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# Do You Feel What I Feel? The Relation Between Congruence of Perceived Affect and Self-Reported Empathy in Daily Life Social Situations

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Theories of empathy highlight the importance of *affective congruence*, which is the degree to which we match an interaction partner in negative or positive affect. However, no research to date has used a multipronged assessment approach necessary to investigate whether and how affective congruence typically relates to empathy (i.e., perception of others' affect, self-reported affect, and self-reported empathy during interpersonal interactions). Using multilevel response surface analysis and ecological momentary assessment, we investigated relations between congruence of perceived affect and self-reported empathy during social interactions in a large sample of adults ($N$ = 526; total interactions = 21,521; $Mdn$ = 38 interactions per person). Data were collected in spring 2023. We found that while self-reported empathy is generally higher when there is congruence of perceived affect, empathy is highest when there is congruence in high positive affect. Further, people are least empathetic when they feel emotionally worse than they perceive the other person is feeling. These findings provide novel insights into the empathic processes.

*Keywords:* ecological momentary assessment, ambulatory assessment, interpersonal processes, response surface analysis, multilevel modeling



When are we most empathic? Do we empathize most strongly with another's negative feelings when we experience those negative feelings ourselves? Do we empathize with others' positive emotions when we feel those positive emotions along with them? These questions about *affective congruence*, or the degree to which we match an interaction partner in negative or positive affect, are central to theories of empathy. However, we know very little about how the alignment of affective experiences between oneself and others' emotions in day-to-day life gives rise to the experience of increased (or decreased) empathy.

## Empathy and Affect

Empathy is inextricably linked to the emotions that occur during interpersonal situations (Main et al., 2017) whether these emotions are positive or negative. Researchers distinguish between the processes of perspective-taking and emotional contagion, which are typically conceived of as distinct but related processes of empathy[1] (Cuff et al., 2016; Davis, 2018; Duan & Hill, 1996). Although emotions figure prominently in nearly all theories of empathy, the role of affective congruence is debated (Coplan, 2011; Cuff et al., 2016; Murphy et al., 2022). Some theories argue empathy should be narrowly conceptualized as affective congruence (e.g., Bird & Viding, 2014; Bloom, 2017; Coll et al., 2017; de Vignemont & Singer, 2006). According to this perspective, the experience of empathy *requires* feeling the same emotion as another person (Coll et al., 2017; Singer & Lamm, 2009). Other theories posit that empathy can and often does occur without affective congruence (Main et al., 2017; Murphy et al., 2022; Zaki, 2014). Proponents of this perspective point out that there are many instances where we would be empathetic while not feeling the same emotion as the

[1] While the broader empathy literature commonly groups such processes into the categories of "cognitive empathy" and "affective empathy," there is substantial variety in what these terms refer to and how they are assessed (Cuff et al., 2016). Thus, where applicable, we have avoided using these labels and describe specific processes without assigning them to either category of empathy.

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other person, such as a parent empathizing with a child throwing a tantrum but not sharing their anger. To adjudicate between these perspectives requires first establishing the extent to which empathy typically co-occurs with affective congruence during interpersonal interactions.

Mapping the relation between affective congruence and how empathic a person feels requires the assessment of (a) the empathizer's perception of the target's emotion or the target's self-reported emotions, (b) the empathizer's own emotion, and (c) the empathizer's reported empathy during the interpersonal situation. Yet, most research to date has used study designs that only assess one or two of these elements. Until recently, the large majority of research on empathy has used cross-sectional self-report instruments or laboratory paradigms. In cross-sectional studies, participants report their subjective experience of empathy or their perception of affective congruence (Hall & Schwartz, 2019). In either case, affective congruence between the participant and another person is not directly calculated. In laboratory paradigms, the three elements noted above are often conflated. For example, in common "implicit empathy" paradigms, a participant's neurological activity in particular brain regions after viewing images designed to elicit empathic or affective responses (e.g., a door closing on someone's finger; Jackson et al., 2005) are interpreted as empathy. However, such paradigms do not assess whether the emotion or experience depicted in the stimuli is subjectively shared by the participant, nor whether the degree of affective congruence relates to the participant's experience of empathy. In other paradigms such as the empathic accuracy task (Ickes et al., 1986; Zaki et al., 2008), participants judge the emotions of a video-recorded target to determine congruence between the target's affect and participant ratings of the target's affect, but not the congruence of the participant's affect and the target's. While empathic accuracy is an important aspect of social functioning (particularly when identifying others' negative affect; Sened et al., 2017), empathic accuracy is separable from the relation between affective congruence and empathy. To capture how the alignment in affective experiences of self and others relate to empathy, it is critical to incorporate a multipronged assessment of self and other affect, quantify congruence in these ratings, and examine how this congruence relates to reported empathy. Moreover, experimental studies only tell us whether people *can* be empathetic in certain situations. They do not capture situations where they are *usually* empathetic. Whether people usually experience affective congruence when being empathetic is at the heart of debates on how fundamental (or not) affective congruence is to empathy.

## The Role of Affect and Empathy in Daily Life

Ecological momentary assessment (EMA) is ideally suited to establish regularities when people are empathetic across meaningful interpersonal situations. A relatively small literature has examined relations between empathy and affect in real-life interpersonal contexts using EMA. These studies have found that individuals are more likely to report experiences of empathy in response to the positive emotions of others as opposed to negative emotions (Depow et al., 2021). Relatedly, regarding self-rated affect, empathy shows stronger within-person covariation with positive emotions compared to negative emotions (Nezlek et al., 2001; Ringwald & Wright, 2021). EMA-based research has also found that components of empathy often co-occur (e.g., emotion contagion, perspective-taking), suggesting that these aspects of empathy are typically reported in tandem and relate similarly to outcomes like prosocial behavior (Depow et al., 2021; Löchner et al., 2023; Ringwald & Wright, 2021). This work has begun to outline how empathy and affect typically unfold in daily life. However, this research has only examined associations between empathy and one's own affect *or* another person's affect, but not empathy's relation with *affective congruence*. These questions require assessing a person's experience of empathy, the perception of their own affect, and the perception of the other person's affect.

