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Together in a Digital World: Motivational States, Affect, and Relationship Quality in Couples' Messenger Communication

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Abstract

Our study investigates if couples with a high relationship quality judge their partner's mental state more accurately. We examine associations between different aspects of empathic accuracy and relationship quality in the context of couples' messenger communication. We propose a new procedure for assessing the empathic accuracy of judgments of affect and interpersonal motivational states. Using the Truth and Bias Model and the Actor-Partner Interdependence Model, data from N = 102 participants (51 couples) was analyzed to examine how empathic accuracy of different variables (affective states, e.g. valence and arousal, and interpersonal motivational states, e.g. agency and communion) are related to quality of relationship. Contrary to our pre-registered hypotheses, results do not indicate a clear positive association with relationship quality across all facets of empathic accuracy. However, empathic accuracy of affective valence was significantly associated with relationship quality, and a similar trend emerged for empathic accuracy of agentic motivational states. These findings provide some evidence for the connection of relationship quality and empathic accuracy of affective states in the context of couples' messenger communication. Our findings underline the relevance of differentially examining affective and motivational subdomains of empathic accuracy and their outcomes. In addition, our results call for further research on empathic accuracy of agentic motivational states in couples.

Keywords

empathic accuracy, affect, interpersonal motivational states, messenger, couple relationships

Within the dynamics of couple relationships, reciprocal understanding, or empathic accuracy, is of central interest in both research and interventions for couples (Ickes & Hodges, 2013). The ability to comprehend mental states and personal traits of one's partner appears to be beneficial for relationships, which has been primarily investigated in the affective domain (Sened et al., 2017). Due to its importance in couple dynamics, recent studies on empathic accuracy have addressed interpersonal motivational states in couples (LaBuda et al., 2020; Pusch et al., 2020), but the impact on relationship quality remains unclear. Examining judgments of both motivational states and affect is important for understanding the complex dynamics of couple wellbeing and tailoring interventions (Doss et al., 2017).

We use a novel messenger-based assessment method, which we developed to study empathic accuracy in couples. We examine and compare the differential impact of empathic accuracy of affective valence and arousal judgments, as well as judgments of agentic and communal motivational states, on relationship quality.

Empathic Accuracy and Relationship Quality in Couples

Among the adaptive processes for couple satisfaction and stability, empathic accuracy, the ability to accurately assess a partner's mental state in each situation, has received substantial attention in the scientific literature (Fletcher & Kerr, 2010; Ickes & Hodges, 2013). However, because accuracy may not be helpful in all situations, an elaborate pathway between empathic accuracy and relationship satisfaction has been proposed. Motivated inaccuracy describes the relationship-stabilizing process of situational reductions in accuracy or perceptual biases, for example when discussing relationship threatening topics or when a partner's view is seen as overly positive or similar to one's own (Gagné & Lydon, 2004). These assumptions have not been fully confirmed in recent studies and it is questionable whether detrimental effects of empathic accuracy of relationship-threatening content exist (for an overview, see Hinnekens et al., 2018). Importantly, empathic accuracy is conceptualized primarily as the correspondence between self and other ratings with the criterion, or the rating of the partner, being potentially biased. Thus, the term empathic accuracy can be misleading as it represents the correspondence of judgements and not accuracy of manifest entities. In summary, bias and accuracy play an integral role in couples' relationship dynamics (for a review see LaBuda & Gere, 2023), but it is not yet fully understood how empathic accuracy relates to relationship quality.

Various terms and conceptualizations have been proposed to illustrate those aspects of romantic relationships that are associated with functionality, stability, or positive psychosocial outcomes. Among others, relationship or marital satisfaction (Hendrick et al., 1998), responsiveness (Reis & Gable, 2015), and relationship quality (Pierce et al., 1997) have been introduced. In the present study, we are interested in assessing general relationship quality with a focus on the impact of miscommunication and lack

of understanding. Therefore, our conceptualization of relationship quality includes both general satisfaction and the perception of conflicts in relationships.

