Creative Empathy

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Abstract

Empathy research has long emphasized accuracy when imagining other minds. We explore whether empathy can be a creative process, where people think of multiple diverging possibilities of others' experiences. We developed two tasks to measure creative empathy. First, we adapted "forward flow" (Gray et al., 2019) to measure the dynamic unfolding of creativity while imagining other minds, quantified as semantic distance between mental state concepts when freely associating the contents of other minds. Second, we developed a divergent thinking task where participants reflect on others' mental states and responses are scored using subjective and automated methods. In Studies 1-3, participants instructed to "be creative" showed higher scores than those instructed to be accurate and a no-instruction control, demonstrating that people vary in how creatively they approach empathy. In Study 4, participants instructed to be empathic (vs. objective) towards a target showed greater creativity on the divergent thinking task, demonstrating that empathy can produce creativity. Creativity on these tasks were inconsistently associated with trait and state empathy measures, suggesting complex relationships between creative empathy and empathic outcomes. Overall, these findings support a novel approach to measuring empathy that accounts for creative processes, broadening the scope of empathy and creativity research.

Keywords: creativity, empathy, divergent thinking, imagination, free association

Introduction

Imagine you are walking through a park, and you see a man sitting on a bench. You may ask yourself what this person is thinking and feeling. For instance, one option may be to choose Path A, where you decide that the man is feeling "bored," and you continue walking along. Alternatively, another option may be to choose Path B, where you take time to consider each of the possible thoughts and feelings the man could be experiencing – is he pensive, despondent, or complacent? Or you might ponder what this person's personality is like, why he is at the park, or what he does for a living.

People may face many options such as these when simulating the minds of others. Although both paths require one to imagine another mind, a person who chooses path A forms a unilateral concept of the other person's mind ("bored"), while a person who chooses Path B generates an elaborate and multifaceted portrait of the other mind. These multiple methods of representing another's mental state exist because the contents of another mind can never truly be known – a dilemma often referred to as "the problem of other minds" (Hyslop, 2013, p. 5). Because of this problem, people rely on imaginative leaps to construct what another person is experiencing, suggesting creative contributions to empathy (Currie & Ravenscroft, 2002).

Yet, psychologists have typically not emphasized this creative process during empathizing, instead focusing on outcomes such as empathic accuracy (Bartz et al., 2010; Ickes et al., 1990), empathic concern (Batson et al., 2007), or emotion contagion (Hatfield et al., 1993; Jordan et al., 2016). There is great benefit to understanding these empathic outcomes. However, these approaches may neglect the variety of paths that people explore on their path to understanding other minds. What did a person imagine when reflecting on the state of another mind – was it a single mental state, or multiple? Do they imagine one type of emotional state

(e.g., “sad”, “depressed”, “melancholy”), or do they imagine multiple, conflicting, and ambiguous emotion types (e.g., “bittersweet,” “nostalgic”)? A basic representation of another’s mental state – such as one that involves simple, commonly-expressed emotions (e.g., “sad and depressed”) – is more likely to be conventional and thus uncreative, while a more intricate and complex representation (e.g., “bittersweet and nostalgic”) is more likely to be novel and thus creative. Because empathy involves open-ended, active construction of other minds (Murphy et al., 2022), it may be a creative process itself – empathy may inherently involve some degree of creativity – as well as an individual difference where people can vary in how creatively they approach constructing other minds. In this paper, we examine the divergent paths a person may take while understanding other minds.

Defining Creative Empathy

While definitions of empathy vary considerably (Cuff et al., 2016), it is often believed to be a broad concept consisting of multiple overlapping yet distinct facets (Batson, 2009; Eisenberg et al., 1994; Preston and de Waal, 2002). These facets consist of making inferences about others’ mental states, vicarious sharing of others’ mental states, and/or feelings of concern towards others’ needs (Decety & Cowell, 2014; Zaki, 2014; Zaki & Ochsner, 2012). When defining creative empathy, we primarily focus on how people imagine and represent others’ thoughts and feelings (i.e., perspective-taking) given its theoretical overlap with creativity (elaborated more below), though we examine and consider how creative empathy may be linked to other facets as well (e.g., concern).

