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How cognitive and emotional empathy relate to rational thinking: empirical evidence and meta-analysis

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ABSTRACT

Empathy is frequently described in opposition to rationality. Yet in two studies, we demonstrate that the relationship between rationality and empathy is nuanced and likely context dependent. Study 1 reports correlational data from two American samples and Study 2 presents a meta-analysis of existing literature ($k = 22$). We demonstrate that various types of cognitive empathy (perspective-taking, emotion recognition, and fantasy) are positively correlated with self-reported rationality, but unrelated to rational performance. In contrast, types of emotional empathy (empathic concern, personal distress, and emotion contagion) are generally negatively correlated with performance measures of rationality, but their relationships with self-reported rationality are divergent. Although these results do not settle the debate on empathy and rationality, they challenge the opposing domains hypothesis and provide tentative support for a dual-process model of empathy. Overall, these results indicate that the relationship between rationality and empathy differs depending upon how rationality and empathy are measured.

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For centuries, philosophers have debated the potentially conflicting roles of emotion and reason. Ancient Greek philosopher Plato saw reason and emotion as necessarily in conflict, using the metaphor of a charioteer (Reason) who struggles to control two horses pulling a chariot in different directions (Emotions; Hackforth, 1952). Philosopher David Hume's famous 18th century quote "Reason is, and ought only to be the slave of the passions" (Hume, 1739, 2.3.3.4¹) similarly posits tensions between the two, albeit in opposing roles to Plato. Lay people continue to see emotion and reason as competing constructs today, by judging that people who use emotion are less likely to use reason in their decision making, and vice versa ($r = -0.8$; Levine et al., 2018).

Within psychology, these tensions have also been widely debated, with some scholars finding that emotions may at times help to enhance rational thinking (Damasio, 1994; Dolan, 2002; Loewenstein & Lerner, 2003; Peters & Slovic, 2000), and others finding that emotions may at times hinder rational thinking (Blanchette & Richards, 2004, 2010; Blanchette et al., 2018; Jung et al., 2014; Schwarz, 2000). As examples of the latter, psychologists have found that participants perform worse on a logical reasoning task (e.g., Wason selection task) after being primed to be in a positive or negative mood (Oaksford et al., 1996) or when reasoning about emotional content (Blanchette & Richards, 2004; Goel & Dolan, 2003), compared to more neutral conditions. Similar results have been found using other logical reasoning tasks (syllogisms, Melton, 1995; analogies, Palfai & Salovey, 1993).

In the current research, we focus on one specific aspect of the emotion-reason debate: how *empathy* may be related to rational thinking. This is an interesting case in point because empathy is a multi-dimensional construct that does not simply involve emotional processes, but also cognitive ones.

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Generally, *cognitive empathy* involves understanding others' thoughts and feelings without necessarily reacting emotionally, whereas *emotional empathy* involves experiencing emotions in response to others' emotional experiences or expressions. However, empathy researchers disagree on whether this distinction is meaningful, exactly which concepts are classified under each umbrella term, and whether some concepts should even count as empathy at all (Batson, 2009; Hall & Schwartz, 2019).

Importantly, depending on how empathy (and rationality) are defined, the assumed nature of their relationship would likely be different. For example, if we consider empathy as a rush of emotions in response to another person's suffering, and rationality as a slow and deliberate appraisal of the situation, then we are likely to consider these two concepts to be in opposition. However, if we consider empathy to include attempting to imagine what it might be like to be in that other person's situation, this might be considered a rational way to understand a complex social situation. Alternatively, if we consider empathy to be people's ability to correctly judge emotions, then the inherent rationality of the judgment may depend on whether we consider it to be correct, or at least reasonable, given the information provided. To this point, if rationality is defined as having a reasonable and logical response to a situation then even extreme emotional empathic responses could be seen as rational in certain situations.

There are dozens of potential definitions of empathy and rationality, and many potential relationships between them. In this paper, we attempt to systematically consider how various concepts that have been called empathy relate to one definition of rationality (measured in two ways, via self-report or performance). In this way, we hope to provide a better understanding of how empathy relates to rationality, and also to contribute to debates on the different natures of various concepts that researchers call empathy.

We define rationality as a thinking style characterized by "a tendency to make slower, elaborated, and cognition-based decisions" which involves a system "which operates at a conscious level and is intentional, [and] analytical" (Wang et al., 2017). Rationality is therefore not based on the correctness of the outcome, and although correlated, it is conceptually distinct from related constructs such as general intelligence (Stanovich, 2012) and numeracy (Liberali et al., 2012). Here, we specifically operationalize rationality using a commonly used self-report measure (Need for Cognition) and a commonly used performance-based measure (Cognitive Reflection Test).

With regard to empathy, we include a number of concepts that have been called "empathy" within our definition (see Table 1). We use the overarching terms "emotional empathy" and "cognitive empathy," but further subdivide each category. We divide emotional empathy into empathic concern, emotion contagion, and personal distress. These subtypes of emotional empathy differ in the extent to which they are oriented toward the self. Empathic concern is focused on other people's experiences, whereas personal distress captures a propensity to have self-focused emotional reactions. Emotional contagion is equally focused on the self and the other, namely, it involves a sense of emotional fusion or mirroring of others' emotions. Self-report measures of empathic concern and personal distress are generally negatively correlated (Davis, 1983), and have different relationships with prosocial behavior (Eisenberg et al., 1989).