## The Present Study

We investigated how congruence of one's own and the perceived affect of others relate to feeling empathetic during interpersonal contexts in a large sample of adults ($N = 526$) across many social interactions in daily life ($n = 21{,}521$; $Mdn = 38$ interactions over 15 days). We made use of a design that assessed all elements necessary for a rigorous test of how congruence of perceived affect relates to self-reported empathy: participants' perception of others' affect, their own self-reported affect, and their self-reported empathy during interpersonal interactions. To examine our hypotheses about the relations between affective congruence and empathy, we used response surface analysis (RSA; Nestler et al., 2019). RSA is ideally suited to test such "congruence hypotheses" while avoiding the shortcomings of more common approaches like difference scores (Edwards, 2001).

# Method

## Participants and Procedure

Our sample was drawn from a study of mental health and daily life functioning (the Intensive Longitudinal Investigation of Alternative Diagnostic Dimensions study). Participants were recruited through a university-based research registry in spring 2023. To be eligible for the study, participants had to be between 18 and 50 years old and own a study-compatible Android or iPhone smartphone. Additionally, the sample was enriched for participants who endorsed past-year mental health treatment. This study was approved by the University of Pittsburgh Institutional Review Board (STUDY22100033).

All study procedures were conducted remotely. Participation involved a battery of self-report questionnaires completed online and a 15-day ambulatory assessment period. Following the baseline questionnaires, participants received training for the ambulatory assessment protocol. This training included instruction on downloading the smartphone applications needed for the study, how to answer surveys, troubleshooting instructions, and an overview of the compensation structure. Self-report surveys used in this study were collected via the MetricWire application (MetricWire, 2019).

The ambulatory assessment protocol consisted of event-contingent surveys focused on interpersonal interactions and separate randomly initiated surveys (8×/day) that did not ask about interpersonal interactions. This study only used data from the event-contingent surveys. Interpersonal interactions were defined as any direct, real-time communication regardless of modality (e.g., face-to-face, text, video chat) between the participant and another person lasting at least 5 min. Participants were expected to complete a minimum of four event-contingent surveys per day for 100% compliance. On average, participants in our sample reported ~3 interactions per day.

Compensation was based on rates of compliance with the ambulatory assessment procedures. Participants could earn up to $200 for the entire protocol. To further incentivize participation, each survey counted as an entry into a drawing for a $100 Amazon gift card or Apple watch. The number of event-contingent surveys that could count toward the drawing was capped at five entries per day.

A total of 552 participants completed the ambulatory assessment protocol. Per our preregistered plan, we excluded participants with fewer than three event-contingent surveys to obtain reliable estimates of their typical interpersonal interaction patterns. Thus, the sample size for this study was 526[2] participants with a median of 38 interactions per person (total number of interactions = 21,521). Sample demographics are in Table 1.

## Measures

### Empathy

Empathy was rated for each reported interaction using four items. Two items were designed to assess perspective-taking ("I considered what the person(s) I interacted with was thinking." and "I considered what the person(s) I interacted with was feeling."). One item was designed to assess emotion contagion ("When the person(s) I interacted with showed emotions, I felt their emotions inside of me."), and one item was designed as a face-valid measure of general empathy ("I empathized with the other person(s) I interacted with."). Each item was rated on a slider scale from 0 (*Neutral*) to 10 (*Very much*). The perspective-taking and emotion contagion items have been used in prior work on other samples (Kumar et al., 2023; Ringwald & Wright, 2021). In our preregistration, and in prior work with this scale, we used the terms "cognitive" and "affective" empathy when describing the constructs. However, we changed the label cognitive empathy to perspective-taking and affective empathy to emotional contagion based on helpful feedback from reviewers.

We calculated scores for global empathy by averaging all four items, perspective-taking by averaging the two respective items, and emotional contagion was indexed by the single item. The internal consistency of global empathy was $\omega_{\text{between-person}} = .95$[3] and $\omega_{\text{within-person}} = .86$ and $\omega_{\text{between-person}} = .98$ and $\omega_{\text{within-person}} = .84$ for perspective-taking.

**Table 1**
*Sample Demographics*

| Variable | *M* (*SD*) | *N* (%) |
|---|---|---|
| Age | 31 (8.6) | |
| Race | | |
| American Indian/Alaskan Native | | 1 (<1%) |
| East Asian | | 21 (4%) |
| South Asian | | 12 (2%) |
| Black/African American | | 25 (5%) |
| White | | 430 (82%) |
| Other/multirace | | 37 (7%) |
| Gender identity | | |
| Man | | 77 (15%) |
| Woman | | 402 (76%) |
| Transmasculine | | 2 (<1%) |
| Genderqueer | | 2 (<1%) |
| Gender fluid | | 2 (<1%) |
| Nonbinary | | 18 (3%) |
| Another identity/multiple identities | | 23 (4%) |
| Annual income | | |
| Less than $14,999 | | 58 (11%) |
| $15,000–29,999 | | 37 (7%) |
| $30,000–44,999 | | 88 (17%) |
| $45,000–59,999 | | 57 (11) |
| $60,000–74,999 | | 42 (8%) |
| $75,000–89,999 | | 40 (8%) |
| $90,000–109,999 | | 37 (7%) |
| $110,000–129,999 | | 48 (9%) |
| $130,000–149,999 | | 36 (7%) |
| $150,000 or more | | 83 (16%) |
| Past year mental health treatment | | 328 (62%) |

*Note*. Total $N = 526$.

### Affect

Affect of self and other was reported for each interaction. There was a slider scale for positive affect and one for negative affect for self and others. The item stem for the participant's own affect was "How [POSITIVE/NEGATIVE] did you feel during the interaction?" and the item stem for the other person's affect was "How [POSITIVE/NEGATIVE] were their emotions during the interaction?" Each scale ranged from 0 (*Neutral*) to 10 (*Very negative/Very positive*).

## Analytic Plan

We used multilevel response surface analysis (ML-RSA; Nestler et al., 2019) to test our study hypotheses. RSA combines polynomial regression with response surface methodology to model how (in)congruence between two variables (i.e., self and other affect) relates to an outcome (i.e., self-reported empathy). ML-RSA is an extension of standard single-level RSA that accounts for nested data, which in this study are interpersonal interactions (within-person/Level 1) nested within-participants (between-person/Level 2).