We also conceptualize empathy as a dynamic *process* (i.e., how people approach representing other minds) rather than empathic *outcomes* (i.e., where people arrive during this process). Empathy is often viewed in terms of outcomes, which may include empathic accuracy

(Ickes et al., 1990) or emotion contagion (Hatfield et al., 1993). From this conceptualization, "empathy" has occurred when a person accurately assesses another's experience or feels what the other person is feeling. However, some have criticized such views of empathy as overly narrow and as neglecting many important dimensions of empathy (Murphy et al., 2022; Zaki, 2017). Instead, some have suggested that empathy is best viewed as an unfolding process of imagining and responding to other minds, which may include moments of accuracy or affective matching but can also consist of complementary responses (Main et al., 2017; Main & Kho, 2020; Murphy et al., 2022). For example, one may imagine that another person is sad and respond with concern even if they are incorrect or do not feel sad themselves. Even if one has not matched or perfectly assessed another's internal state, this overall process of engaging and responding to another mind can be considered empathic. This view of empathy is useful because it incorporates the broader set of processes that may occur during an empathic interaction and is consistent with how empathy is often treated in clinical and lay contexts (Murphy et al., 2022).

In line with common definitions of creativity (Runco & Jaeger, 2012), we suggest that creative empathy is empathy that is an appropriate and novel representation of another's mental state, both of which are necessary for empathy to be considered creative. Appropriateness reflects the extent to which an empathic response is relevant to the situation at hand, while novelty reflects the extent to which an empathic response deviates from a typical response. For example, describing a smiling person as "happy" would be highly appropriate but not novel, while describing this person as "traffic cone" would be highly novel but not appropriate; neither of these descriptions would be considered creative. Describing a smiling face as "exquisitely nostalgic," on the other hand, would be highly appropriate (relevant to the smiling face) and novel (an uncommon response to a smiling face), and thus creative. This conceptualization

applies the most common definition of creativity (i.e., a combination of novelty and appropriateness; Runco & Jaeger, 2012) to an empathic context. Similar to creativity in general, we can expect responses that are highly appropriate to empathy to often not be novel (and thus uncreative), while the most creative ideas will be highly novel while also remaining highly appropriate (Diedrich et al., 2015). The appropriateness criterion also ensures that highly novel responses that are out of the bounds of empathy (e.g., the traffic cone example above) are not considered creative (though assumptions about what is considered "appropriate" in an empathic context may vary; see below).

We should note that if empathy inherently involves creativity, then empathizing with another mind should often be more creative compared to not empathizing at all (e.g., simply describing another without regard to their thoughts and feelings). The open-ended and uncertain nature of imagining other minds may allow more room for novelty and originality. Individuals may also vary in how creatively they approach empathy: some people may imagine other minds with greater novelty and appropriateness than others. In addition, while we acknowledge that creativity may ultimately be more complex than novelty and appropriateness, it is nonetheless the most widely applied definition of creativity (Runco & Jaeger, 2012) and thus provides a useful framework to explore creative empathy.

In assessing creative empathy, we prioritize novelty and originality (e.g., Runco & Jaeger, 2012). We focus on novelty because it is a core component of creative thought (Acar et al., 2017) and is considered a primary criterion for creativity (while appropriateness is considered more secondary; Diedrich et al., 2015). In addition, novelty within the context of empathy has received little attention in empathy research and has the potential to reshape how researchers think about the empathic process.

When assessing appropriateness, we consider empathy to be appropriate if it is *relevant* to the mental states of a given target. We consider a response to be relevant if it constitutes a representation of another's thoughts and feelings. We chose to prioritize relevance in this manner because empathy is a broad concept dealing with people respond to and represent the mental states of others (e.g., Zaki & Ochsner, 2012; Preston & de Waal, 2002), and, as mentioned, is often conceptualized as an open-ended, ongoing, and dynamic process (Main et al., 2017; Murphy et al., 2022). Thus, any response that represents the thoughts and feelings of another could be considered part of this empathic process, and such responses may vary in their degree of novelty and originality.