Interpersonal Motives and Motivational States

Although the original definition of empathic accuracy refers to thoughts and feelings (Ickes & Hodges, 2013), studies of empathic accuracy about partners' transient states primarily focus on the domain of mood or affect (Fletcher & Kerr, 2010; Sened et al., 2017). It can be assumed that being empathically accurate about domains that are in the center of couples' relationship dynamics may be particularly helpful for couples' relationship quality. Interpersonal motives, which describe specific dispositions that drive partners' behavior, are of interest in interpersonal research (Horowitz et al., 2006), psychopathology (Pincus & Wright, 2012), and psychotherapy (Locke et al., 2017). In a review article, Horowitz et al. (2006) argue that interpersonal interactions are influenced by the understanding or misunderstanding of interpersonal motives, which can lead to frustrated motives and interpersonal problems. Emotions and behaviors can serve as indicators of interpersonal motives, but an emotion or behavior may be based on more than one interpersonal motive. A two-dimensional model of interpersonal motives with the dimensions of agency (e.g. dominant vs. submissive) and communion (e.g. close vs. indifferent or distanced) is widely accepted and conceptualized as an interpersonal circumplex (Horowitz et al., 2006; Kiesler, 1983). Previous studies on the empathic accuracy of personality or interpersonal motives find associations between self and other ratings in couples (Pusch et al., 2021; Sanderson & Cantor, 2001).

A motive can be regarded as a "density distribution of states" (Zygar et al., 2018; p. 208). Partners with strong interpersonal motives experience corresponding motivational states more frequently. In turn, motivational states co-occur with interpersonal motivational behavior (Zygar et al., 2018). Few studies to date have addressed empathic accuracy of motivational states or behaviors in couples. A study of judgments of partners' daily approach and avoidance motives in couples reported both accuracy and bias, and the use of emotional cues in the judgment of motives (LaBuda et al., 2020). In a longitudinal study on the interplay between communal motives and empathic accuracy of interpersonal behavior in couples, empathic accuracy of interpersonal behavior is defined as the correspondence between self-referential and partner ratings of actual behavior. Higher communal motives were associated with an overestimation of communal behavior and an underestimation of non-communal partner behavior (Pusch et al., 2020).

In the present study, we focus on momentary interpersonal motivational states. This goes beyond interpersonal behavior and targets the momentary interpersonal goal in each interaction, whether it has an impact on the partners' behavior or not. For example, in a couple's interaction, one partner may be confronted with a partner's demanding behavior ("You didn't buy the groceries I told you to buy!") and has the strong momentary motivation to counter or fend off the demanding behavior by acting dominant

("That's unfair! Please show some respect for my effort!") but decides to act appeasing and submissive to avoid an ongoing conflict ("All right, I was wrong. I'll get the groceries now."). It can be assumed that the prevailing and therefore significant interpersonal motivational state is the agentic motivation to counter the demanding behavior of the partner. Functional interpersonal understanding includes not only the understanding of the behavior being displayed, but also the predominant motivational state currently present in the partner. In the specific situation, understanding the interpersonal motivational state could contribute to conflict resolution by avoiding misinterpretation and subsequent dysfunctional relationship patterns (Horowitz et al., 2006). Thus, our study addresses the research gap of the relationship between empathic accuracy of momentary interpersonal motivational states and relationship quality.

To allow a comparison between empathic accuracies in couples and their respective outcomes, we additionally include affective states in our study. Empathic accuracy of affect has been studied extensively and meta-analytic results demonstrate a low but robust association between empathic accuracy and relationship quality (Sened et al., 2017). We follow the conceptualization of the circumplex model of affect which describes all affective states using the two dimensions valence or pleasure and arousal or alertness as opposed to the use of discrete emotions (Russell, 1980; Posner et al., 2005).

Relationship Quality and Text Messaging in Couples

A higher risk of miscommunication in smartphone and online communication is assumed and may impair empathic accuracy in some but not all couples (Edwards et al., 2020). This, in turn, could lead to reduced positive conflict behavior (Ruppel et al., 2021) and lower levels of relationship quality. In general, increased smartphone use has been theoretically linked to a lower general relationship quality due to reduced responsiveness and immediate interpersonal interactions (Sbarra & Coan, 2018). This view is supported by a study in couples which reports that interacting via smartphone impedes the accuracy of judging affiliation of the partner (Sadikaj & Moskowitz, 2018). However, it can be assumed that the effects of smartphone use on relationship quality are rather heterogeneous. In a study of college couples, general smartphone use was beneficial for relationship quality, but smartphone dependency was associated with a lower relationship quality (Lapierre & Custer, 2021). In the present study, we aim to address the research gap regarding the influence of empathic accuracy on couples' relationship quality in text-messaging interactions.

