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Predicting Interpersonal Reactivity Dimensions through the Multifaceted Empathy Test (MET)

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Abstract

Objective: This study aimed to investigate whether empathy components, measured via the Multifaceted Empathy Test (MET), can predict the diverse dimensions of interpersonal reactivity assessed by the Interpersonal Reactivity Index (IRI).

Method: A sample of 92 Iranian adults (Mage = 26.7, SD = 3.98; 75% female) completed the MET and the IRI. Four simultaneous multiple linear regression analyses were conducted to predict IRI dimensions (perspective taking, fantasy, empathic concern, and personal distress) from cognitive empathy, positive affective empathy, and negative affective empathy scores derived from the MET.

Results: The regression model for Empathic Concern was statistically significant (F = 2.94, p = .037, R^2 = 0.091), driven by a shared, combined predictive effect among empathy components rather than standalone predictors. For perspective taking, the overall model was marginally significant (F = 2.64, p = .054, R^2 = .083), with cognitive empathy emerging as a significant positive predictor (β = .256, p = .015). In the non-significant fantasy model (F = 1.47, p = .228), positive affective empathy acted as a significant negative individual predictor (β = -.269, p = .045). The personal distress model was not significant (F = 1.05, p = .373).

Conclusion: The results suggest that these relationships may vary across different dimensions of interpersonal functioning and should be interpreted with caution.

Keywords: Empathy; Multifaceted Empathy Test; Interpersonal reactivity.

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1. Introduction

Empathy constitutes a fundamental, multidimensional socio-cognitive capacity that enables individuals to accurately infer and functionally resonate with the internal states of others, thereby functioning as an indispensable adaptive mechanism for social survival (Marsh, 2022). Rooted in evolutionary imperatives, this functional ability facilitates prosocial bonding, altruistic motivation, and the nuanced navigation of complex group dynamics (Decety, 2015). Far from being a monolithic trait, empathy encompasses the interaction of distinct but interrelated neural and psychological subsystems—specifically cognitive and affective processing components—that permit the sharing of affective experiences while simultaneously maintaining self-other distinction (Zaki & Ochsner, 2012). The critical importance of these processing mechanisms is starkly illustrated in neurodevelopmental conditions such as autism spectrum disorder, where selective impairments in spontaneous affective resonance and cognitive perspective-taking dissociate, underscoring the dissociable architecture of empathic processing and its profound impact on social reciprocity (Song et al., 2019). This functional dissociation has motivated extensive efforts to operationalize empathy as a multi-component capacity amenable to rigorous empirical investigation.

The ontogenetic development of empathy follows a protracted trajectory that mirrors the maturation of higher-order cognitive and affective neural circuitry. In early infancy, empathic responding manifests primarily as emotional contagion—a reflexive, bottom-up process wherein the perception of another's distress automatically triggers a congruent affective state in the observer (Decety & Holvoet, 2021). With advancing age and accumulating social experience, this primitive resonance mechanism gradually becomes supplemented by, and integrated with, more sophisticated top-down processes involving perspective-taking, mental state attribution, and explicit emotion regulation (Hoffman, 2000; Decety, 2010). The transition from automatic affective sharing to volitional cognitive empathy is critically supported by the protracted structural and functional maturation of the prefrontal cortex, particularly the medial prefrontal and orbitofrontal regions, which subserve the executive control and self-other differentiation necessary for accurate mentalizing (Singer & Tusche, 2014; van der Meulen et al., 2024). Consequently, empathic competence reflects an emergent property of dynamic interplay between limbic affective systems and prefrontal regulatory networks, a process that extends well into adolescence.