We note that creativity during the empathic *process* is distinct from empathic *outcomes* that may occur as a result of this creativity. Creative exploration of other minds may be associated with a number of positive or negative empathic outcomes. For example, creativity may lead to lower empathic accuracy if it leads one to stray too far from the actual contents of another mind, or it may lead to greater interest and engagement with other minds if one is highly motivated to think creatively. Even if creative empathy confers negative outcomes, we nonetheless believe it has the potential to strengthen our understanding of empathy. For example, prior work has found that people in close relationships can be motivated towards empathic inaccuracy if it prevents one from considering painful truths about their partner's mental states, as doing so may help maintain the relationship (Ickes & Simpson, 2001). This suggests that even empathic inaccuracy can be highly informative for how people think about other minds.

In sum, we suggest that the open-ended and uncertain nature of other minds may allow room for creative exploration, and people may vary in the degree to which they approach

empathy creatively. If creativity is often part of the empathic process, studying this may allow us to better understand the factors that support or detract from optimal empathic outcomes.

In introducing creative empathy, we seek to develop ways to measure creativity within an empathic context. We accomplish this by integrating theory and methods from two typically disparate disciplines: empathy and creativity.

Evidence for Creative Empathy

While many empathy-relevant concepts deal with how people passively explore the mental lives of characters in creative works (Davis, 1983; Green & Brock, 2000; Kidd & Castano, 2013, but see Panero et al., 2016), there is little work on how people may actively construct others' mental states with creativity. Yet, creativity and empathy may be theoretically linked. Creativity often draws upon theory of mind, such as when people create characters in fictional pieces of writing (Taylor et al., 2003) or portray a character in theater (Goldstein & Bloom, 2011). Empathy may also draw upon creativity. Creativity is associated with mental simulation (imagining non-present events; Taylor et al., 1998), with greater simulation ability linked to greater creativity (Beaty et al., 2018; Madore et al., 2015; Madore et al., 2016; Meyer et al., 2019). Perspective-taking – a key facet of empathy (Epley & Caruso, 2008) – has been similarly linked to simulation as it often requires a person to transcend their own perspective and imagine oneself in another's shoes (Batson, 2009; Decety & Jackson, 2008; Myers & Hodges, 2014).

The reliance on mental simulation to both think creatively and imagine others' mental states suggests that empathy may involve similar processes as creativity. Some studies have indeed found correlations between individual differences in creativity and individual differences in constructs related to empathy (e.g., emotional intelligence; Ivcevic et al., 2007; Wolfradt et al.,

2002), and that inducing a creative mindset can facilitate perspective-taking (Yang & Hung, 2021). In addition, creativity in teams can be facilitated by a number of empathy-relevant constructs, such as perspective-taking (Hoever et al., 2012) and emotional intelligence (Rego et al., 2007). Some work has also found links between trait empathy and the creative process (i.e., generation and selection of ideas by engineering students; Alzayed et al., 2022). However, these prior studies have treated creativity and empathy as separate constructs, either by assessing correlations between creative traits and empathic traits, or by priming creativity and testing its effects on perspective-taking during an unrelated, non-creative perspective-taking task (i.e., Yang & Hung, 2021). In the current research, we test how creativity and empathy may occur simultaneously by examining creativity within an empathy task.

What predicts creative empathy? One possibility is that people who show a greater capacity to imagine others' perspectives would also show greater creative empathy. Other facets of empathy, such as empathic concern (Batson, 1987; Eisenberg & Miller, 1987) or distress (Batson et al., 1987) are often facilitated by perspective taking (Coke et al., 1978) and thus may similarly be associated with creative representations of other mental states. Creative empathy may also reflect creativity in a domain-general sense: people who are more creative in general may show higher creativity across a range of contexts, including those that are empathic. Yet another possibility is that creative empathy involves *both* creativity and empathy, and thus people with a greater ability and/or capacity to empathize *and* think creatively may show the highest creative empathy. In the current research, we explore which (if any) relevant constructs may predict creative elements of empathy.