The Present Study

The present study examined the association of empathic accuracy and relationship quality in couples using a messenger-based assessment method. It extends previous studies by including empathic accuracy of motivational states and its effect on relationship quality.

It was hypothesized that empathic accuracy, i.e. the degree of interpersonal correspondence between self and partner ratings of affect valence and arousal as well as the correspondence of ratings of agentic and communal motivational states are positively associated with relationship quality in couples. In addition, we expected empathic accuracy of motivational states to be more strongly related to relationship quality when compared to empathic accuracy of affect. For all analysis, we expected both actor and partner effects. We did not make any assumptions regarding differential actor or partner effects within the actor partner interdependence model but used it to account for the dyadic data structure (Kenny et al., 2006).

Method

All hypotheses, procedures and analyses were preregistered (https://osf.io/vsuq7) and all deviations from this preregistration were highlighted.[1]

Recruitment and Participants

Our assessment method has not been previously utilized, thus we had no information on effect sizes. Preregistered power calculations were conducted using APIMPower (Kenny & Ackermann, 2016) and the effect size for the relation between empathic accuracy and relationship satisfaction, which was reported in a meta-analysis (r = .134; Sened et al., 2017). We aimed for a desired power of .80, an alpha level of .05 and indistinguishable dyads, resulting in a necessary sample size of 198 dyads.

Data from the present sample was also used for a Truth and Bias analysis of accuracy of affect and the moderation of truth and bias by communication frequency and experience with messengers (Steinebach et al., 2025). Notably, that investigation did not include downstream analysis of empathic accuracy on relationship satisfaction.

Couples were recruited in 2022 via advertisement using convenience sampling. Due to limited resources our recruiting resulted in a sample of 51 couples (102 individuals). This sample size did not meet our preregistered power analysis but aligns with general recommendations for multilevel research (Maas & Hox, 2005). The study was approved by the Ethics Committee of the Faculty of Medicine, University of Gottingen (# 24/12/18) and the data protection officer of the University Medical Centre Gottingen, University of Gottingen.

Eligible participant couples had to be in a relationship for six months and both partners had to be at least 18 years of age. We did not preregister these two inclusion criteria. 121 couples started the messenger-based assessment procedure. We revised our

1) The present study addresses Hypotheses 4.2 of the preregistration (https://osf.io/dp3e2). Hypotheses 4.1 are addressed in Steinebach et al. (2025).

only preregistered inclusion criteria by reducing it from 10 to 5 ratings per couple to increase the sample size. This resulted in a total of 51 couples and a dropout rate of 57%. High dropout rates can be partially explained by insufficient incentives for completion of the study. To investigate effects of drop-out rates, we used Wilcoxon tests. We found that participants who completed the study were younger ($p < .001$, effect size $r = 0.17$) and they had more experience with messengers ($p < .01$, effect size $r = 0.13$). In our sample of 51 couples, the most common age range was 26 to 30 years (*IQR* = 1, range: 18–25 to 61–65 years), the most prevalent relationship duration ranging from 4 to 10 years (*IQR* = 1, range: less than one year to more than 10 years) and 57% ($n = 29$) of the participants were cohabitating couples. 47% ($n = 24$) reported male gender (45% female, $n = 23$; 5% diverse, $n = 3$; and 3% did not report their gender, $n = 2$) and 88% ($n = 45$) reported being in a mixed-sex relationships (8% same-sex, $n = 4$; 2% diverse, $n = 1$; and 2%, $n = 1$ did not report their gender).

