	.05	.07(92)	.946	0
Seeking	-.04(.17)	-.22(92)	.829	0	1.96(92)	.054 [†]	.01
Partner EA	.3(.09)	3.22(92)	.002**	.08	1.32(92)	.190	.01
Actor EA*Seeking	.22(.21)	1.02(92)	.311	< 0	-.28(92)	.781	0
Partner EA*Seeking	-.1(.21)	-.46(92)	.645	< 0	-1.41(92)	.161	0
First Week PPR	.82(.05)	14.92(92)	< .001***	1.54			

EA – Empathic Accuracy. PPR – Perceived Partner Responsiveness [†]p < .1 *p < .05 **p < .01
***p < .001

Figure 1. Study Procedure

(a) Study 1



(b) Study 2

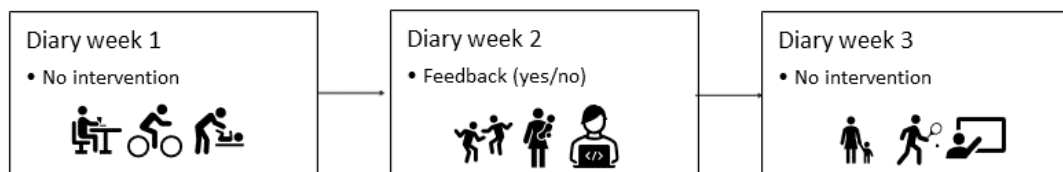
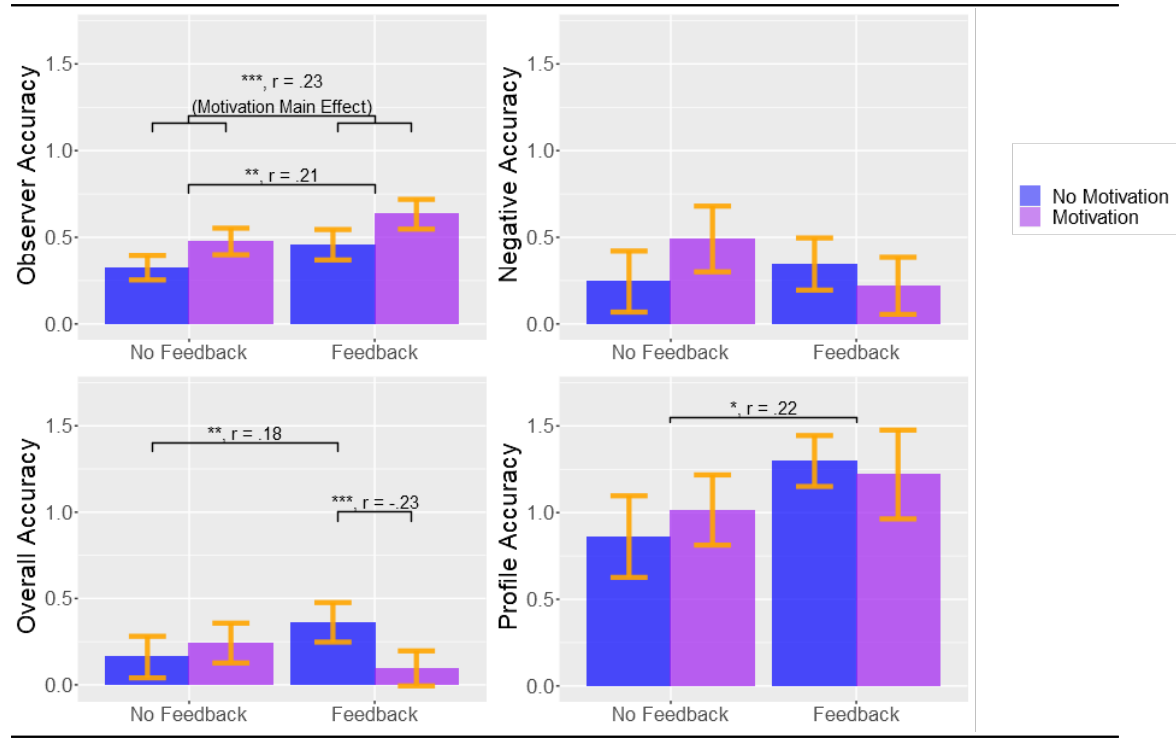
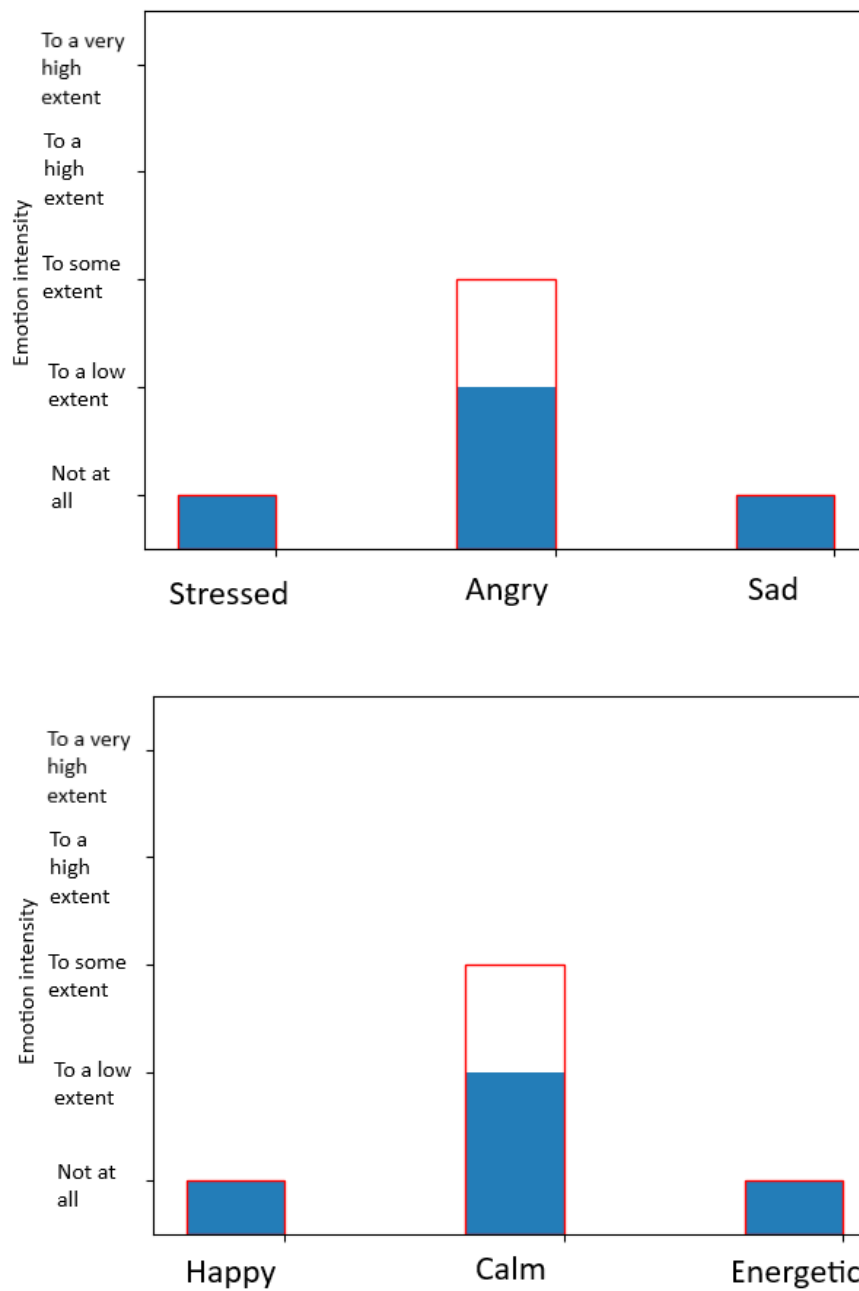