Measuring Creative Empathy

Empathy measures often do not assess creativity. For example, in the Reading the Mind in the Eyes Test, participants are asked to select one out of four possible mental states that best describes the emotion expressed by a set of eyes (Baron-Cohen, 2001). For an image where the correct solution is "sad," a particularly creative empathizer may think of mental states that are not typically used to describe a sad face (e.g., "wistful", "lachrymose"), while an even more creative empathizer may ponder the context surrounding the set of eyes. The four fixed choices offered by the task would obscure these dimensions of creativity in the participant's empathic response. Self-report methods of assessing empathy (e.g., Davis, 1983; Jordan et al., 2016) similarly may not capture creativity because they rely on ratings of agreement with several statements and these statements do not emphasize creative processes. For example, items on the fantasy subscale of the Interpersonal Reactivity Index (Davis, 1983), although they concern engagement with characters in creative works, primarily assess passive involvement ("I really get involved with the feelings of a character in a novel") rather than active, creative construction of characters.

To complement these prior empathy measures and assess creative elements of empathy, we can draw upon existing creativity measures. Adapting creativity measures allows us to measure creativity in empathic contexts in a way that is not afforded by existing empathy measures. To accomplish this, we draw upon two common methods for tapping into creativity: free association and divergent thinking.

Free Association

Creativity is shaped by how people form associations between concepts (Mednick, 1962). These associations are often facilitated by searching for distantly related concepts in one's

semantic memory (Kenett et al., 2014), which can occur in a bottom-up (i.e., through individual differences in semantic memory structure; Hass, 2017; Kenett, 2019; Kenett & Faust, 2019) or a top-down (i.e., through executive functions; Beaty & Silvia, 2012; Benedek et al., 2017; Groborz & Neçka, 2003; Lee & Therriault, 2013; Silvia et al., 2013) manner.

Creative empathy may involve retrieving mental state words across more distantly related concepts. For example, the word "cold" can refer to a physical state (e.g., a person is feeling cold due to the low temperature), a behavior (e.g., a person responded in a cold manner), or a personality trait (e.g., a cold and unfriendly person). When perceiving another person who appears to be shivering (cold due to low temperature), a highly creative empathizer may retrieve mental state words that are also relevant to the concepts of responding in a cold manner and being a cold and unfriendly person (i.e., spreading activation, Collins & Loftus, 1975).

How a person forms associations between mental state concepts can be captured by free association (a person's spontaneous "train of thought"; Marron & Faust, 2018, p. 1). One method of quantifying free association is through "forward flow," which captures how thoughts semantically evolve by instructing participants to form many continuous semantic associations from an initial "seed" word (Gray et al., 2019). This measure uses Latent Semantic Analysis (LSA), which computes the likelihood that two words will co-occur within a piece of text (Deerwester et al., 1990), to quantify overall semantic distance: how distantly related words are in semantic space (Rips et al., 1973). LSA measures semantic distance by calculating the degree of co-occurrence between two words in relation to a large corpus of text. Although several studies have used LSA to study associative processes involved in creative thinking (Acar & Runco, 2014; Beaty et al., 2014), "forward flow" is unique in that it calculates a single semantic

distance value across a sequence of words to quantify a person's overall semantic evolution. In this paper, we adapted forward flow to examine free association within empathic contexts.

Divergent Thinking

Because forward flow is only one task, it features some limitations, including its use of an automated metric and its restriction to single-word responses. To account for these limitations, we also developed an empathy-based divergent thinking task to broaden our measurement of creative empathy across multiple methods. In a divergent thinking task, a person typically comes up with multiple creative solutions to a specific problem or prompt and responses can be scored for creativity by human raters (Gabora, 2018; Runco et al., 2010) or through automated methods (Kennett, 2019). These tasks can be easily applied to empathic situations: for example, a person can be provided an empathy-related prompt (e.g., a description of another person's suffering) and tasked with providing possible responses to the prompt (e.g., a reflection or account of the person's thoughts and feelings). A person's open-ended response to another person's internal experience may vary along dimensions of creativity: a reflection that is highly novel and appropriate, for example, would be considered creative by the most common definitions of creativity (Runco & Jaeger, 2012). We adapt an empathy-relevant divergent thinking task in Study 3 and Study 4 of the current paper and assess creative responses on this task using both subjective (i.e., Silvia et al., 2008) and automated (i.e., Beaty & Johnson, 2021) scoring methods.