At the within-person level, we specified a polynomial model estimating how congruence in self and other affect relates to empathy during a given interaction. This part of the model included the random effects of self and other affect, their squared terms, and their product term as predictors of momentary empathy. At the between-person level, we modeled the fixed effects of the predictors, which together reflect the average response surface (i.e., how congruence in self/other affect typically relates to empathy). Equations for the multilevel model are in Table 2.

ML-RSA provides two outputs for interpreting the effects of congruence: (a) parameters summarizing key features of the response surface that provide a formal, statistical test of congruence and (b) a plot of the response surface depicting relations between the two predictors and outcome in a three-dimensional space to allow for more nuanced and qualitative interpretations. The average response surface is characterized by the line of congruence (LOC), line of

[2] Due to a calculation error, we misreported an expected sample size of 535 in the preregistration.

[3] We note that this value differs from the ω value in the preregistration, since the latter was erroneously based on participants with greater than or equal to three interactions, whereas the value here is based on participants with greater than three interactions (which was our preregistered criterion for inclusion).

**Table 2**
*Equation for Multilevel Model, Response Surface Parameters, and Corresponding Interpretations*

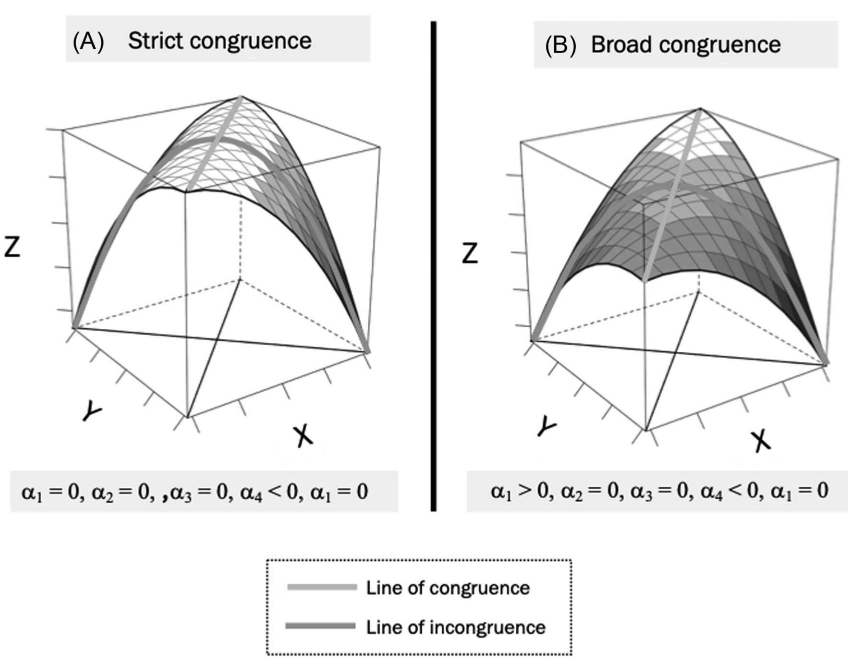
| Multilevel model | Response surface parameter | Interpretation |
|---|---|---|
| Level 1: $z_{ip} = b_{0p} + b_{1p}x_{ip} + b_{2p}y_{ip} + b_{3p}x_{ip}^2 + b_{4p}x_{ip}y_{ip} + b_{5p}y_{ip}^2 + \varepsilon_{ip}$ | $\hat{\alpha}_1 = \hat{\gamma}_{10} + \hat{\gamma}_{20}$ | Additive effects of self-affect ($\hat{\gamma}_{10}$) other affect ($\hat{\gamma}_{20}$) on empathy. |
| Level 2: Nezlek et al. (2001) $b_{0p} = \gamma_{00} + \gamma_{01}x_p + \gamma_{02}y_p + \gamma_{03}x^2p + \gamma_{04}xy_p + \gamma_{05}y_p^2 + u_{0p}$ | $\hat{\alpha}_2 = \hat{\gamma}_{30} + \hat{\gamma}_{40} + \hat{\gamma}_{50}$ | Linearity of the line of congruence. |
| $b_{1p} = \gamma_{10} + u_{1p}$ | $\hat{\alpha}_3 = \hat{\gamma}_{10} - \hat{\gamma}_{20}$ | Difference in the effects of self-affect ($\hat{\gamma}_{10}$) and other affect ($\hat{\gamma}_{20}$) on empathy. |
| $b_{2p} = \gamma_{20} + u_{2p}$ | $\hat{\alpha}_4 = \hat{\gamma}_{30} - \hat{\gamma}_{40} + \hat{\gamma}_{50}$ | Linearity of the line of incongruence. |
| $b_{3p} = \gamma_{30} + u_{3p}$ | $\hat{\alpha}_5 = \hat{\gamma}_{30} - \hat{\gamma}_{50}$ | Alignment of the first principal axis and line of congruence. |
| $b_{4p} = \gamma_{40} + u_{4p}$ | | |
| $b_{5p} = \gamma_{50} + u_{5p}$ | | |

incongruence (LOIC), and the first principal axis (FPA), and five parameters are extracted from the between-person part of the model to summarize these features ($\alpha_1$, $\alpha_2$, $\alpha_3$, $\alpha_4$, $\alpha_5$). These features of the response surface are also shown visually in Figure 1A–1B. In our models, the LOC represents the level of empathy when self/other affect are identical in magnitude and sign and is described by $\alpha_1$ and $\alpha_2$. $\alpha_1$ is the slope of the LOC and $\alpha_2$ indicates whether the LOC is linear or curvilinear. The LOIC is orthogonal to the LOC, and represents the level of empathy when self/other affect are identical in magnitude but opposite in sign. $\alpha_3$ is the LOIC slope above the origin and $\alpha_4$ indicates whether the LOIC is linear or curvilinear. The FPA represents combinations of self/other affect that account for the most variance in empathy, with $\alpha_5$ indicating whether the FPA aligns with the LOC.