In this paper, we also use the term cognitive empathy as an overarching term to include theory of mind, emotion recognition, perspective taking, and fantasy (see Table 1). Self-report measures of perspective taking correlate very minimally with performance measures of emotion recognition and theory of mind, (explaining only about 1% of the variance in these tasks, Murphy & Lilienfeld, 2019), suggesting they tap different theoretical concepts. To bolster our investigation of how rationality relates to different operationalizations of empathy, we consider several different types of cognitive empathy, which will allow us to determine whether the nature of this relationship differs between them.

Conflicting theories

As discussed above, depending on how one defines empathy and rationality, the relationship between the two concepts is likely to differ. However, to our knowledge, there are only two established theories in psychology that formally hypothesize the expected relationship between rationality and empathy.

Table 1. Definitions of various subtypes of empathy.

Emotional Empathy		Cognitive Empathy		
Feeling emotion in response to another person's expression of an emotion.		Understanding another person's thoughts or feelings.		
Empathic Concern ⁱ Compassion ⁱⁱ Sympathy ^{iii,iv}	Emotion Contagion ^v Emotional Resonance ^{vi} Empathy ^{vii}	Personal Distress ⁱ	Emotion Recognition ^{xi} Empathic Accuracy ^x	Perspective Taking ⁱ Sympathy ^{xii} Einfühlung ^{xiii} Empathy ^{xiv} Fantasy ^v
"Other-oriented feelings of sympathy and concern for unfortunate others" (Davis, 1983, p. 114)	"Coming to feel the same emotion that another person feels" (Batson, 2009, p. 5).	"Self-oriented feelings of personal anxiety and unease in tense interpersonal settings" (Davis, 1983, p. 114).	"Being able to accurately infer the specific content of another person's thoughts and feelings" (Ickes, 1993, p. 588) Cohen et al., 1985, pp. 38).	"Tendency to transpose themselves imaginatively into the feelings and actions of fictitious characters" (Davis, 1983, p. 114).

ⁱDavis (1983), ⁱⁱHume (1739), ⁱⁱⁱSmith (1759), ^{iv}Eisenberg and Strayer (1990), ^vDarwin (1871), ^{vi}Hatfield et al. (1994), ^{vii}Decety and Meyer (2008), ^{viii}Hoffman (2001), ^{ix}Premack and Woodruff (1978), ^xBateman and Fonagy (2012), ^{xi}Ickes (1993), ^{xii}Hess and Hareli (2017), ^{xiii}Smith (1759), ^{xiv}Lipps (1903), ^{xv}Fitchner (1909).

Dual-process models of empathy theorize that cognitive empathy is a more rational process; while emotional empathy is less rational (Martingano, 2020; Yu & Chou, 2018). In support of a dual-process model, neurological evidence finds that a variety of cognitive empathy tasks (including theory of mind and perspective taking) involve distinct pre-frontal brain activation (Yu & Chou, 2018), relate more strongly to executive functioning (Yan et al., 2019), and require more mental resources, compared to emotional empathy (Davis et al., 1996; Dimberg et al., 2000; Morelli & Lieberman, 2013; Rameson et al., 2012). Although there is some evidence that cognitive empathy (in the form of recognizing emotions from facial expressions) occurs even under cognitive load (Tracy & Robins, 2008), this result is challenged by other research that finds a marginal or significant reduction in this skill under cognitive load (Ahmed, 2018; Lima et al., 2019; Reed & Steed, 2019; Tsouli et al., 2017). In addition, people's ability to recognize emotions appears to improve if offered the chance to deliberate (Tracy & Robins, 2008).

If, in line with a dual-process model, cognitive empathy is a rational process and emotional empathy is not, then we might expect that cognitive empathy and rational thinking would be positively associated. However, based on a dual-process model, we would expect no relationship, or perhaps even a negative relationship, between emotional empathy and rational thinking.

In contrast, the *opposing domains hypothesis* posits that even cognitive empathy is in conflict with rational thinking. The opposing domains hypothesis proposes a conflict between thinking about other people's mental states and thinking about physical or logical processes (e.g., mechanical or logical reasoning; Jack, 2014; Jack et al., 2013; Van Overwalle, 2011). Evidence for a neural dissociation in cognitive empathy and logical reasoning tasks supports this theory, by indicating that different areas of the brain are separately responsible for these domains, and they cannot be accessed simultaneously (Jack, 2014; Van Overwalle, 2011). Other support comes from small negative correlations between self-reported empathizing and self-reported systemizing thinking styles (Greenberg et al., 2018; Wakabayashi et al., 2006). Note that opposing domains research often combines physical and logical reasoning processes, making it difficult to understand the independent associations between each and cognitive empathy. Still, following the opposing domains hypothesis, we might expect rational thinking to be negatively associated with all types of empathy, including cognitive empathy.

Conflicting empirical data

Perhaps unsurprisingly given the definitional inconsistencies surrounding both concepts, empirical research examining the relationship between rationality and empathy has yielded mixed results. To their credit, some researchers studying empathy and rationality have distinguished between different types of empathy; however, others have not, or have to varying degrees. To further complicate matters, the relationship between rationality and empathy also appears to differ depending on how rationality is measured.