Procedure

Our messenger-based assessment method for couples involved completing initial and final online questionnaires and regular ratings of affective and interpersonal motivational state in the context of a novel messenger app (see Figure S1 in the Supplemental Material, see Steinebach, 2023). Initially, couples received instructions on app usage and rating completion as well as a detailed introduction to the rating system. Couples received several daily push notifications on the messenger app reminding them to rate each other in the messenger app. Each partner could initiate a rating at any given time. The respective partner was then informed, that a rating procedure was initiated and could complete the rating. We used single-item measures and illustrating symbols for affective (see Figure S3) and interpersonal motivational states (see Figure S2) of self- and partner ratings to simplify the procedure. Each complete rating involved two ratings for affective states (one for self and one for partner) and two ratings for interpersonal motivational states (one for self and one for partner) per partner, resulting in a total of eight ratings per couple. The entire reciprocal messenger-based assessment spanned over 10 days. During this period, the ratings between the partners were concealed in both the rating procedure and the chat. To encourage meaningful reporting, couples were advised to rate frequently. Upon conclusion of the assessment phase, couples were provided with an automatically generated report on their behavior during the study and underwent a debriefing session. The assessment procedure was conducted entirely online, fully automated, and did not collect any personally identifiable information, such as email address. We adhered to privacy by design principles and implemented privacy and protection regulations in the messenger-based assessment procedure (Hustinx, 2010).

Further information on the messenger-based assessment procedure and the technical background can be found in the preregistration (https://osf.io/vsuq7).

Measures

Messenger-Based Assessment of Affective and Motivational States

For the affect ratings, we used a single-item instrument based on the valence-arousal model of affect (Posner et al., 2005; Russell, 1980), represented by symbols in a 7x4 matrix. The general use of single-item measure has been discussed critically (Allen et al., 2022) but reliability and validity of the single-item affect grid has been demonstrated (Killgore, 1998). For the ratings of interpersonal motivational states we modified the interpersonal circumplex model of agency and communion (Horowitz et al., 2006; Perkins et al., 1979) with five levels for communion, varying from *distance* to *approach* and five levels for agency, varying from *lead* to *follow*. This results in eight possible values around the circumplex model. Each symbol was described using a specific symbol and three keywords. For instance the top item of the agency axis was described by the terms "to be clear and precise", "to be self-assured", "to assert oneself", while the bottom item was described by "to hold back", "to fit in", "to need help". Meanwhile, the far right item of the communion axis read "to empathize", "to appreciate", "to be cordial", while the far left item read "to be reserved", "to show little interest", "to prefer to be alone". Labels with low negative associations were used to avoid bias from social desirability. Single-item scales to assess interpersonal perceptions of agency and communion have been shown to be reliable and valid (Moskowitz & Zuroff, 2005; Pusch et al., 2020; Sadikaj et al., 2017). Comprehensibility of all symbols and labels was tested in a pilot study including nine couples and five structured telephone interviews with participants. Out of the 51 participants we obtained 960 joint assessments of affective and interpersonal motivational states during messenger interactions (Mean per couple = 18,82, *SD* = 12.85, range = 5–61). A test of our preregistered inclusion criteria of a maximum duration of 15 minutes between partners' ratings revealed that 235 rating procedures exceeded this criterion. In 40 cases the evaluation of rating times was not possible due to technical issues. To avoid a further drop in power, all ratings were included in the analysis.

Relationship Quality

Relationship Quality was evaluated using the German version of the Relationship Assessment Scale (RAS; Hassebrauck, 1991; Hendrick et al., 1998) and the German version of the Quality of Relationship Inventory's conflict subscale (QRI; Pierce et al., 1997; Reiner et al., 2012).

The RAS consists of seven items with a five-point scale. Higher scores reflect higher relationship satisfaction. The validity and reliability of both the English and German versions of the RAS have been demonstrated (Dinkel & Balck, 2005; Hendrick et al., 1998). Reliability was high in our sample (α = .84).

The QRI's conflict subscale consists of 12 items with a four-point scale. Higher scores reflect higher conflict. The validity and reliability of the English and German versions

of the QRI have been demonstrated (Pierce et al., 1997; Reiner et al., 2012). The QRI conflict subscale displayed a moderate negative correlation with a single item measure of relationship and sexuality satisfaction (r = -.35; Reiner et al., 2012). In our sample reliability was high (α = .90).