A congruence effect is supported if these parameters meet certain conditions. We considered parameters to be equal to zero if zero was in the 95% confidence interval for the point estimate. For *strict* congruence to be supported, the LOC must be linear ($\alpha_2 = 0$) with no slope ($\alpha_1 = 0$), meaning empathy is predicted to be highest when self/other affect is exactly the same, regardless of whether it is matching at high or low positive/negative affect. The LOIC must also be curvilinear ($\alpha_4 < 0$) with the highest point at the origin ($\alpha_3 = 0$), meaning that empathy is always predicted to be lower when self/other affect are incongruent versus congruent. Finally, the FPA must be equal to the LOC ($\alpha_5 = 0$), meaning congruence is the combination of self/other affect that predicts the highest empathy. An example of a response surface plot for a strict congruence effect is shown in Figure 1A. Equations for the response surface parameters and corresponding interpretations are in Table 2.

For *broad* congruence to be supported, the same criteria must be met for a strict congruence effect, except it includes additional main effects of affect ($0 > \alpha_1 > 0$). These more liberal criteria allow for the possibility that congruence in high positive affect predicts higher

**Figure 1**
*Examples of Response Surface Plots Depicting Broad and Strict Congruence*




*Note*. $X$ and $Y$ = predictor variables, $Z$ = outcome variable.

empathy than congruence in low positive affect, for example. An example of a response surface plot for a broad congruence effect is shown in Figure 1B.

Our analyses focused on the differential effects of congruence in *positive* versus *negative* affect, as well as the effects of congruence on *global* versus *cognitive* versus *affective* empathy. This resulted in six models:

1. Self/other *positive* affect → *global* empathy
2. Self/other *negative* affect → *global* empathy
3. Self/other *positive* affect → perspective-taking
4. Self/other *negative* affect → perspective-taking
5. Self/other *positive* affect → emotion contagion
6. Self/other *negative* affect → emotion contagion

We preregistered three hypotheses. Based on EMA research empathy tends to be highest when people report positive affect (Nezlek et al., 2001; Ringwald & Wright, 2021), and the general consensus across theories is that people will feel empathetic when sharing positive emotions (Morelli et al., 2015; Zaki, 2014), we hypothesized congruence of self/other *positive* affect would predict higher global empathy, perspective-taking, and emotion contagion. Given mixed expectations about empathy and negative emotions, models of negative affective congruence were exploratory. Our other two hypotheses regarded differences between perspective-taking and emotion contagion. Emotion contagion is thought to arise, in part, from relatively automatic processes that would manifest in similar levels of affect (Hatfield et al., 2009; Lockwood, 2016). In contrast, people may override such "emotional contagion" responses with top-down cognitive processes (Wondra & Ellsworth, 2015). Thus, we hypothesized congruence in positive and negative affect would be more predictive of emotion contagion than perspective-taking.

For each hypothesis, we expected conditions for broad (not strict) congruence to be met. To test hypotheses comparing effects of congruence on perspective-taking versus emotion contagion, we interpreted the magnitude of $\alpha_4$ and examined the response surface plots. Specifically, we considered $\alpha_4$ values to be significantly different from each other if the $\alpha_4$ estimate in one model (e.g., congruence of positive affect related to perspective-taking) does not fall within the confidence interval for $\alpha_4$ in another model (e.g., congruence of positive affect related to emotion contagion).

### Power Analysis

There is no established method to determine the available statistical power for ML-RSA (Nestler et al., 2019). However, we conducted power analyses in a standard, multilevel context using the approach introduced by Enders et al. (2023). With our sample size of 526, 38 observations per person, and an intraclass correlation coefficient of .50 for global empathy, we have perfect power to detect standardized effect sizes at the between-person level ranging from .10 to .19. Further details on the power analysis specification (which include how effect sizes were specified for product terms relevant for ML-RSA) are reported in the preregistration and results are available at https://osf.io/kyszn/?view_only=34d836d8f08a456591bd0792de3c9034.

## Transparency and Openness

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study, and the study follows Journal Article Reporting Standards (Appelbaum et al., 2018). All data, analysis code, and research materials are available on the Open Science Framework at https://osf.io/unvp8 (Ringwald et al., 2025). Analyses were conducted in R (R Core Team, 2023) using the lme4 (Bates et al., 2015) and RSA (Schönbrodt & Humberg, 2023) packages and functions provided by (Nestler et al., 2019). All analyses were preregistered (preregistration is available at https://osf.io/pb8f9).

## Results

All code and data needed to reproduce our analyses are on the Open Science Framework page for this study (https://osf.io/kyszn/?view_only=34d836d8f08a456591bd0792de3c9034). Full output from the multilevel models are reported in the additional online material (https://osf.io/unvp8). Descriptive statistics for study variables are in Table 3. Bivariate, multilevel correlations are in Table 4. Per recommended guidelines for ensuring adequate power for detecting (in)congruence effects with RSA, we first quantified rates of numerical

**Table 3**
*Descriptive Statistics for Study Variables*

| Study variable | *M* | *SD* | Range | ICC |
|---|---|---|---|---|
| Self positive affect | 7.10 | 2.38 | 0–10 | .23 |
| Self negative affect | 1.73 | 2.33 | 0–11 | .20 |
| Other positive affect | 7.17 | 2.33 | 0–12 | .22 |
| Other negative affect | 1.66 | 2.28 | 0–13 | .17 |
| Global empathy | 6.34 | 2.54 | 0–14 | .52 |
| Perspective-taking | 6.88 | 2.55 | 0–15 | .45 |
| Emotional contagion | 5.32 | 3.24 | 0–16 | .56 |

| Interaction context variable | *n* interaction | *n* unique participant |
|---|---|---|
| Interaction modality | | |
| In person | 14,904 | 547 |
| Not in person | 6,673 | 516 |
| Phone call | 2,276 | 442 |
| Text message | 2,100 | 388 |
| Video chat | 1,549 | 349 |
| Messaging app | 575 | 174 |
| Playing games online | 95 | 29 |
| Other | 73 | 46 |
| Interaction partner | | |
| My romantic partner/spouse | 4,855 | 382 |
| My friend | 3,735 | 456 |
| My coworker/classmate | 2,553 | 380 |
| My parent/stepparent | 2,422 | 398 |
| My child | 1,456 | 140 |
| Someone never met/stranger | 1,328 | 369 |
| My boss/teacher | 1,126 | 314 |
| My sibling/stepsibling | 947 | 236 |
| An acquaintance | 754 | 267 |
| Other family member | 646 | 210 |
| My roommate | 490 | 79 |
| My employee/supervisee | 276 | 98 |
| My ex-romantic partner/spouse | 180 | 56 |
| Other | 804 | 279 |

*Note.* ICC = intraclass correlation coefficient.