The recognition that empathy is not a unitary phenomenon but rather a multifaceted capacity has been pivotal for both theoretical refinement and measurement innovation. Contemporary models converge on a fundamental distinction between cognitive empathy—the capacity to deliberately adopt another's psychological point of view and accurately represent their mental states, closely aligned with Theory of Mind (ToM)—and affective empathy, which encompasses the vicarious sharing of emotional experiences and the generation of other-oriented concern (Dziobek et al., 2008; Shamay-Tsoory, 2011). Critically, these two dimensions are subserved by partially dissociable neural networks and exhibit divergent developmental trajectories and susceptibility to psychopathology (Decety & Jackson, 2004; Singer, 2006). This functional architecture implies that the ability to accurately mentalize another's perspective does not inherently necessitate an equivalent level of emotional resonance, as these processes can

operate independently depending on the social context and the individual's regulatory mechanisms. Understanding the precise interplay between these dissociable processing streams is essential for capturing the full complexity of how individuals navigate and interpret the social world.

While empathy represents an underlying processing capacity, it is equally important to consider how these internal mechanisms manifest as stable patterns of interpersonal reactivity. Interpersonal reactivity refers to the broad dispositional tendencies of an individual to respond to the observed experiences of others, encompassing both cognitive and affective domains (Davis, 1980). This multifaceted construct is typically operationalized through dimensions such as Perspective Taking, the tendency to spontaneously adopt the psychological point of view of others, and Empathic Concern, which reflects the inclination to experience feelings of warmth and compassion (Davis, 1996). Conversely, it also includes more self-oriented or imaginative responses, such as Personal Distress—the tendency to experience unease in tense social settings—and Fantasy, the propensity to imaginatively transpose oneself into fictional situations (Pulos et al., 2004). Because these reactive patterns reflect long-standing personality traits rather than acute empathic performance, they provide a critical framework for understanding how individuals consistently navigate their social environments over time (Chrysikou & Thompson, 2011; Murphy et al., 2020).

The relationship between empathic processing and interpersonal reactivity may be influenced by broader contextual and sociocultural factors. Previous cross-cultural research has suggested that individuals from different cultural backgrounds may vary in their reliance on contextual versus focal social information during interpersonal judgments (Nisbett & Masuda, 2003; Zhu et al., 2023). Such findings raise the broader question of whether performance-based empathy measures capture aspects of social functioning that are relevant across different cultural settings. The Multifaceted Empathy Test (MET), through its use of context-rich stimuli, provides an opportunity to examine associations between functional empathic capacities and dispositional interpersonal tendencies (Dziobek et al., 2008). Accordingly, the present study examined whether the cognitive and affective dimensions of the MET were associated with dimensions of interpersonal reactivity in a sample of Iranian adults.

Building upon these theoretical considerations, the present study aimed to investigate the relationship between performance-based empathic capacities and patterns of interpersonal reactivity. Specifically, this research examined the extent to which objective indices of empathy, as assessed by the MET, were associated with enduring reactive tendencies measured by the Interpersonal Reactivity Index. By examining these relationships in an Iranian sample, the study contributes additional evidence regarding the association between performance-based empathy measures and dispositional interpersonal responsiveness.

2. Method

2.1. Participants

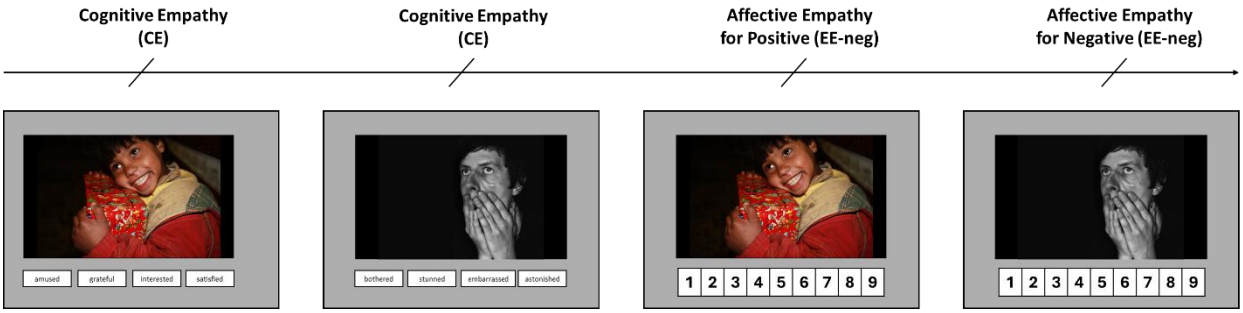
An a priori statistical power analysis was conducted using G*Power 3.1 (Faul et al., 2009).