Self-report measures of rationality

Need for Cognition, a self-report measure of preferences to engage in rational thinking, forms a subscale of the Rational-Experiential Inventory (Cacioppo & Petty, 1982; Epstein et al., 1996). Using this measure, researchers have found mixed relationships with composite self-report measures of empathy such as the Empathizing Quotient, with some researchers finding a negative correlation (Svedholm-Häkkinen & Lindeman, 2017), and others finding no correlation (Brosnan et al., 2014). When researchers are able to differentiate between empathy subtypes using multidimensional empathy scales, there is some support for a dual-process model of empathy: Need for Cognition is positively correlated with cognitive empathy (perspective taking), but unrelated to emotional empathy (neither empathic concern nor personal distress; Strobel et al., 2017). Sometimes emotion recognition measures support this trend, with researchers finding that people who are more accurate at recognizing

emotions from photographs (a cognitive empathy skill) report higher levels of Need for Cognition (Mayukha et al., 2020). However, other researchers have found no relationship between emotion recognition and Need for Cognition (Brosnan et al., 2014).

To the extent there is evidence for a dual-process model, it appears to be stronger for personal distress compared to empathic concern (Mayukha et al., 2020). Mayukha et al. combined perspective taking and empathic concern, but examined personal distress alone. This composite measure of empathy was positively related to Need for Cognition, but personal distress was negatively related.

Performance measures of rationality

Rational thinking can also be measured using performance measures, such as the Cognitive Reflection Test (CRT; Frederick, 2005), which is consistently positively correlated with the Need for Cognition scale (Frederick, 2005; Pennycook et al., 2016). The CRT presents simple mathematical reasoning problems with intuitively appealing, but incorrect, answers. For example: “A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?” Although the intuitive response to the question is \$0.10, the correct answer is actually \$0.05. Choosing the correct answer requires rational thinking to override other more intuitive responses.

Most research finds no relationship between CRT performance and any type of empathy, suggesting empathic people may *believe* they are more or less rational, but they perform similarly to less empathic people when tested. This result supports neither a dual-process model nor the opposing domains hypothesis and suggests a novel “measure dependent” caveat. For example, researchers have found that emotional empathy (empathic concern and personal distress) is unrelated to CRT performance (Strobel et al., 2017). Yet, using an extended 6-item version of the CRT task, one study found that empathic concern was negatively related to rational performance (Royzman et al., 2015). These inconsistent findings demonstrate the importance of considering how rationality is measured.

With respect to cognitive empathy, researchers have found that perspective taking was unrelated to CRT performance (Strobel et al., 2017). Similarly, other types of cognitive empathy, such as emotion recognition (Brosnan et al., 2014) and Theory of Mind (Corgnet et al., 2018) are often unrelated to CRT performance. Nevertheless, there is some limited evidence that some types of cognitive empathy may be more positively related to CRT performance than emotional empathy, in line with a dual-process model. For example, some researchers have found that people who are more accurate at recognizing emotions from photographs or during social interactions perform better on the CRT (MacKellams & Lerner, 2016). However, there is a need to systematically examine how different types of cognitive and emotional empathy are related to rational performance.

The current research

To date, research on the relationship between rationality and empathy appears to have yielded no consensus. Yet determining trends in the literature based simply on whether studies report a statistically significant relationship is inherently flawed. The size of the effects should also be taken into account. By systematically considering how various empathy types relate to rational thinking, we aim to provide a more nuanced understanding of how empathy relates to rationality, and also contribute to ongoing conversations about definitions and operationalizations of each.

In Study 1, we present data from two American samples, assessing the relationship between empathy and rational thinking. In Study 2 we report a meta-analytic review of existing literature to determine the overall relationship between different types of empathy and different operationalizations of rational thinking. Overall, this paper seeks to clarify the relationship between empathy and

rationality, and evaluate the opposing domains and dual-process theories of empathy by examining which aspects of empathy (if any) are associated with rational thinking. All data and analyses syntax are available via OSF (https://osf.io/mvu4t/?view_only=c6b8c4647da042efab016435b29d2125).

Study 1

Method

We performed secondary analyses on two datasets collected by Tullett et al. (2016) which are publicly available as supplementary materials. Their paper reported the relationship between political affiliation and interest in novelty, and the analyses here have not been previously reported.

Participants

Study 1A participants were 280 University of Alabama undergraduates (172 women, Mean age = 19.19 years, SD = 1.20), and Study 1B participants were 198 University of California Berkeley undergraduates (157 women, Mean age = 21.34 years, SD = 3.20).