**Table 4**
*Multilevel Bivariate Correlations Between Study Variables*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Between-person | | | | | | | |
| 1. Self positive affect | — | | | | | | |
| 2. Self negative affect | −.64 | — | | | | | |
| 3. Other positive affect | .93 | −.56 | — | | | | |
| 4. Other negative affect | −.60 | .92 | −.61 | — | | | |
| 5. Global empathy | .50 | −.21 | .47 | −.17 | — | | |
| 6. Perspective-taking | .52 | −.24 | .49 | −.20 | .95 | — | |
| 7. Emotion contagion | .36 | −.09 | .33 | −.07 | .89 | .74 | — |
| Within-person | | | | | | | |
| 1. Self positive affect | — | | | | | | |
| 2. Self negative affect | −.75 | — | | | | | |
| 3. Other positive affect | .74 | −.63 | — | | | | |
| 4. Other negative affect | −.62 | .70 | −.74 | — | | | |
| 5. Global empathy | .39 | −.27 | .28 | −.17 | — | | |
| 6. Perspective-taking | .36 | −.25 | .26 | −.16 | .91 | — | |
| 7. Emotion contagion | .26 | −.16 | .19 | −.08 | .81 | .58 | — |

discrepancies in self/other affect (cut point of $|\delta\ z| > 0.5$; Schönbrodt et al., 2018). Results showed there was sufficient representation of all (in)congruence combinations, with congruence ($n$ obs$_{\text{positive affect}}$ = 16,784; $n$ obs$_{\text{negative affect}}$ = 17,214) occurring more often than incongruence of other affect < self-affect ($n$ obs$_{\text{positive affect}}$ = 2,151; $n$ obs$_{\text{negative affect}}$ = 2,367) or other affect > self-affect ($n$ obs$_{\text{positive affect}}$ = 2,582; $n$ obs$_{\text{negative affect}}$ = 1,936).

ML-RSA parameters are in Tables 5 and 6 and response surface plots are in Figures 2 and 3. We attempted to estimate all predictors as random effects in the ML-RSA models, but this caused convergence problems due to the near-zero variance in the squared and product terms. Per our preregistered plan in the case of such issues, we subsequently only estimated the main effects of self/other affect as random and the squared and product terms were estimated as fixed effects in all models.

**Table 5**
*Average Response Surface Parameters From Multilevel Response Surface Models With Positive Affect Predicting Empathy*

| Parameter | Estimate | 95% CI | *SE* | *p* | Variance |
|---|---|---|---|---|---|
| Global empathy | | | | | |
| $\alpha_1$ | .38 | [.36, .41] | .01 | .000 | .040 |
| $\alpha_2$ | .03 | [.02, .03] | .00 | .000 | .000 |
| $\alpha_3$ | .31 | [.27, .36] | .02 | .000 | .080 |
| $\alpha_4$ | −.03 | [−.04, −.02] | .01 | .000 | .000 |
| $\alpha_5$ | .02 | [.01, .04] | .01 | .000 | .000 |
| Emotion contagion | | | | | |
| $\alpha_1$ | .36 | [.33, .39] | .01 | .000 | .060 |
| $\alpha_2$ | .04 | [.03, .04] | .00 | .000 | .000 |
| $\alpha_3$ | .29 | [.24, .34] | .03 | .000 | .090 |
| $\alpha_4$ | −.01 | [−.02, .01] | .01 | .340 | .000 |
| $\alpha_5$ | .02 | [.00, .03] | .01 | .040 | .000 |
| Perspective-taking | | | | | |
| $\alpha_1$ | .38 | [.35, .40] | .01 | .000 | .040 |
| $\alpha_2$ | .02 | [.02, .03] | .00 | .000 | .000 |
| $\alpha_3$ | .31 | [.26, .35] | .02 | .000 | .100 |
| $\alpha_4$ | −.03 | [−.04, −.02] | .01 | .000 | .000 |
| $\alpha_5$ | .02 | [.01, .04] | .01 | .000 | .000 |

*Note.* $\alpha_1$ = additive effects; $\alpha_2$ = linearity of line of congruence; $\alpha_3$ = difference in effects of self/other affect; $\alpha_4$ = linearity of line of incongruence; $\alpha_5$ = alignment of first principal axis and line of congruence; CI = confidence interval; *SE* = standard error; Variance = between-person variance in parameter.

As shown in Tables 5 and 6, none of the models met statistical criteria for broad congruence. Plots of the response surface reveal why this is the case—there are congruence *and* incongruence effects, and these (in)congruence effects are strongest for specific combinations of self/other affect. Of note is the distribution of data marked by the elliptical-shaped bag plots on the response surface, with observations outside the bags considered to be statistical outliers. Due to limited data at the extreme ends of the LOIC, these effects are less reliable and should be interpreted more cautiously.

Starting with the model of positive affect and global self-reported empathy, the response surface is tilted downward, showing that people report being more empathetic when feeling high positive affect and when they perceive their interaction partner as feeling positive affect. The additive effects of self/other positive affect are also evident by the significant, positive $\alpha_1$ parameter. Further, the plot shows that the highest values fall along the LOC (although the slightly positive $\alpha_5$ indicates the highest values are outside the LOC), suggesting self-reported empathy is generally highest when there is a congruence of perceived affect. However, the LOC is curved slightly upward ($\alpha_2 > 0$) indicating that people are *most* empathetic when there is congruence in high positive affect with their interaction partner, and the sharp downward curve along the LOIC ($\alpha_4 < 0$) shows they are *least* empathetic when feeling low positive affect and perceive the other person as feeling high positive affect (i.e., incongruence).