The Present Research

In four studies, we explore creative empathy by adapting free association and divergent thinking measures and manipulations within explicitly empathic contexts. We provide a starting point for research on creative empathy through initial construct validation, using two primary

approaches. First, we examine whether the instruction to "be creative" (Acar et al., 2020; Harrington, 1975; Said-Metwaly et al., 2020) increases creativity scores on these tasks. We test whether participants who receive creativity instructions show higher creativity than those instructed to be accurate and a no-instruction control. If a person becomes more creative on an empathy task when trying to do so (compared to baseline or when they are strictly trying to be accurate), this would demonstrate that creativity *can occur and vary* within empathic contexts. This effect would further indicate that these tasks measure creativity within empathic contexts, thus providing initial task-validation. If creativity instructions have no effect on creativity, on the other hand, this would indicate that people may have difficulty applying creativity to an empathic space and may suggest that creative empathy is not a meaningful concept.

We also use this instructions-based approach to experimentally test for linkages between creativity and empathy. If creativity and empathy are theoretically connected, we may expect creativity instructions to increase empathy and for empathy instructions to increase creativity. In Study 3, we test whether instructions to be creative influence empathy outcomes; in Study 4, we test whether instructions to be empathic influence creativity outcomes.

Second, we examine how creativity on these tasks are associated with relevant individual differences. Throughout all studies, we measure individual differences in empathy (e.g., empathic concern; Davis, 1983), as well as openness to experience – a robust predictor of creative thinking (Silvia et al., 2009) – to test potential convergent and discriminant validity. However, given that there are often heterogenous associations between self-reported and behavioral measures of creativity and empathy (Murphy & Lilienfeld, 2019; Reiter-Palmon et al., 2012), we did not have strong predictions about the degree to which these trait measures would be associated with creative empathy.

Below, we outline our general approach for assessing forward flow and divergent thinking across studies. Although free association and divergent thinking measures are designed to capture creativity, our measures are incorporated within an empathic context: they instruct participants to reflect on the contents of other minds. Thus, these are not simply measures of creativity: they capture creative imagination while reflecting on another mind, and so are inherently empathic as well.

Forward Flow

We provided participants with an image of a target and instructed participants to freely generate a list of the target's mental states across 8 trials (presented in random order). In each trial of this task, participants are shown an image of a face displaying either positive or negative affect (taken from the Chicago Face Database; Ma et al., 2015), are provided with a seed word (e.g., "good" for positive affect images and "bad" for negative affect images), and are instructed to write 10 words that come to mind to describe what this person is experiencing.

We uploaded each word list to an online engine at forwardflow.org, which calculates semantic distance using the Touchstone Applied Science Associates corpus (TASA), a commonly used corpus of 37,000 K-12 educational texts that has been trained and validated in prior work (Deerwester et al., 1990; Gray et al., 2019). The engine computes a semantic distance score from 0 (no semantic distance) to 1 (complete semantic distance). Because participants wrote 10 words per trial, this resulted in a 10 x 10 symmetric matrix of semantic distance values. The average semantic distance between each word in the matrix and all words in the list that preceded it was calculated (i.e., all prior words were included in the semantic distance calculation or each word),[1] and the average of these averages was then computed to obtain a final

[1]All word lists can be accessed via the online repository for this project on the Open Science Framework

forward flow metric (see Gray et al. (2019) for additional details and specific formulas). Further details about this task – e.g., specific images and seed words used, how the semantic distance values are calculated – are explained in the supplementary material.