Figure 2. Study 1 Hypothesis 1b Support providers' Results



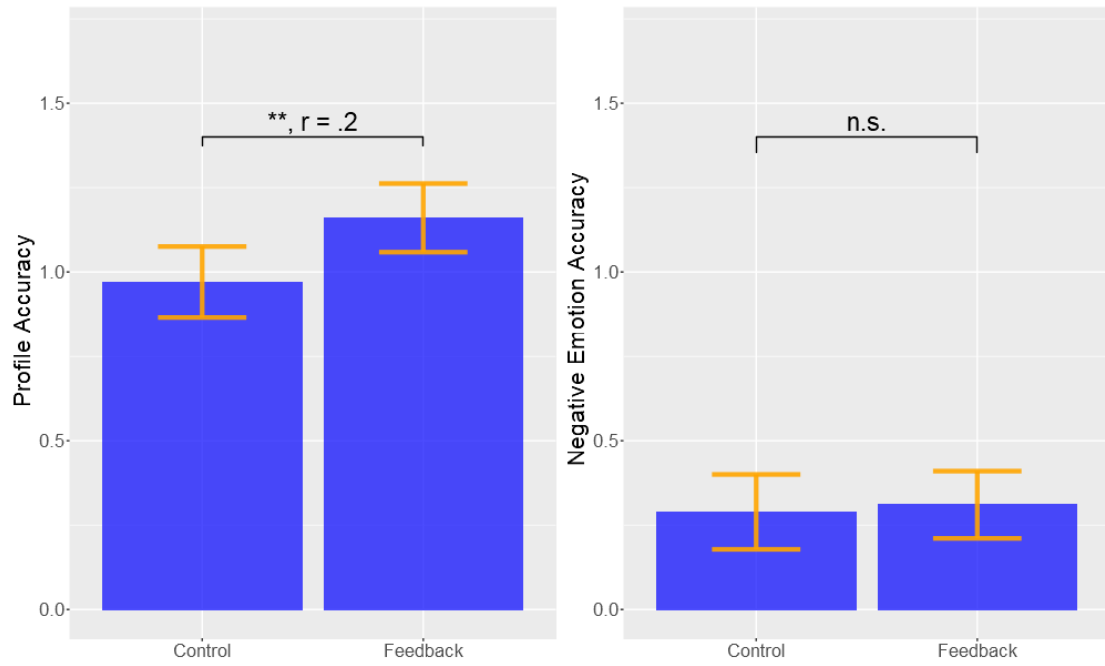
*p < .05 **p < .01 ***p < .001

Figure 3. Example Empathic Accuracy Feedback



Example of the feedback sent to participants in the feedback group by E-mail and displayed during the questionnaire (in the actual study feedback was provided in Hebrew). The blue bars are the emotions self-reported by the recipient's partner; the red lines are the recipient's inferences.

Figure 4. Study 2 Hypothesis 1b – Effect of feedback intervention across study week and participant role



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

Appendix A – Motivation Text

English Translation of Motivation Text:

This task measures understanding between partners. Usually, romantic partners have more mutual understanding than strangers or even acquaintances or friends. Studies in our lab and in other universities in the country and abroad tell us that such understanding can help partners support each other better, improve their relationship in the long term and help preserve it. This kind of understanding is important in any case – whether one's partner is feeling good or bad. Even if sometimes it is difficult to think about one's partner feeling something unpleasant, correctly identifying this kind of feelings can increase mutual understanding and closeness even more.

Original Hebrew Text:

זוהי מטלה שמודדת הבנה בין אישית בין בני זוג. בדרך כלל, יש הבנה הדדית רבה יותר בין בני זוג מאשר בין זרים או אפילו בין מכרים או ידידים. מחקרים במעבדה שלנו ובאוניברסיטאות אחרות בארץ ובעולם מלמדים שהבנה כזו יכולה לסייע לבני הזוג לתמוך טוב יותר אחד בשני, לשפר את הקשר לטווח הארוך ולעזור לשמר אותו. הבנה כזו חשובה בכל מקרה – בין אם בן/בת הזוג מרגישים טוב או רע. גם אם לעיתים קשה לחשוב על כך שבן/בת הזוג מרגישים משהו לא נעים, זיהוי נכון של תחושות אלו יכול להגביר עוד יותר את ההבנה ההדדית ואת הקרבה.