We used the QRI and RAS ratings of the initial study questionnaire in all analysis. A composite measure of the QRI and RAS was used since we expect couples' conflict as well as couples' relationship satisfaction to be affected by empathic accuracy. The composite measure was computed by averaging the z-scores of the mean of the RAS items and the z-scores of the mean of the reversed QRI conflict subscale items. Multilevel within and between reliability of the composite measure was high (omega within = .79, omega between = .94).

Analytic Strategy

To examine the association between empathic accuracy and relationship quality, we employed the Actor Partner Interdependence Model (APIM; Kenny et al., 2006) combined with the Truth and Bias Model (T&B; West & Kenny, 2011). In the T&B model direct accuracy represents the truth force predicting the judgment. Indirect accuracy represents the extent, to which the bias force influences accuracy in judgments. Total accuracy scores for each individual are calculated by adding direct and indirect accuracies (Stern & West, 2018). Total accuracy scores were then used as empathic accuracy scores to predict relationship quality in the APIM analysis, which is based on structural equation modeling. In the APIM, actor and partner effects are computed while considering the interdependence of the couple ratings. The actor effect refers to the effect of the first partner on their own outcome and the partner effect refers to the effect of the first partner on the outcome of the second partner (West & Kenny, 2011). Initially, we computed overall accuracy scores for valence and arousal as well as agency and communion, separately adhering to the T&B model by Stern and West (2018). For the main hypotheses, we utilized the composite or mean of total accuracy scores of valence and arousal for affective states and the mean of total accuracy scores of agency and communion for motivational states. Single valence and arousal as well as agency and communion scores were used exploratory. Since we included non-heterosexual couples, participants of diverse genders and participants, who did not indicate their gender, dyads were considered as indistinguishable. Thus, only one actor and one partner effect was calculated in the APIM.

In all APIMs we included age and relationship length as covariates. Contrary to our preregistration, we did not include day of assessment and the degree of understanding of symbols in the app due to technical issues. No missing values were present in our data. Predictors, moderators, and covariates were grand-mean-centered in all analyses. We made several changes to the preregistered analysis procedure. First, we used omega estimates of the R package multilevelTools (Wiley, 2023) to calculate multilevel reliabilities,

in accordance with Geldhof et al. (2014). Second, we did not assess multicollinearity further because the correlation coefficients between the APIM predictors were low. Third, following recommendations and the software by Kenny (2015), we examined outliers using normalized residuals greater than 3. We utilized R (Version 4.1.3; R Core Team, 2022) for data handling, descriptive statistics, and T&B calculations of total accuracies. APIM analysis was performed using the web application by Stas et al. (2018). For the standardized actor and partner estimates, the overall standard deviation across all persons was used for standardization and standard errors refer to unstandardized estimates.

Results

Descriptive Statistics

Means, standard deviations, and correlations of actor total accuracies, and actor relationship quality are presented in Table 1. Overall, non-significant correlations were present between perceivers' total accuracies.

Table 1

Means, Standard Deviations, and Correlations With Confidence Intervals

Variable	*M*	*SD*	Range	1	2	3	4
1. Relationship Quality	0.22	0.83	-1.59 – 1.47				
2. Accuracy Valence	0.34	0.36	-0.50 – 1.21	.25			
				[-.03, .49]			
3. Accuracy Arousal	0.09	0.39	-0.63 – 1.33	.08	-.04		
				[-.20, .35]	[-.31, .24]		
4. Accuracy Communion	0.28	0.40	-0.89 – 1.05	.03	.12	-.01	
				[-.25, .31]	[-.16, .39]	[-.29, .26]	
5. Accuracy Dominance	0.09	0.40	-1.63 – 0.84	.06	-.11	.16	.13
				[-.22, .33]	[-.37, .17]	[-.13, .41]	[-.15, .39]

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Correlations refer to variables of the same partner. Accuracy variables refer to individual total accuracy scores of the Truth and Bias Model (Stern & West, 2018). Values in square brackets below correlation coefficients indicate the 95% confidence interval for each correlation. No correlation was statistically significant.