Assuming a medium effect size ($f^2 = 0.15$), an alpha level of .05, a desired statistical power of .80, and three predictors, the required minimum sample size was estimated to be 77 participants. The final analytic sample comprised 92 Iranian adults residing in Tehran (Mage = 26.7 years, SD = 3.98), including 69 women and 23 men (75.0% female). Participant recruitment was conducted through a public call circulated on social media platforms in late fall 2025, which provided a hyperlink to the study protocol. Of the 101 initial respondents, nine participants were excluded for failing one or more of four attention-check items embedded within the MET, which consisted of simple instructional prompts designed to identify inattentive responding. Additionally, individuals reporting a history of psychiatric disorders were not eligible for participation and were excluded during the initial screening process. Participation was entirely voluntary, and all respondents provided electronic informed consent prior to data collection.

2.2. Measures

Multifaceted Empathy Test (MET). The MET (Dziobek et al., 2008) is an assessment tool developed to dissociate cognitive and affective components of empathy using ecologically rich visual stimuli. The version utilized in the current investigation consists of 40 complex, naturalistic images depicting emotionally charged positive and negative human situations. Within this framework, each emotional stimulus is evaluated twice, once for the cognitive dimension and once for the affective dimension, resulting in 40 trials for cognitive empathy and 40 trials for affective empathy, which are presented in a randomized order to control for sequence effects. For the cognitive trials, participants are presented with the question, "*What emotion is this person feeling?*" to evaluate emotion recognition accuracy, where responses are scored binarily as either correct (1) or incorrect (0). For the affective assessment, participants respond to the prompt, "*How much you empathize with this person?*" to measure emotional resonance, with responses rated on a 9-point Likert scale ranging from 1 to 9 for each image. The task yields three distinct scores for each participant: cognitive empathy, affective empathy for positive valence stimuli, and affective empathy for negative valence stimuli. A schematic representation of the experimental task design and trial flow is illustrated in Figure 1. In this study, the MET was administered via a Google Script interface, with minimal supplementary Persian instructions embedded to ensure comprehension for Iranian participants without compromising the ecological integrity of the original pictorial stimuli.

Figure 1. *Schematic representation of the Multifaceted Empathy Test (MET)*



Interpersonal Reactivity Index (IRI). The Interpersonal Reactivity Index (Davis, 1980) is a 28-item instrument designed to measure a respondent's diverse dimensions of responsiveness during interpersonal situations. It operationalizes interpersonal reactivity as a multidimensional construct across four distinct subscales, each comprising 7 items. These subscales include Perspective Taking, which assesses the tendency to spontaneously adopt the psychological point of view of others (e.g., "*I sometimes find it difficult to see things from the 'other guy's' point of view*," reverse coded); Fantasy, which evaluates the propensity to imaginatively transpose oneself into the feelings and actions of fictitious characters (e.g., "*I daydream and fantasize, with some regularity, about things that might happen to me*"); Empathic Concern, measuring other oriented feelings of sympathy and concern for unfortunate others (e.g., "*Sometimes I don't feel very sorry for other people when they are having problems*," reverse coded); and Personal Distress, capturing self-oriented feelings of anxiety and unease in tense interpersonal settings (e.g., "*In emergency situations, I feel apprehensive and ill-at-ease*"). Respondents rate each item on a 5 point Likert scale ranging from 0 ("*Does not describe me well*") to 4 ("*Describes me very well*"), with higher scores reflecting greater levels of dispositional interpersonal reactivity. In the present study, the validated Persian version of the IRI was administered, which has demonstrated robust reliability and construct validity within Iranian samples.

2.3. Ethical Considerations

The study protocol was approved by the local research ethics committee at Shahid Beheshti University (Ethics Code: *IR.SBU.REC.1404.305*). Prior to any data collection, participants were presented with an electronic informed consent form outlining the study's objective, its entirely voluntary nature, and rigorous data confidentiality measures. No personal identifying information was collected at any stage, ensuring complete participant anonymity throughout the workflow.