Divergent Thinking

Beginning in Study 3, we developed a divergent thinking task where participants are provided with four brief vignettes (e.g., "George stubbed his toe") about a target undergoing an acute negative experience (adapted from Bruneau et al., 2015). For each vignette, participants are instructed to write one 4-5 sentence response reflecting on what the target in the vignette is thinking and feeling and responses are scored for creativity. We chose this method to sample across different empathy-based scenarios and to standardize the number of responses provided by participants, while ensuring that participants do not become fatigued over the course of the task (e.g., by writing several responses to multiple scenarios).

We should note that divergent thinking tasks typically instruct participants to provide multiple solutions for each prompt (e.g., the Alternate Uses Task; Guilford, 1967), while in our task, participants are instructed to generate one open-ended solution to each prompt (similar to creative problem-solving tasks, which are related but distinguishable from typical divergent thinking tasks; Reiter-Palmon et al., 1997). While there are some differences between these different types of instructions and creative outcomes (Reiter-Palmon & Arreola, 2015), both kinds of tasks involve some divergent and convergent thinking (Cortes et al., 2019) and thus we believe our task should capture meaningful variation in divergent thinking across empathic stimuli.

We should note that in both tasks, participants are instructed to describe the target's thoughts and feelings, and thus these tasks primarily involve the perspective-taking sub-facet of

empathy (as opposed to other facets, such as experience sharing; Decety & Cowell, 2014). Because of the complexity and ambiguity of the term "empathy" and the interrelationships among different facets (Batson, 2009; Murphy et al., 2022), we broadly use the term "empathy" when describing these tasks for the sake of simplicity. However, when describing our results, we differentiate among specific facets when relevant.

Individual Differences

We tested the association between creative empathy and several individual differences in all studies. In all studies except Study 4, these measures were included after the forward flow and/or divergent thinking tasks. In Study 4, we included these measures before the divergent thinking task to ensure that they would not be impacted by the empathy induction. We measured self-reported trait empathy using the empathic concern (αs > 0.86), fantasy (αs > 0.73), perspective-taking (αs > 0.80), and personal distress (only included in pilot study; α > 0.87) sub-scales of the Interpersonal Reactivity Index (a widely used measure of individual differences in empathy; Davis, 1983). For time concerns, we did not include each sub-scale in each study, although we measured empathic concern across all studies. In Study 4, we included an abbreviated, 10-trial version of the Empathy Selection Task as a behavioral measure of empathy (Cameron et al., 2019). In this measure, participants choose to either feel empathy or describe a target across several trials, where the total proportion of empathy choices is taken as an overall measure of empathic propensity. Finally, we measured openness to experience in all studies except for Study 4, using a 12-item scale from the HEXACO-60 (Ashton & Lee, 2009; αs > 0.79). Openness is characterized by intellect and imagination and often predicts creativity (King et al., 1996; McCrae, 1987; Silvia et al., 2009). Thus, we were interested in whether openness would be associated with creative empathy.

Within each study, we present correlations between creative empathy measures and individual differences in empathic concern, fantasy, and openness to experience, given that these were most consistently measured across studies (results for other individual differences are located in the supplemental material). Then, we present meta-analyzed correlations to estimate the relationship between creative empathy and individual differences across all studies.

Studies 1 and 2

Data and syntax for all studies are available on the Open Science Framework (anonymous link: https://osf.io/mfb2h/?view_only=a35dbe0c38134d6dbd7565f826acc37d). Prior to Study 1, we conducted a non-experimental pilot study, which is reported in the supplementary material. Studies were approved by [institution name redacted for peer-review]'s Institutional Review Board under protocol [protocol number redacted for peer-review]. In these studies and all subsequent studies, participants read a consent form at the start of the study and clicked to the next page to provide implied consent. In Study 1, we tested whether forward flow improves when participants are instructed to be creative. In Study 2, we attempted to replicate the results of Study 1. We conducted this replication for two reasons. First, we made several minor changes to the forward flow task to test whether effects from Study 1 were robust to different variations of the task. Specifically, in Study 2 participants were not provided with seed words and were instructed to write about target *experiences* (vs. *feelings* in Study 1). These changes are explained in greater detail in the supplement. Second, many participants were excluded from analyses in Study 1 (explained below), and thus in Study 2, we used features available on CloudResearch (Litman et al., 2016) to help ensure higher data quality and retain a higher sample size.