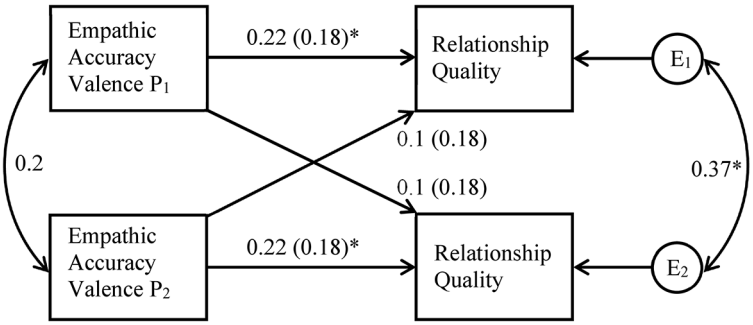
Empathic Accuracy and Relationship Quality

The first APIM with empathic accuracy of overall judgments of affect as an independent variable showed no significant actor effect for empathic accuracy of affective state on relationship quality, which was contrary to our predictions. However, non-significant actor and partner effects exhibited expected positive trends (β_{actor} = 0.17, *SE* = 0.25, p = .092; $\beta_{partner}$ = .07, *SE* = 0.26, p = .430; refer to Figure S4 in the Supplemental Material,

see Steinebach, 2023). When examining the differential impact of empathic accuracy for valence and arousal, we found that only accuracy of valence judgments had a significant positive actor effect on relationship quality and no significant partner effects emerged (β_{actor} = 0.22, *SE* = 0.18, *p* = .010; $\beta_{partner}$ = .10, *SE* = 0.18, *p* = .231). Figure 1 displays the results of the APIM of valence. Only the age covariate had a significant impact on the outcome ($\beta_{first\ role}$ = - 0.38, *p* = .001; $\beta_{second\ role}$ = - 0.19, *p* = .107). Results of the APIM of arousal are displayed in Figure S5. We ran a model without covariates to explore the impact of control variables on the result (see Figure S6). The APIM without covariates revealed a significant actor effect, while the partner effect remained non-significant (β_{actor} = .18, *p* < .05; $\beta_{partner}$ = .16, n.s.).

Figure 1

Actor-Partner-Interdependence-Model of Affective Valence and Relationship Quality



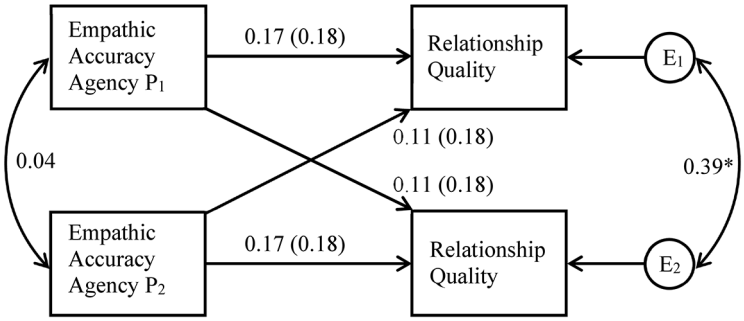
Note. Model parameters are standardized estimates with standard errors indicated in brackets. Horizontal arrows represent actor effects, diagonal arrows represent partner effects. The arrow between E1 and E2 represent the residual non-independence in the outcome.
*p < .05.

The second APIM with empathic accuracy of interpersonal motivational states as an independent variable showed that contrary to our expectations, there were no significant effects on relationship quality for either actor or partner effects. Instead, there was a non-significant association (β_{actor} = 0.12, *SE* = 0.24, *p* = .163; $\beta_{partner}$ = .08, *SE* = 0.24, *p* = .362; see Figure S7). When exploring the differential impact of empathic accuracy of the two assessed subcomponents of interpersonal motivational states, we found that only agency had a notable but not significant positive actor effect on relationship quality and no substantial partner effects emerged (β_{actor} = 0.17, *SE* = 0.18, *p* = .060; $\beta_{partner}$ = .11, *SE* = 0.18, *p* = .226). The results of the APIM of agentic motivational states are displayed in Figure 2, The APIM of communal motivational states can be found in Figure S8. Only the covariate of age had a significant impact on the results ($\beta_{first\ role}$ = - 0.36, *p* = .002; $\beta_{second\ role}$ = - 0.21, *p* = .077). We computed a model without covariates to investigate

the impact of control variables on the outcome (see Figure S9), which did not reveal differences to the full model.