2.4. Procedure

Data collection was conducted entirely through a web-based format, deploying the behavioral task via a custom Google Apps Script interface and hosting the self-report survey instruments on the Porsline platform. Following an online call for participants, individuals accessed the study via a secure hyperlink using their personal electronic devices. The Multifaceted Empathy Test (MET) was completed first. Stimuli were presented individually, with one image displayed per screen, and the presentation order was randomized for each participant to minimize potential order effects. After submitting a response, participants were automatically advanced to the next trial and were not permitted to return to or modify previous responses. No time limits were imposed on task completion. Upon completion of the MET, participants were automatically redirected to the Porsline platform, where they completed the remaining study questionnaires, including the Interpersonal Reactivity Index (IRI). Prior to participation, electronic informed consent was obtained from all respondents.

3. Result

The primary objective of the present study was to investigate the predictive role of functional

empathy components (cognitive empathy, affective empathy-positive, and affective empathy-negative) in determining various dimensions of interpersonal responsiveness (perspective taking, fantasy, empathic concern, and personal distress). Prior to the main analyses, Pearson correlation coefficients were calculated to examine the bivariate relationships between the variables. All significance levels were tested using two-tailed parameters. Descriptive statistics for the study variables are presented in Table 1.

Table 1. *Descriptive Statistics for the Study Variables*

Variables	M	SD	Min	Max	Skew	Kurt
1. Cognitive Empathy	21.92	3.26	15	31	0.560	0.285
2. Affective Empathy (Positive)	112.38	33.16	32	180	-0.050	-0.566
3. Affective Empathy (Negative)	111.23	32.53	39	180	-0.449	-0.226
4. Perspective Taking	17.32	3.69	11	25	0.471	-0.495
5. Fantasy	16.40	4.25	5	25	-0.064	-0.294
6. Empathic Concern	18.58	3.55	11	25	-0.410	-0.295
7. Personal Distress	15.05	3.40	9	22	0.259	-0.153

The results of the correlation analysis, presented in Table 2, revealed a significant positive correlation between cognitive empathy and perspective taking ($r = .244$, $p = .019$). Additionally, affective empathy for positive valence was significantly and positively correlated with empathic concern ($r = .261$, $p = .012$). No other significant correlations were observed among the remaining variables (all $p > .05$).

Table 2*. Pearson Correlation Matrix between MET Components and IRI Dimensions*

Variables	1	2	3	4	5	6	7
1. Cognitive Empathy (MET)	1						
2. Affective Empathy (MET)	-.112	1					
3. Affective Empathy (MET)	.079	.615**	1				
4. Perspective Taking (IRI)	.244*	.064	.132	1			
5. Fantasy (IRI)	.054	-.179	-.015	-.022	1		
6. Empathic Concern (IRI)	-.179	.261*	.180	.132	.237*	1	
7. Personal Distress (IRI)	-.123	-.063	.054	-.071	.189	_	1

	.366**

*Note. * p < .05, ** p < .01 (two-tailed).*

Prior to conducting the multiple linear regression analyses, the underlying assumptions were evaluated for all models. Visual inspection of scatterplots of standardized residuals against standardized predicted values supported the assumptions of linearity and homoscedasticity, with no evidence of systematic or funnel-shaped patterns. Histograms of standardized residuals approximated normal distributions, and normal probability (P-P) plots showed observations lying close to the expected diagonal line, indicating that the normality assumption was reasonably satisfied. Multicollinearity was not a concern, as Tolerance values ranged from 0.618 to 0.987 and Variance Inflation Factor (VIF) values ranged from 1.013 to 1.618 across the models. In addition, the Durbin–Watson statistics ranged from 1.818 to 2.375, supporting the assumption of independence of residuals. Overall, the diagnostic analyses indicated that the assumptions required for multiple linear regression were adequately met.