Method

Participants

We aimed to recruit 300 participants in each study, which would provide 95% power to detect a medium effect size between three conditions (calculated using G*Power; Erdfelder et al., 1996). We recruited 304 participants in Study 1 and 300 participants in Study 2; participants were recruited from Amazon Mechanical Turk in both studies. Participant recruitment was limited to workers from the United States and those with at least a 95% approval rating and more than 1000 HITs approved. We also excluded participants if their IP address matched a previous IP address in the data set or an IP address from a pilot study. In Study 2, we recruited participants via CloudResearch (Litman et al., 2016), which allowed us to automatically prevent repeat participants and block participants with suspicious geolocations. Using similar criteria as Gray et al. (2019), we excluded participants if their semantic distance scores were greater than three standard deviations away from the mean, or if they entered an average of two or more invalid words (i.e., words that the LSA engine could not process) across trials. These invalid words included blank responses, meaning that participants were excluded if they did not write an average of at least 8 words across trials. In addition, because participants completed multiple trials, we excluded participants who received a score of "0" on any of the forward flow trials (i.e., from writing the same word 10 times). Following these exclusions, we had a final N of 252 in Study 1 (65.08% men, 34.92% women; M_{age} = 34.75, SD_{age} = 9.59) and 276 in Study 2 (56.52% men, 43.48% women; M_{age} = 37.27, SD_{age} = 11.02).[2] With these final sample sizes, we conducted sensitivity analyses to determine the minimum detectable effect size given an alpha of

[2]Details on number of exclusions per criterion, exclusions per condition, and study attrition rates can be located in the supplementary material.

0.05 and a power of 80% (using the "pwr" package, Champely et al. (2017), and converting f^2 to η^2). This analysis revealed a minimum effect of $\eta^2 = 0.04$ in Study 1 and $\eta^2 = 0.03$ in Study 2.

Procedure

Participants completed the empathy-based forward flow task. Participants were randomly assigned (using the randomizer function on Qualtrics) to read one of three task instructions: 1) creative, 2) accurate, and 3) control. In the *creative* condition (Study 1: $N = 85$; Study 2: $N = 81$), participants read that the "The goal is to be creative and imaginative. Please try to think of words that are interesting or uncommon." These creativity instructions were adapted from divergent thinking instructions used by Nusbaum et al. (2014) and primarily emphasize novelty. In the *accurate* condition (Study 1: $N = 83$; Study 2: $N = 92$), participants read that "The goal is to be accurate and realistic. Please try to think of words that are precise or relevant." In the *control* condition (Study 1: $N = 84$; Study 2: $N = 103$), participants were only instructed to write 10 words that come to mind to describe what the target was experiencing.

Forward flow was calculated by uploading word lists to forwardflow.org (as outlined in Gray et al., 2019) and taking the average forward flow score provided across the 8 trials. Participants also rated how creative they thought their responses were on a 1-7 Likert scale, along with several exploratory measures (reported in supplement). We included self-reported creativity to test its association with forward flow and, as an additional test of the creativity manipulation, to test if creativity instructions increase self-reported creativity. We did not have strong inclinations about how self-reported creativity would be associated with forward flow, however, given that there are often heterogenous relationships between self-reported and behavioral creativity (Reiter-Palmon et al., 2012).

Because forward flow is a verbal task, we also included three GRE-style verbal ability questions in Study 2 (taken from Gray et al., 2019) to test whether verbal ability covaries with the experimental effect of instructions on forward flow scores and accounts for any relationships between forward flow and individual differences.