Measures

Empathy

Interpersonal reactivity index (IRI). Participants completed the Empathic Concern (EC), Perspective Taking (PT), Fantasy (FT), and Personal Distress (PD) subscales of the IRI (Davis, 1983). Empathic Concern assesses feelings of warmth, compassion, and concern for others (e.g., “*I often have tender, concerned feelings for people less fortunate than me.*” 1 = “does not describe me well,” 5 = “describes me very well”). For Personal Distress, we used the PD scale, which measures feelings of fear, apprehension, and discomfort at witnessing the suffering of others (e.g., “*In emergency situations, I feel apprehensive and ill-at-ease.*”). Perspective Taking was measured using the PT scale, which measures one’s tendency to imagine how another person thinks or feels (e.g., “*I sometimes try to understand my friends by imagining how things look from their perspective*”). Fantasy was measured using the FT scale, which measures respondents’ tendency to transpose themselves imaginatively into the feelings and actions of fictitious characters (e.g., “*I really get involved with the feelings of the characters in a novel*”). PD and EC are considered measures of emotional empathy, whereas PT and FT are considered measures of cognitive empathy. All the IRI subscales had reasonable internal consistency (Cronbach’s α : Study 1A, PT = 0.74, EC = 0.83, PD = 0.77, FT = 0.83; Study 1B, PT = 0.83, EC = 0.84, PD = 0.81; FT = 0.81).

Rational thinking

Need for cognition scale (NFC). Participants completed the 18-item revised Need for Cognition Scale (Cacioppo & Petty., 1982). This self-report measure captures a dispositional tendency to engage in rational thinking (e.g., “*I would prefer complex to simple problems*” and “*I prefer my life to be filled with puzzles that I must solve.*” 1 = Strongly Disagree to 5 = Strongly Agree). Cronbach’s α for Study 1A = 0.87, and Study 1B = 0.88.

Cognitive reflection task (CRT). Participants completed a 3-item performance measure of rational thinking (Frederick, 2005). This task presents simple mathematical reasoning problems with intuitively appealing, but incorrect, answers (see bat and ball example in Introduction). Participants’ written answers were coded as correct (1) or incorrect (0), and total scores ranged from 0 (all answers incorrect) to 3 (all answers correct). Cronbach’s α Study 1A = 0.74, Study 1B = 0.78.

Results

We examined how each type of empathy was correlated with rationality (see Supplementary Tables S1 and S2 for full correlation matrices). Table 2 presents the correlation coefficients (Pearson's r) for self-reported rational thinking (Need for Cognition Scale) and Table 3 presents correlation coefficients for rational performance as measured by the Cognitive Reflection Task. The Need for Cognition Scale positively correlated with performance on the Cognitive Reflection Task in both Study 1 ($r = 0.23$, $p < .001$) and Study 2 ($r = 0.22$, $p = .001$). We then combined datasets from both samples using random effects meta-analyses using Comprehensive Meta-Analysis V3 software (Borenstein et al., 2006).² We converted correlations into Fisher's z for analysis but use Pearson's r for interpretation. We discuss combined data here, but report individual study results for transparency.

Need for cognition scale (NFC)

When data were combined across samples, there was a positive correlation between Need for Cognition and three types of empathy (empathic concern EC $r = 0.22$; perspective taking PT $r = 0.33$; and Fantasy FT $r = 0.20$) and a negative correlation with personal distress (PD $r = -0.31$). Subgroup analyses confirmed that the nature of the relationship between NFC and Personal Distress was significantly more negative compared to the relationship between NFC and all other types of empathy (EC $Q = 24.87$, $p < .001$, PT $Q = 95.382$, $p < .001$, and FT $Q = 33.74$, $p < .001$).

Cognitive reflection task (CRT)

When data were combined across samples, the relationship between CRT performance and empathy was null for three types of empathy (Empathic Concern, Perspective Taking, and Fantasy; see Table 3). However, the relationship between Personal Distress and CRT performance was significantly negative ($r = -0.13$, $p = .006$). Unlike the self-reported NFC results discussed above, subgroup analyses indicated that the nature of the relationship between CRT and Personal Distress was not significantly different from the relationship between CRT and EC ($Q = 0.253$, $p = .615$), and CRT and PT ($Q = 0.979$, $p = .323$). However, the relationship between CRT and PD was significantly more negative than the relationship between CRT and FT ($Q = 8.35$, $p = .004$).

Comparing NFC and CRT results

Subgroup analyses were used to compare the relationship between empathy and rationality depending on how rationality was measured. The relationship was significantly more positive when rationality was measured via self-report (NFC) than performance (CRT) for EC ($Q = 5.05$, $p = .025$) and PT ($Q = 20.13$, $p < .001$). However, the relationship between FT and rationality did not differ depending

Table 2. Correlations between self-reported need for cognition (NFC) and empathy.

	Empathic Concern (EC)		Perspective Taking (PT)		Personal Distress (PD)		Fantasy (FT)	
	r	p	r	p	r	p	r	p
Study A (N = 280)	0.13	.034	0.29	<.001	-0.30	<.001	0.13	.031
Study B (N = 157)	0.33	<.001	0.38	<.001	-0.34	<.001	0.28	<.001
Combined	0.22	.023	0.33	<.001	-0.31	<.001	0.20	.009

Table 3. Correlations between performance on cognitive reflection task (CRT) and empathy.

	Empathic Concern (EC)		Perspective Taking (PT)		Personal Distress (PD)		Fantasy (FT)	
	r	p	r	p	r	p	r	p
Study A (N = 280)	0.00	.979	0.02	.757	-0.16	.008	0.11	.065
Study B (N = 157)	-0.16	.024	-0.11	.113	-0.08	.258	0.01	.918
Combined	-0.09	.868	-0.05	.523	-0.13	.006	0.08	.172

on how rationality was measured ($Q = 2.17, p = .141$). In addition, the relationship between PD and rationality was significantly more negative when rationality was measured via self-report than performance ($Q = 9.02, p = .003$).