Response surface plots for negative affect and global empathy show a similar pattern of results to positive affect but reversed. As shown in the plot, the response surface is tilted downward toward the back of the space, showing people are generally less empathetic when feeling high negative affect, regardless of how they perceive the other person's affect. This is also evident by the significantly negative $\alpha_1$ parameter, with multilevel model coefficients (in the additional online material: https://osf.io/unvp8) showing the linear effect of self-affect—but not the perception of other's affect—was significant. There is also a congruence effect like positive affect, with the highest values of self-reported empathy falling along the LOC ($\alpha_5 = 0$). Unlike positive affect, the LOIC is tilted linearly rather than having a slight, reversed U-shaped curve ($\alpha_4 = 0$), indicating a less pronounced congruence effect but a notable incongruence effect such that people are *least* empathetic when they feel high negative affect and perceive the other person to be feeling low negative affect.

The only statistical difference between emotion contagion and perspective-taking was for congruence in perceived positive affect. Specifically, $\alpha_4$ for perspective-taking was significantly more negative than $\alpha_4$ for emotion contagion indicating a more curvilinear LOIC. This difference can be seen in the steeper downward curvature of the response surface in Figure 2. Together, these results indicate that the incongruence of feeling low positive affect when another person is perceived as feeling high positive affect has a stronger effect on perspective-taking versus emotion contagion.

To contextualize the magnitude of effects, we calculated $R^2$ indexing variance explained at the within-person level of our ML-RSA models using the *r2mlm* package in R (Rights & Sterba, 2019; Shaw et al., 2023). ML-RSA models with positive affect predictors

**Table 6**
*Average Response Surface Parameters From Multilevel Response Surface Models With Negative Affect Predicting Empathy*

| Parameter | Estimate | 95% CI | *SE* | *p* | Variance |
|---|---|---|---|---|---|
| Global empathy | | | | | |
| $\alpha_1$ | −.24 | [−.27, −.21] | .02 | .000 | .070 |
| $\alpha_2$ | .01 | [.00, .02] | .00 | .020 | .000 |
| $\alpha_3$ | −.28 | [−.33, −.24] | .02 | .000 | .060 |
| $\alpha_4$ | −.02 | [−.03, .00] | .01 | .030 | .000 |
| $\alpha_5$ | .01 | [−.01, .02] | .01 | .310 | .000 |
| Emotion contagion | | | | | |
| $\alpha_1$ | −.20 | [−.24, −.17] | .02 | .000 | .070 |
| $\alpha_2$ | .02 | [.01, .02] | .00 | .000 | .000 |
| $\alpha_3$ | −.23 | [−.28, −.18] | .03 | .000 | .060 |
| $\alpha_4$ | −.01 | [−.02, .01] | .01 | .260 | .000 |
| $\alpha_5$ | .00 | [−.01, .01] | .01 | .980 | .000 |
| Perspective-taking | | | | | |
| $\alpha_1$ | −.25 | [−.28, −.22] | .02 | .000 | .060 |
| $\alpha_2$ | .01 | [.00, .02] | .00 | .000 | .000 |
| $\alpha_3$ | −.27 | [−.32, −.22] | .03 | .000 | .080 |
| $\alpha_4$ | −.02 | [−.03, −.01] | .01 | .000 | .000 |
| $\alpha_5$ | .02 | [.01, .03] | .01 | .000 | .000 |

*Note.* $\alpha_1$ = additive effects; $\alpha_2$ = linearity of line of congruence; $\alpha_3$ = difference in effects of self/other affect; $\alpha_4$ = linearity of line of incongruence; $\alpha_5$ = alignment of first principal axis and line of congruence; CI = confidence interval; *SE* = standard error; Variance = between-person variance in parameter.

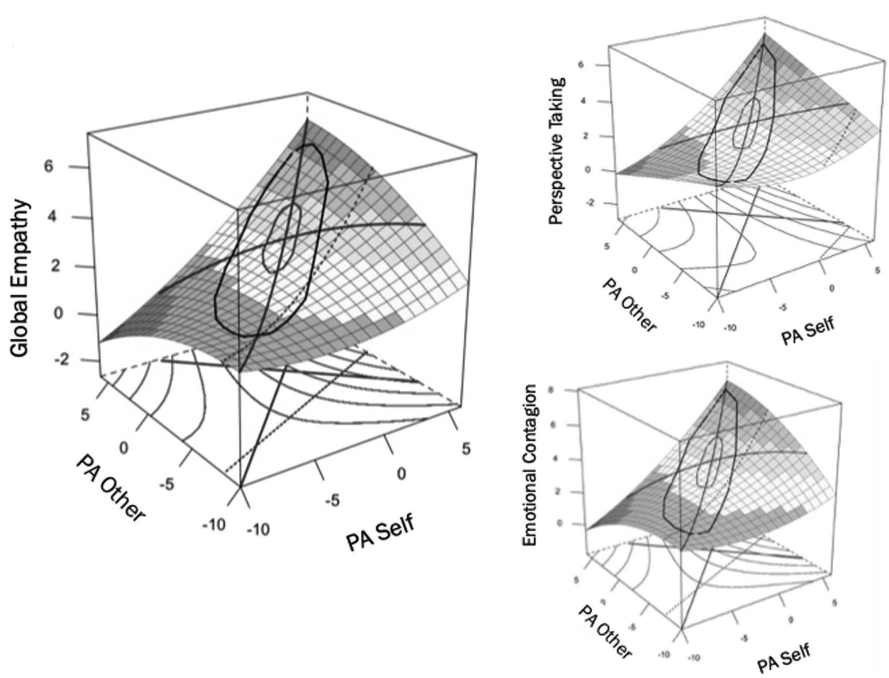
accounted for 16% of the within-person variance in global empathy, 13% in perspective-taking, and 8% in emotional contagion. Models with negative affect predictors accounted for 7% of the within-person variance in global empathy, 6% of perspective-taking, and 3% of emotional contagion.

## Exploratory Analyses

We conducted two sets of post hoc, not preregistered analyses examining moderators of affective congruence effects on empathy. ML-RSA parameters and plots for both sets of exploratory analyses are in the additional online material (https://osf.io/unvp8). First, given differences in the availability of relevant emotional cues across different social interaction modalities, we separately estimated ML-RSA models for interactions that occurred in-person ($n$ = 14,904 observations) versus not in-person (e.g., phone calls, text, video conference; $n$ = 66,73 observations). Parameters were compared based on effect size rather than statistical significance due to the reduced sample size and associated loss of power. Overall, the sign of RSA coefficients was identical in models of in-person and not in-person interactions, the magnitude of effects was comparable, and the plots showed similar response surfaces, suggesting our main findings on (in)congruence held across modality.