Figure 2

Actor-Partner-Interdependence-Model of Agentic Interpersonal Motivational States and Relationship Quality



Note. Model parameters are standardized estimates and standard errors in brackets. Horizontal arrows represent actor effects, diagonal arrows represent partner effects. Arrow between E1 and E2 represent the residual nonindependence in the outcome.
$^{*}p < .05$.

Since we found higher effects in the APIM for empathic judgements about affective states, we refrained from testing our hypothesis, that empathic accuracy for interpersonal motivational states has a stronger association with relationship quality compared with empathic accuracy of affect.

Post-hoc power analysis based on the priori assumed effect size of $r = .134$ (Sened et al., 2017), the obtained sample size of $N = 51$, an alpha of .050, a correlation of actor and partner variables of .03, and a correlation of errors of .03 using a dyadic data power calculation tool (APIMpower; Kenny & Ackermann, 2016) revealed a low power of .287 for the actor and partner effects of empathic accuracy on relationship quality.

Discussion

The study investigated the correlation between empathic accuracy in couples' messenger communication and the quality of their relationship using a messenger-based assessment method. No definitive evidence for overall associations between relationship quality and empathic accuracy of affective or interpersonal motivational states was found. However, exploratory analysis revealed a significant association between empathic accuracy of valence as one of the two assessed dimensions of affect and relationship quality as well as a trend for a correlation between empathic judgements about agency and relationship

quality. While these results do not directly confirm our primary hypotheses, they provide evidence for the importance of assessing different subcomponents of empathic judgments to understand the effects of empathic accuracy in a text messaging environment on relationship quality.

Empathic Accuracy and Relationship Quality

Contrary to our preregistered hypothesis, we did not see a significant overall correlation between empathic accuracy of affect and relationship quality. However, the standardized effect size averaged across actor and partner effects in our study (β_{total} = .11 corresponding to r = .16, following Peterson & Brown, 2005; Lenhard & Lenhard, 2017) is comparable to meta analytical results on the connection between empathic accuracy of affect judgments and relationship quality (r = .134; Sened et al., 2017). Regarding the reported effect sizes, our analysis of overall empathic accuracy of valence and affect, are consistent with the previous findings. Therefore, our non-significant results may be due to low power in our study.

As preregistered, we conducted an exploratory analysis of empathic accuracy of valence and arousal as distinct dimensions of affective states. Our results suggest that empathic accuracy for valence is more strongly related to relationship quality than is empathic accuracy for arousal. This exploratory finding points to a higher importance of empathic accuracy of affective valence for the quality of relationships. Higher accuracy rates in valence judgements, compared to arousal, have been reported previously (Erbas et al., 2016). Our results could indicate that in messenger-based assessments, the judgment of valence leads to more meaningful differences in empathic accuracy, which are in turn associated with relationship quality.

In the analysis of overall empathic accuracy of interpersonal motivational states, results did not support our initial preregistered hypothesis of a higher importance of empathic accuracy of motivational states for the quality of relationships. By contrast, we did not find a significant effect of empathic accuracy of motivational states on relationship quality. Like the analysis of affective judgements, the results of exploratory analysis pointed towards different contributions of judgements about subcomponents of interpersonal motivational states on relationship quality, as we observed a non-significant positive trend for empathic accuracy of agentic motivational states. These findings should be interpreted with caution but may have implications for interpersonal research and interventions for couples. To date, most research in interpersonal motivational states or momentary behavior in couples has addressed the communal domain (Pusch et al., 2020; Sadikaj et al., 2020; Zygar et al., 2018). Our observations challenge the focus on communal motivational states and highlight the importance of including both agentic and communal interpersonal motivational states in couple research. Importantly, we used a conceptualization of interpersonal motivational states that is focused rather on intentions, as opposed to inference from observations of a partner's actual behavior. Based

on feedback from our pilot study about the difficulty of understanding the dimensions agency and communion, we applied several steps in the procedure. First, we designed a tutorial that included video and text information about motivational states. Second, we included test items in the tutorial to ensure comprehension and third, we created an overlay in the app with three descriptive terms accompanying each rating symbol. Regarding emotion research, the topic of understanding affective dimensions and their readability is more elaborated (e.g. Erbas et al., 2015) while corresponding research in interpersonal motivational states is lacking.