Discussion

We found that both types of cognitive empathy (PT and FT) and one type of emotional empathy (EC) were positively associated with self-reported, but not performance, measures of rationality. In contrast, personal distress (a type of emotional empathy) was negatively related to both self-report and performance measures of empathy. These results indicate that the relationship between rationality and empathy may differ depending upon how rationality and empathy are measured.

Study 2

Study design

In order to confirm and extend these results, we conducted a systematic literature review followed by two random effects meta-analyses.

Literature search

First, we conducted a database search of Web of Science and PsycINFO using the following term: (Empath*AND (“Cognitive Reflection Task” OR “Need for Cognition” OR “Rational Experiential Inventory”)). Second, we reviewed reference sections of all suitable articles identified via database searches and performed citation forward checking to locate other relevant publications.

For a study to be included, it had to meet three inclusion criteria.

- (1) Be written in English.
- (2) Employ a self-report measure of rational thinking or the Cognitive Reflection Task.
- (3) Employ a quantitative measure of empathy that could be categorized as empathic concern, emotional contagion, personal distress, theory of mind (ToM), emotion recognition, perspective taking, or fantasy. See [Table 1](#) for defining criteria.

We obtained 57 full-texts of articles through databases and other sources, after removing duplicates (see [Figure 1](#)). From these full-texts, 26 articles were excluded for the following reasons: 4 articles were excluded because they did not use a suitable measure of rational thinking, 19 articles were excluded because they did not include a suitable measure of empathy, and 1 article was excluded because it was not available in English. In addition, we excluded 2 articles that did not measure empathy and rationality with the same sample of participants thereby preventing a correlation from being calculated, leaving a total of 31 records suitable for inclusion. All articles suitable for inclusion reported that they measured rational thinking and empathy, however, as it was not relevant to the author’s hypotheses, several articles did not report the correlation between these measures. When these data were missing, we emailed first authors to request raw correlations. Despite our best efforts, 9 articles were excluded from our meta-analysis as we were unable to obtain these correlations.

Overall, we obtained 22 usable articles (20 published journal articles, 1 dissertation, and we also include our novel analyses of Tullett et al. (2016; reported in Study 1).

Statistical analyses

We conducted two random effects meta-analyses using Comprehensive Meta-Analysis V3 software (Borenstein et al., 2006) to determine the relationships between empathy subtypes and the two operationalizations of rational thinking. The first meta-analysis includes studies using the Need for Cognition Scale, and the second includes studies using the Cognitive Reflection Task. For each meta-

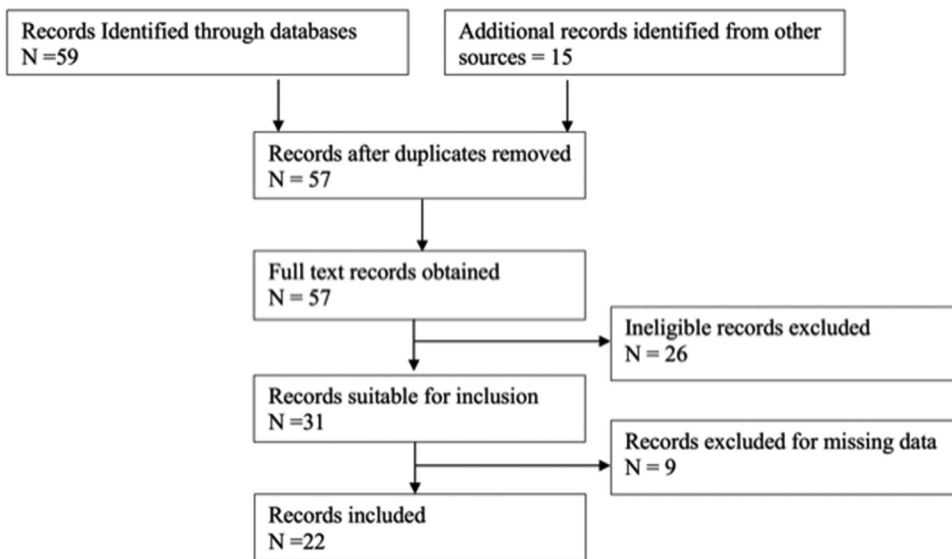


Figure 1. PRISMA 2009 flow diagram.

analysis, results for each subtype of empathy were analyzed separately using subgroup analyses. In addition, we report overall summaries for cognitive and emotional empathy. We converted correlations into Fisher's z for analysis but use Pearson's r for interpretation.