Second, we evaluated the role of relationship by estimating separate ML-RSA for interactions with close others (i.e., family members, friends, current or ex-romantic partners, roommates; $n$ = 14,731 observations), acquaintances (i.e., boss/teacher, employee/supervisee, classmate; $n$ = 4,709 observations), and strangers ($n$ = 1,328 observations). There are two notable differences in interactions with strangers versus close others and acquaintances. The LOIC ($\alpha_4 < 0$) was more curvilinear in the model for strangers indicating people are least empathetic when there's incongruence at either extreme; namely, in addition to the overall sample finding that low empathy is predicted by feeling low positive affect when perceiving the other person as experiencing high positive affect, when interacting with strangers, people are also least empathetic when feeling high positive affect and perceive the other person to be

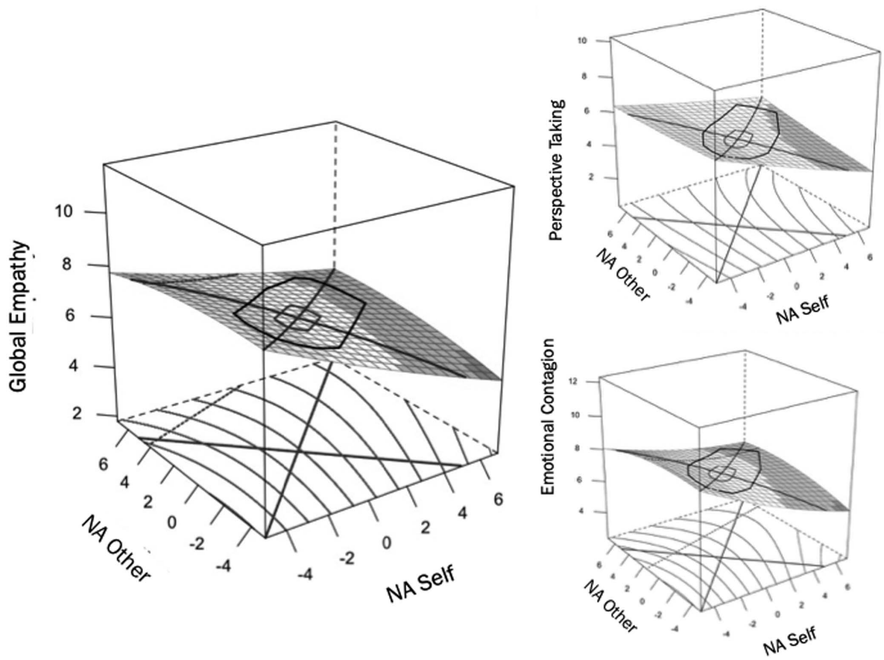
**Figure 2**
*Average Response Surface Plot of Positive Affect Predicting Global Empathy, Perspective-Taking, and Emotion Contagion, Affective, and Cognitive Empathy*




*Note.* PA = Positive affect.

**Figure 3**

*Average Response Surface Plot of Negative Affect Predicting Global, Affective, and Cognitive Empathy*




*Note.* NA = negative affect.

experiencing low positive affect. For negative affect, there was an exaggerated effect of incongruence found in the whole sample when interacting with strangers. Taken together, these results suggest affective congruence is more relevant for empathy in interactions with close others. Interactions with strangers lasting over 5 min are likely transactional (e.g., customer service calls), limiting the motivation to align emotionally. However, given the relatively few observations for interactions with strangers, these results are more uncertain (i.e., wider confidence intervals) and should be interpreted with caution.

## Discussion

Affective congruence has a central role in theories of empathy. We found that although self-reported empathy is generally higher when there is congruence in one's own and their interaction partner's perceived affect, empathy is highest when there is congruence in perceived *high positive affect*. However, people report being least empathetic when they feel emotionally worse than how they perceive the other person to be feeling. We found little evidence that these results differed when examining perspective-taking versus emotion contagion. Collectively, the results offer novel insights into the role affective congruence plays in feelings of self-reported empathy.

### Implications for the Role of Affective Congruence in Empathy

Self-reported empathy was *usually* stronger when there was congruence in perceived affect, though not always. Despite the many examples one can think of in which one would feel empathetic and not share the other person's emotions, our results suggest those situations are atypical in the flow of everyday life. More often than not, self-reported empathy is stronger when one has similar feelings to how they perceive the other person is feeling. Our results take an important step toward elucidating the relation between affective congruence and empathy in daily life, which has notable theoretical importance.

By mapping out all combinations of self/other affect, our results also uncovered nuances in the role of affective congruence for self-reported empathic processes. We found that people's own emotions have a large influence on how empathetic they are;[4] people are most empathetic when sharing high, positive affect and least empathetic not just when feeling down—but when feeling worse than how they perceive the other person to feel. Intuitively, it is easy to imagine how emotions affect our willingness or capability to share in someone else's excitement or distress. Consider how you may respond to a colleague who shares their grant submission was funded after learning your grant was also funded, versus if you just learned your grant submission was rejected. Our findings also align with research on the special importance of positive empathy (e.g., Morelli et al., 2015) and coexperienced positive affect on social and emotional functioning (e.g., see Brown & Fredrickson, 2021). For example, physiological synchrony between married couples is at its highest during moments of shared positive affect compared to

[4] This can also be observed from examining the regression coefficients from the multilevel regression models—the regression coefficient for individuals' own mood is approximately 10 times the magnitude of the coefficient for others' perceived mood.

shared negative affect (Chen et al., 2021), whereas, in unfamiliar dyads, synchrony in expressions of positive affect was more strongly related to connectedness over time compared to synchrony in negative affect expressions (Cheong et al., 2023). Thus, sharing positive emotions consistently relates to self-reported empathy in everyday interactions, which in turn may serve the functions of regulating emotions and maintaining social bonds (Keltner & Kring, 1998; Main et al., 2017; Zaki, 2020).