Following the correlation analyses, four separate multiple linear regression analyses were conducted to determine the extent to which MET components (cognitive empathy, affective empathy-positive, and affective empathy-negative) could predict the dimensions of interpersonal reactivity. The first regression model examined perspective taking. The overall model was not statistically significant, $F(3, 88) = 2.64$, $p = .054$, accounting for 8.3% of the variance ($R^2 = .083$, Cohen's $f^2 = .09$). Examination of the individual predictors indicated that cognitive empathy was positively associated with perspective taking ($\beta = .256$, $t = 2.49$, $p = .015$). Affective empathy for positive valence ($\beta = -.001$, $p = .995$) and negative valence ($\beta = .153$, $p = .241$) did not significantly contribute to the model. These results are summarized in Table 3.

***Table 3**. Regression Coefficients for Predicting Perspective Taking*

Predictor	β	**t**	**Sig.**
Cognitive Empathy	.256	2.492	.015*
Affective Empathy (Positive)	-.001	-.006	.995
Affective Empathy (Negative)	.153	1.180	.241

*Note. * p < .05.*

The second regression model examined the Fantasy dimension. The overall model was not statistically significant, $F(3, 88) = 1.47$, $p = .228$, accounting for 4.8% of the variance ($R^2 = .048$, Cohen's $f^2 = .05$). Within the model, the coefficient for positive affective empathy was negative and reached the conventional significance threshold ($\beta = -.269$, $t = -2.03$, $p = .045$). The coefficients for cognitive empathy and negative affective empathy were not statistically significant (all ps > .05). Given the non-significant overall model, these coefficient-level findings should be interpreted with caution. Detailed results are presented in Table 4.

***Table 4**. Regression Coefficients for Predicting Fantasy*

Predictor	β	t	Sig.
Cognitive Empathy	.036	.340	.735
Affective Empathy (Positive)	-.269	-2.033	.045*
Affective Empathy (Negative)	.153	1.158	.250

*Note. * p < .05.*

The third regression model evaluated Empathic Concern. The overall regression model was statistically significant, F(3, 88) = 2.94, p = .037, accounting for 9.1% of the variance (R^2 = .091, Cohen's f^2 = .10). However, none of the individual MET components emerged as statistically significant independent predictors (all ps > .05). The largest coefficient was observed for positive affective empathy (β = .226, t = 1.75, p = .083), although this effect did not reach statistical significance. The detailed results are presented in Table 5.

***Table 5**. Regression Coefficients for Predicting Empathic Concern*

Predictor	β	t	Sig.
Cognitive Empathy	-.151	-1.477	.143
Affective Empathy (Positive)	.226	1.751	.083
Affective Empathy (Negative)	.029	.225	.823

The final regression model focused on the prediction of Personal Distress. The results indicated that the overall model was not statistically significant, F(3, 88) = 1.05, p = .373, and accounted for only 3.5% of the variance (R^2 = .035, Cohen's f^2 = .04). None of the MET components (cognitive, positive affective, or negative affective empathy) were significant predictors of personal distress in this sample (all p > .05). The detailed results of this analysis are summarized in Table 6.

***Table 6**. Regression Coefficients for Predicting Personal Distress*

Predictor	β	t	Sig.
Cognitive Empathy	-.130	-1.235	.220
Affective Empathy (Positive)	-.169	-1.265	.209
Affective Empathy (Negative)	.148	1.112	.269

Overall, the regression analyses yielded limited evidence for associations between MET empathy components and dimensions of interpersonal reactivity. Among the four models examined, only the Empathic Concern model reached statistical significance at the omnibus level. Although cognitive empathy was associated with a significant positive coefficient in the Perspective Taking model and positive affective empathy showed a negative coefficient in the Fantasy model, both overall models were not statistically significant and therefore these findings should be interpreted with caution. Collectively, the results provide only modest evidence for links between performance-based empathy components and dispositional interpersonal reactivity.

4. Discussion

The primary objective of the present study was to examine the relationship between performance-based empathic processing capacities, assessed using the MET, and dimensions of interpersonal reactivity measured by the Interpersonal Reactivity Index (IRI). Overall, the findings provided limited evidence for associations between MET-derived empathy components and interpersonal reactivity dimensions. Among the four regression models examined, only the model predicting Empathic Concern reached statistical significance at the omnibus level. Although cognitive empathy showed a significant positive coefficient within the Perspective Taking model, the overall model did not reach statistical significance. Similarly, the Fantasy and Personal Distress models were not statistically significant. Taken together, these findings suggest that associations between performance-based empathy measures and dispositional interpersonal reactivity may be restricted and should be interpreted with caution.