Results

Need for cognition (NFC)

Subgroup analyses revealed that the relationship between empathy and self-reported rational thinking (NFC scores) differs depending on the type of empathy being considered, $Q(5) = 161.40$, $p < .001$. Overall, there was a significant positive relationship between rational thinking and cognitive empathy, $r = 0.185$, $p < .001$, $k = 19$. When examining subtypes of empathy separately, this positive relationship is significant for perspective taking and fantasy, but only trending for emotion recognition (see Table 4 for summary data and see Supplemental Figure S1 for forest plot). There was an overall null relationship between rational thinking and emotional empathy, $r = 0.036$, $p = .482$, $k = 22$. The relationship between different subtypes of emotional empathy and NFC differed dramatically, being positive for empathic concern, negative for personal distress, and null for emotional contagion (see Table 4). Overall cognitive empathy was more positively related to rational thinking than emotional empathy ($Q(1) = 6.22$, $p = .013$). This trend appears to be driven by perspective taking, which is more positively related to NFC compared to any of the emotional empathy subtypes; and personal distress, which is more negatively related to NFC scores than any of the cognitive empathy subtypes (see Supplementary Table S3).

Cognitive reflection task (CRT)

Subgroup analyses revealed that the relationship between empathy and performance on the Cognitive Reflection Task also differs depending on the type of empathy being considered, $Q(6) = 39.81$, $p < .001$. There is no significant relationship between rational performance and cognitive empathy overall, $r = 0.010$, $p = .730$, $k = 16$. This null trend is consistent across all types of cognitive empathy (perspective taking, ToM, emotion recognition, and fantasy, see Table 5 for summary data and see Supplemental Figure S2 for forest plot). There is a significant negative relationship between CRT

Table 4. Standardized correlations (Pearson's r) between self-reported rationality (i.e., Need for Cognition) and different types of empathy.

Empathy Type	k	Correlation	Lower Limit	Upper Limit	Z-value	p-Value
Emotional Empathy						
Empathic Concern	14	0.16	0.08	0.24	3.85	<.001
Emotion Contagion	4	-0.07	-0.32	0.18	-0.56	.57
Personal Distress	4	-0.28	-0.34	-0.22	-8.47	<.001
Summary Emotional Empathy	22	0.04	-0.07	0.14	0.70	.48
Cognitive Empathy						
Emotion Recognition	6	0.09	-0.01	0.19	1.75	.08
Fantasy	4	0.13	0.03	0.24	2.44	.01
Perspective Taking	9	0.27	0.21	0.33	8.84	<.001
Summary Cognitive Empathy	19	0.19	0.13	0.24	6.02	<.001

Table 5. Standardized correlations (Pearson's r) between performance measures of rationality (i.e., Cognitive Reflection Task) and different types of empathy.

Empathy Type	k	Correlation	Lower Limit	Upper Limit	Z-value	p-Value
Emotional Empathy						
Empathic Concern	15	-0.09	-0.13	-0.05	-4.89	<.001
Emotion Contagion	1	-0.16	-0.19	-0.12	-7.80	<.001
Personal Distress	3	-0.06	-0.19	0.07	-0.88	.38
Summary Emotional Empathy	19	-0.09	-0.13	-0.06	-5.49	<.001
Cognitive Empathy						
Emotion Recognition	6	0.07	-0.02	0.16	1.57	.12
Fantasy	3	0.06	-0.02	0.14	1.56	.12
Perspective Taking	6	-0.05	-0.13	0.02	-1.39	.16
Theory of Mind	1	-0.03	-0.18	0.12	-0.38	.70
Summary Cognitive Empathy	16	0.01	-0.05	0.06	0.35	.73

performance and emotional empathy overall, $r = -0.093$, $p < .001$, $k = 19$. This negative trend also appears consistent across all subtypes of emotional empathy (empathic concern, personal distress, and emotional contagion), although it does not reach statistical significance for personal distress (see Table 5). Like the NFC results, overall cognitive empathy was more positively related to rational thinking than emotional empathy ($Q(1) = 9.942$, $p = .002$), even if in absolute terms all the relationships shifted toward the negative. Unlike the NFC, this does not appear to be driven by any particular empathy subtypes (see Supplementary Table S4).

Comparing NFC and CRT results

Additional subgroup analyses were conducted to compare NFC and CRT results for each type of empathy. In line with the results from Study 1, these analyses revealed that the relationship between rationality and empathic concern was significantly more positive when rationality was measured via self-report, $Q(1) = 30.43$, $p < .001$, as was the relationship between rationality and perspective taking, $Q(1) = 43.61$, $p < .001$. In addition, as in Study 1, the relationship between rationality and personal distress was significantly more negative when rationality was measured via self-report compared to performance, $Q(1) = 8.90$, $p = .003$. No other types of empathy differed in their relationship to rationality depending on how rationality was measured (see Supplementary Table S5). As in Study 1, the relationship between fantasy and rationality did not differ depending on how rationality was measured.

Discussion

In line with our results from Study 1, a meta-analysis demonstrated that cognitive empathy is generally positively associated with self-reported, but not performance, measures of rationality. Meta-analysis has utility over narrative reviews of the literature, which all too often rely on tests of statistical

significance alone to determine trends in the literature. The associations between self-reported rationality and emotional empathy mimic those of Study 1, being negative for personal distress and positive for empathic concern. Yet, in contrast to Study 1, various types of emotional empathy were negatively related to performance measures of rationality. This meta-analysis provides further evidence that the relationship between rationality and empathy differs depending on how rationality and empathy are measured.