Strength and Limitations

To our knowledge, this is the first study to investigate the association between empathic accuracy of interpersonal motivational states and relationship quality. Our study demonstrates the feasibility of assessing interpersonal motivational states during smartphone messenger communication in couples. We implemented a novel assessment method and investigated increasingly influential text messenger interactions. Further notable strength of our study are the privacy standards of our measurement procedure and the inclusion of non-heterosexual couples, diverse gender participants, and participants, who did not indicate their gender.

A major limitation of our study is the low sample size, which is associated with insufficient power for most analysis. Therefore, our results must be interpreted with caution. Also, the focus on a German speaking sample living in Germany likely leads to a high cultural homogeneity and low generalizability of findings. Regarding the novelty of the assessment method, a limitation is the lack of research comparing messenger-based assessment to established assessment methods such as Ecological Momentary Assessments (Stone et al., 1999) or the Dyadic Interaction Paradigm (Ickes et al., 1990).

Future Research

Our results suggest that empathic accuracy for valence and arousal judgments should be examined separately in future studies of empathy in couples. In addition, the issue of measuring interpersonal motivational states should be addressed. To date, it remains unclear how accessible interpersonal motivational states are to couples. Future research should address this issue by comparing existing measures of interpersonal motivational states and their impact on downstream outcomes. In line with this, we compared state measures of situational accuracy with a global measure of relationship quality. Future studies should additionally assess relationship quality as a state measure during interactions to examine changes in relationship quality over time. Furthermore, statistical and methodological issues became apparent in our analysis. To date, no widely accepted statistical procedure for the analysis of global outcomes of state accuracy ratings for indistinguishable couples exists. To increase the understanding of congruence hypothe-

ses, existing measures, such as response surface analysis (Nestler et al., 2019) should be extended to the case of repeated momentary predictors and global outcome measures.

Conclusion

Couple interactions are influenced by complex dynamics of reciprocal understanding and misunderstanding. These dynamics may be affected by the growing importance of text messaging conversations in couples. The present preregistered study uses a novel messenger-based assessment procedure to examine the impact of couples' empathic accuracy of text messages on relationship quality. We extend existing studies on empathic accuracy by including interpersonal motivational states. Contrary to our hypotheses, we did not find significant associations between overall affective or motivational empathic accuracy and relationship quality. However, in our exploratory analysis, we found a significant actor association between empathic accuracy of affective valence and relationship quality. Our results, even though being weak evidence, underline the relevance of differentially examining affective and motivational subdomains and their role in empathic accuracy and its outcomes. Furthermore, they point to the need to further investigate empathic accuracy in couples' messenger communication. Our proposed theoretical conceptualization and assessment of interpersonal motivational states in couple dynamics and the corresponding procedure for familiarizing participants with it contribute to the improvement of interpersonal research.

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Author Contributions: PS, MS, LP, and KS conceptualized and designed the study. Data was collected by PS, MS, and KS. PS analyzed the data and wrote the manuscript, and all authors contributed to paper revisions and approved the final version.

Data Availability: The data that support the findings of this study are not openly available due to reasons of data privacy and protection. Due to the sensitivity of the data, the high level of indirect identifiers in dyadic couple data, and the novelty of the assessment procedure, informed consent was not obtained for publication of participant data. Data are available from the corresponding author upon request and with the permission of Ethics Committee of University of Gottingen. Supplemental Material is available (see Steinebach, 2023).

Supplementary Materials

For this article, the following Supplementary Materials are available (see Steinebach, 2023):

- Study preregistration
- Supplemental Figures S1-S9

Index of Supplementary Materials

Steinebach, P. (2023). *Interpersonal motives and relationship quality* [Preregistration, Supplemental Figures]. OSF. https://osf.io/vsuq7

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