Although cognitive empathy showed a significant positive coefficient within the Perspective Taking model, the overall regression model did not reach statistical significance. Consequently, any interpretation of this association should be considered tentative. Nevertheless, the observed pattern is broadly consistent with theoretical accounts proposing conceptual overlap between mentalizing abilities and dispositional perspective-taking. Cognitive empathy reflects the ability to infer the mental and emotional states of others, whereas perspective-taking represents the tendency to adopt another person's viewpoint in everyday social interactions. Future studies with larger samples and greater statistical power are needed to determine whether the observed association reflects a robust relationship between these constructs.

While the overall regression model predicting Empathic Concern was statistically significant, none of the individual empathy components emerged as significant independent predictors. This pattern may indicate that variance in Empathic Concern is associated with the combined contribution of multiple empathic processes rather than any single component in isolation. Such an interpretation is broadly consistent with theoretical models that conceptualize empathic concern as involving both cognitive and affective elements (Decety, 2011; Zaki & Ochsner, 2012). However, because no individual predictor reached statistical significance, this interpretation should be regarded as tentative.

Within the Fantasy model, positive affective empathy was associated with a negative coefficient that reached the conventional significance threshold. However, the overall regression

model was not statistically significant. Consequently, this finding should be considered exploratory and interpreted with considerable caution. Although the observed pattern may warrant further investigation in future studies, the present data do not provide sufficient evidence to support strong theoretical conclusions regarding the relationship between positive affective empathy and fantasy-related tendencies.

Finally, no significant associations were observed between the MET components and Personal Distress. This finding may suggest that performance-based empathy measures and self-oriented distress represent partially distinct constructs. However, the absence of significant effects should not be interpreted as evidence that these constructs are entirely unrelated. It remains possible that factors not examined in the present study, including broader personality characteristics or emotion-regulation tendencies, contribute to individual differences in Personal Distress. Further research is needed to clarify these relationships.

5. Conclusion and Future Directions

In conclusion, the findings of the present study provide limited evidence for associations between performance-based empathy components and dispositional dimensions of interpersonal reactivity. Overall, the results suggest that relationships between these domains may vary across different aspects of interpersonal functioning rather than occurring uniformly across all dimensions of reactivity. Among the models examined, only the model predicting Empathic Concern reached statistical significance at the omnibus level, whereas the models predicting Perspective Taking, Fantasy, and Personal Distress did not. Although some individual coefficients reached conventional levels of statistical significance, these findings should be interpreted cautiously when the corresponding overall models were not statistically significant.

These findings highlight the potential value of examining empathy as a multidimensional construct that encompasses both situational processing capacities and dispositional interpersonal tendencies. However, the present results do not permit strong conclusions regarding the precise mechanisms linking these domains, and further research is required to clarify the nature and robustness of these associations.

Several methodological limitations should be considered when interpreting these findings. First, data collection and processing tasks were administered via an online, web-based platform, which may have introduced variability in participants' testing environments and attentional engagement. Second, the study did not include measures of broader personality or temperament characteristics, such as neuroticism or attachment-related dispositions. Consequently, potentially relevant factors associated with interpersonal reactivity could not be examined directly. And finally, an additional limitation concerns the demographic composition of the sample, which was predominantly female (75%). As a result, the generalizability of the findings to more gender-balanced populations may be limited. Future studies would benefit from recruiting samples with a more balanced gender distribution to examine the robustness of the observed associations across different participant groups.

Future research may benefit from examining these relationships in clinical or developmentally

distinct populations characterized by different social-cognitive profiles. Additionally, longitudinal and ecologically oriented designs may help clarify how performance-based empathy measures relate to interpersonal functioning across everyday contexts and over time. Such approaches may provide a more comprehensive understanding of the conditions under which empathic processing capacities are associated with stable interpersonal tendencies.

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