General discussion

Overall, our results indicate that some empathic people (those high in empathic concern and perspective taking) report being more rational, but fail to act so when tested. This conclusion is supported by data from two American samples (Study 1), and a meta-analysis of existing literature (Study 2). This result fails to provide conclusive evidence for either a dual-process model, or the opposing domains hypothesis, but rather supports a novel “measure dependent” caveat. The Need for Cognition scale and Cognitive Reflection Task are reliably positively correlated, so these results were surprising, but not unprecedented. Previous research has found that the relationship between empathy and rationality is different when rationality is measured with the CRT task compared to self-report (Strobel et al., 2017). Indeed, various researchers have found a disconnect between self-reported and behavioral measures of rational thinking in other domains (e.g., Gärtner et al., 2021).

One explanation for this disconnect may be participants’ socially desirable responding, with people reporting higher empathy also wanting to appear more rational. Although both the IRI and the Need for Cognition scale are commonly used and well-validated measures (Davis, 1983; Epstein et al., 1996; Handley & Newstead, 2000; Konrath, 2013), they both rely on participants to have insight into their own tendencies as well as a willingness to accurately report them. Indeed, there are a variety of features shared by all self-reports that are likely to inflate correlations between various self-report measures, known as shared method variance.

If social desirability or shared method variance is to blame, one might expect the correlation between rationality and empathy to be eliminated when using performance measures of empathy and self-report measures of rationality. Sadly, there is insufficient literature using performance measures of empathy to make any strong conclusions in this regard. Performance measures are most frequently used to measure emotion recognition and theory of mind. However, these subtypes of empathy differ conceptually from other aspects of cognitive empathy more commonly measured with self-reports (e.g., perspective taking). It is therefore not possible to determine whether the different relationships with rationality occur due to measurement type (self-report versus performance) or specific empathy type; that is, there is a confound between the two. Nevertheless, in our meta-analysis, one subtype of cognitive empathy (emotion recognition) included both performance and self-report measures. To explore if measurement type altered the relationship between emotion recognition and rationality, we conducted some exploratory analyses. The relationship between rationality and emotion recognition does not change depending on how emotion recognition is measured (self-report versus performance, $Q(1) = 1.466, p = .226$; see Supplemental Figure S3). Nevertheless, we encourage future research to account for social desirability bias.

Another explanation for why questionnaire and performance measures of rationality yielded different results may be that they measure different things. The Need for Cognition scale measures a general proclivity toward rational thinking whereas the Cognitive Reflection Task measures rational thinking ability on three specific nonsocial tasks. Highly empathic people may only be interested in thinking rationally about social problems; therefore it is impossible to tease apart whether it is lack of ability or lack of motivation that leads to poor performance on the CRT task. In contrast, the Need for Cognition scale includes broadly applicable items such as “*I find satisfaction in deliberating hard and for long hours*” which participants could interpret as referring to any topic, including social ones.

People high in empathy may therefore endorse these items with social problems in mind. If rational performance is only measured in a nonsocial domain, then this may create a false dichotomy between rationality and empathy, as rational approaches to social problems would be overlooked.

There is experimental precedent for this assertion, as people tend to perform better on the Wason Selection Task (another rational performance task; Wason, 1968) when it is presented in a social context (Cosmides & Tooby, 1992). However, there is some evidence to suggest empathy is unrelated to rational performance even in social contexts. There are several alternative versions of the CRT task available to researchers, including a 3-item version with two social items (e.g., “If it takes 2 nurses 2 minutes to measure the blood pressure of 2 patients, how long would it take 200 nurses to measure the blood pressure of 200 patients?” (Baron et al., 2015). Indeed, recent research by Byrd and Conway (2019) demonstrated that performance on this more social version of the CRT task was unrelated to empathic concern ($r = 0.07$, $p > .05$), suggesting that social context may not alter the relationship between rationality and empathy. Unfortunately, however, this research did not investigate other types of empathy, and it is worth reiterating that only 2 of the 3 items were social in this version of the CRT.

An alternative explanation for the differences in self-report and performance measures of rationality is that emotionally empathic people may be subject to stereotype threat when completing performance-based tasks. Previous research suggests that lay people see emotion and reason as competing constructs (Levine et al., 2018). Therefore, if people report being more emotionally empathic and are then tested on their rational thinking they may perform more poorly on the latter task. This may explain why people high in emotional contagion and empathic concern (but not cognitive empathy) perform more poorly on the CRT task. Sadly, the vast majority of the research included in our meta-analysis does not report the order in which these tasks were completed. However, if the stereotype threat explanation is accurate, we should expect that there would be different results if the order was reversed. This is one potential direction for future research.

Overall, although the current research cannot determine why different results are achieved with performance and self-report measures of rationality, it affirms the importance of attending closely to the methods being used to measure rationality.

Taking into consideration the methodological concerns outlined above, our results provide weak support for a dual-process model of empathy over an opposing domains hypothesis, although they do not find robust support for either theory. In terms of the opposing domains hypothesis, our self-report results contradict the idea that thinking about mental states is necessarily in opposition to thinking about logical processes (Jack et al., 2013). Quite the contrary, we find that people high in various types of empathy (perspective taking, empathic concern, fantasy) self-report greater levels of rationality, suggesting these can at times be complimentary domains. Although some may point to the null results for CRT performance as evidence that more empathic people are in reality no more rational, these results still suggest that rationality and cognitive empathy are unrelated, rather than opposing. Our CRT data also provide some weak support for a dual-process model of empathy (Martingano, 2020; Yu & Chou, 2018), suggesting that emotional empathy is more negatively related to rationality than cognitive empathy. However, our self-reported data finds a mixed relationship for emotional empathy, with empathic concern being as positively related to self-reported rationality as cognitive empathy, tempering support for this theory.