The incongruence effects we found, while intuitive, have little precedence in literature and have important theoretical implications. Motivational theories predict people are incentivized to empathize with people who they perceive as feeling better than they are because it could improve their mood (Morelli et al., 2015; Williams et al., 2018; Zaki & Williams, 2013), which is opposite to the incongruence effect we found. If anything, the incongruence effect expected by theory would be higher self-reported empathy when a person feels better than they perceive the other person to be feeling, reflecting a caring, approach-oriented response (Murphy et al., 2022). Our results suggest this is not when empathy is usually highest. Speculatively, the contrast of feeling low positive affect when others are feeling high positive affect may generate emotions like envy that increase self-focused attention and dampen empathy (Gibbons & Wicklund, 1982), as illustrated by the previous example of a colleague being awarded a grant when yours was rejected. Consistent with this possibility, we found that the incongruence effect of positive affect was more pronounced for perspective-taking than emotion contagion, suggesting the prominence of more effortful, top-down processes—like spiteful dampening of empathy. These results reveal a need for further investigation and perhaps call for an update on existing theories of when people tend to be most empathetic.

Indeed, our results provide a valuable contribution to the ongoing debate surrounding the importance (or lack thereof) of affective congruence to empathy (Murphy et al., 2022). Our results point toward a nuanced position, as there was evidence consistent with the view that affective congruence is an important feature of empathy. However, this was the case only for congruence in perceived positive affect and self-reported empathy. To date, research focused on the role of affective congruence in empathy has not distinguished between affective congruence in negative or positive affect (Coll et al., 2017)—our results highlight this distinction is important. Interestingly, we did not find support for a relation between shared negative affect and self-reported empathy, and instead found that the strongest predictor of self-reported empathy overall was when participants reported experiencing higher positive affect during interpersonal situations. These results, while informative, also underscore the need to closely study additional features of the interpersonal context.

Our aim was to establish general patterns of affective congruence and empathy that cut across the diverse types of interactions people have in daily life, but specific contexts almost certainly influence how these processes play out. For instance, depending on the situation, congruent and incongruent negative affect could predict empathy. Sometimes a friend comes to you because you are emotionally stable and can support them with level-headed advice (i.e., incongruent negative affect predicting high empathy). Such situations may be particularly relevant to experiences of compassion. At other times, a friend wants to commiserate about an injustice that happened to them, and you provide support by sharing their anger (i.e., congruent negative affect predicting high empathy). In yet other contexts, congruent negative affect could predict low empathy, such as when having a fight with a romantic partner and both people are feeling angry and hostile toward each other. These examples highlight contextual factors that will be important to examine for more precise tests of the mechanisms linking affective congruence to empathy, such as social motives, topic of conversation, and specific types of emotion expressed. Duration of interaction could be another informative contextual factor. Perhaps (in)congruence in a very brief interaction is incidental to a shared situation (e.g., excitement shared with a fellow sports fan when your team scores a point) or evoked automatically (e.g., sadness when seeing a stranger crying), making it qualitatively different than (in)congruence that evolves over a longer conversation, and thus related to empathy differently. Ongoing research can build on the foundation laid by our findings to understand when and why patterns of affective congruence and empathy vary.

## Limitations and Future Directions

Limitations of our study can inform future research. First, the areas of extreme incongruence in the response surfaces had limited representation in the data, limiting confidence in interpreting those results. There were, however, sufficient data to support the congruence effects. Replication of the incongruence findings is needed to support their robustness. Second, ratings of one's own affect and empathy, and the interaction partner's perceived affect were all self-reported. Thus, it is important to emphasize that our findings pertain to the relation between self-reported empathy and congruence in perceived affect. Self-reports are arguably the best method for measuring the constructs of interest for this study (i.e., subjective experiences of emotion and empathy, perception of others' emotions), but there is potential to enrich the understanding of affective congruence with dyadic EMA designs. For example, it would be valuable to examine whether there are differences in the relation between affective congruence and empathy depending on whether affective congruence is based on a single reporter (as in the present study) or from self-reports from both dyad members. Incorporating reports from both individuals would allow researchers to examine emotional identification accuracy as a moderator of the relation between affective congruence and empathy. Third, participants provided one rating of empathy and affect for each interpersonal situation. These ratings overlook potentially important fluctuations in empathy and affect that occurred during the course of interactions. Developing methods that retain the ecological validity of in situ assessment while capturing within-interaction processes would be beneficial. For example, capturing within-interaction processes can help distinguish between a partner's affect triggering a subsequent affective response versus situations where both individuals experience similar affect during a shared event. Fourth, our assessment approach was designed to assess different facets of empathy, including a face-valid item of empathy ("I empathized with the other person I interacted with"). Regarding the latter item, evidence has shown that lay conceptions of empathy are diverse (Hall et al., 2021), mirroring conceptions of empathy in the empirical literature. While our assessment of empathy maps onto past operationalizations of the construct in EMA research (Ringwald & Wright, 2021), further psychometric evaluation of empathy items used for EMA designs will be a fruitful direction for future research. Psychometric research on existing empathy self-report questionnaires can serve as a useful guide in this regard (e.g., Murphy et al., 2018, 2020).

## Limits to Generalizability

The generalizability of our results is limited to predominantly White, cisgender women given the demographic characteristics of our sample. This is an important limitation, as empathic behavior is strongly tied to cultural and gender norms (Eichbaum et al., 2023; Hollan, 2012). Additionally, most of our sample was adults with a recent history of mental health treatment. There is some evidence to suggest that samples with higher rates of internalizing problems may exhibit unique patterns of empathic responding (e.g., Schreiter et al., 2013), and thus some caution is warranted in generalizing the present results to nonclinical samples. Last, the types of interpersonal situations included in the present study are those that occur most frequently in daily life. Thus, the number of interactions where very high levels of negative affect occurred were rare, but these kinds of interactions may lead to unique empathic and affective processes that were infrequently captured in the present study.

## Conclusion

The present study provided the first tests of hypotheses involving affective congruence and empathy in day-to-day interactions. We established across thousands of everyday interactions that people are usually most empathetic when sharing positive emotions with another person. At the same time, we showed self-reported empathy is not entirely determined by the degree of congruence in perceived affect. Our results also uncovered the novel finding that people are least empathetic when they are feeling low positive emotions and perceive others are feeling high positive emotions, suggesting potential gaps in our knowledge of empathic processes. These findings lay a foundation for future work on the emotional underpinnings of empathy.

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