Determining the relationship between rational thinking and empathy not only speaks to a longstanding theoretical debate regarding the relationship between emotion and reason, it also provides information on how different types of empathy function, at least in terms of their relationship to rationality. Personal distress and emotional contagion appear to be the least rational of the empathy subtypes we investigated, with people who score highly in on these subtypes of emotional empathy neither performing rationally nor reporting any desire to do so. On the other hand, people who score highly on empathic concern (another type of emotional empathy) report wanting to think rationally, even if they fail to do so when tested. This critical difference in the way that these emotional aspects of empathy relate to rationality speaks to their different nature. Regardless of why, people who score highly on empathic concern want to appear more rational. This desire indicates a strong motivational

component to this type of empathy that is shared by people who score higher on perspective taking and fantasy, who also exaggerate their rational thinking ability. This similarity between empathic concern and these two types of cognitive empathy reiterates the limited utility of the existing cognitive-emotional distinction for understanding the relationship of empathy to rationality. This is in line with other scholars who have argued that the umbrella term “emotional empathy” is problematic because empathic concern and personal distress are qualitatively distinct with different motivational consequences (Batson et al., 1987), and the many empirical results indicating that it is perspective taking and empathic concern, not personal distress, that motivate prosocial behavior (see Batson, 2011 for review).

This research also has potential applied consequences, especially in education settings where empathy and other social-emotional skills are becoming increasingly popular in the curriculum. If empathy is associated with impaired rationality, it may make sense to question the inclusion of empathy building activities in school children’s curriculum. If, however, some types of empathy are positively associated with rational thinking, there may be unintended academic benefits of such programs. There is some empirical precedent for this possibility. Research compiling the results of 213 school-based social and emotional learning programs found that these programs led to an 11% increase in academic competence compared to control groups (Durlak et al., 2011). This possibility does not belie the opposing causal direction: namely that improved rationality can have a subsequent impact on empathy. Previous experimental research exploring this reverse causal direction has found that experimentally inducing rational thinking led to improved empathic accuracy (Ma-Kellams & Lerner, 2016). However, it is unclear if this same trend would be true for other types of empathy. Given the correlational limitations of this paper, we are unable to make any causal conclusions, and we recommend that future researchers directly examine the causal directions between rational thinking and various empathy subtypes.

It is also important to note that the opposite of rationality is irrationality, not intuition. Intuition refers to trust or faith in one’s “gut feelings,” which is separate from a person’s willingness to engage in rational thinking (Pennycook et al., 2016). Importantly, rational thinking and intuitive thinking do not constitute polar opposites on a single dimension, but are two separate dimensions (Wang et al., 2017). Although the Need for Cognition scale is often paired with Faith in Intuition Scale as part of a Rational-Experiential Inventory, these scales typically emerge as separate factors and are generally not strongly negatively correlated (Epstein et al., 1996). In addition, success on the Cognitive Reflection Task is a valid measure of rational thinking, but errors do not constitute a valid measure of intuitive thinking (Pennycook et al., 2016). With this in mind, this paper focuses on rational thinking *only* and makes no claims about the relation of empathy to intuitive thinking, which cannot be assumed to be opposite. Future research should also examine this question.

In addition to the limitations regarding measurement discussed above, the current research has other important limitations, such as having potential confounds, and relying on unrepresentative samples. Even our meta-analysis of the literature resulted in a final sample comprised almost entirely of participants from a Western, Educated, Industrialized, Rich and Democratic (WEIRD) societies (Henrich et al., 2010), which limits its representativeness and external validity (Rad et al., 2018). It is particularly important not to generalize these results to different cultures, as there are wide variations of empathy across cultures (Chopik et al., 2017). In addition, future research should control for differences in general intelligence, numeracy, and social desirability, to determine if and how these potential third variables influence the relationship between different types of rationality and empathy.

In conclusion, the relationship between empathy and rational thinking is complex and nuanced. When discussing this topic, measurement choices matter. The current research measured empathy as a multidimensional concept and contrary to the opposing domains hypothesis, finds that some aspects of empathy (particularly cognitive empathy) are positively associated with, or at least unrelated to,

rational thinking. However, there remain many unanswered questions about the relationship between empathy and rationality, particularly regarding rational performance. In the future, we hope that researchers will design and adapt new methods in order to contribute to this debate.

Notes

1. Book 2, part 3, section 3, paragraph 4.
2. We combined these datasets using meta-analysis rather than pooling them using integrative data analysis because there were significant differences in the means for each sample.

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No potential conflict of interest was reported by the author(s).

Data availability statement

Data used in these analyses are available on OSF <https://osf.io/wgt39>

Open scholarship



This article has earned the Center for Open Science badges for Open Data and Open Materials through Open Practices Disclosure. The data and materials are openly accessible at <https://osf.io/wgt39>.

Supplementary material

Supplementary material for this article can be accessed on the [publisher's website](#).

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