Results

Forward Flow

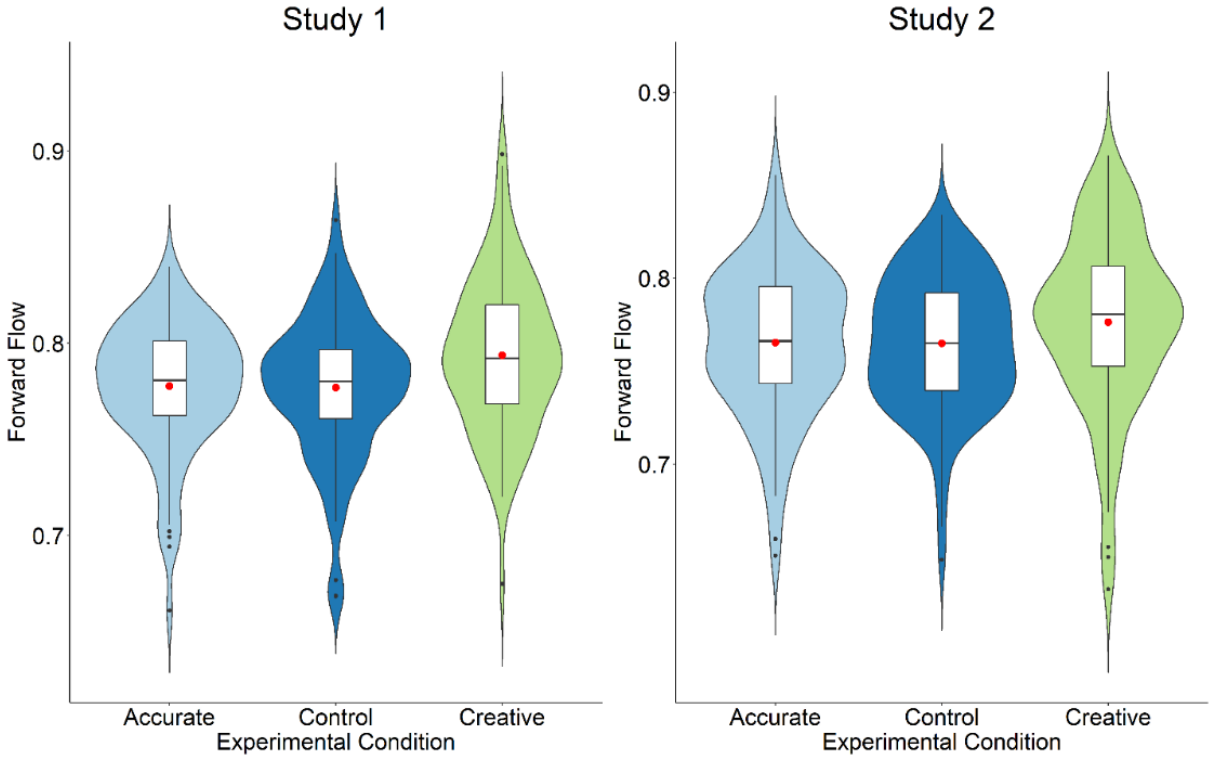
We used planned orthogonal contrast codes to compare the creative (2) with the combination of the accurate (-1) and control (-1) conditions and to compare the control (-1) with the accurate (1) condition. This analysis strategy was decided a priori for both studies. We chose this strategy because we were primarily interested in whether forward flow scores are *highest* in the creativity condition. Planned contrasts allow us to test this hypothesis in one comparison (creative vs. accurate and control combined) rather than two (creative vs. accurate, creative vs. control), thus decreasing redundancy and the likelihood of Type I error. We also compared the control condition and the accurate condition to test the possibility that accuracy instructions reduce forward flow scores relative to no-instructions.

There was an omnibus effect of condition in Study 1, $F(2, 249) = 5.48$, $p = .005$, $\eta^2 = 0.04$, but not in Study 2, $F(2, 273) = 2.19$, $p = .114$, $\eta^2 = 0.02$. However, when examining planned contrasts comparing the creative condition with the accurate and control conditions (per our main hypothesis test), forward flow was higher in the creative condition (Study 1: $M = 0.794$, $SD = 0.040$; Study 2: $M = 0.776$, $SD = 0.048$) than in the accurate and control conditions in both studies (Study 1: $M_{combined} = 0.777$, $SD_{combined} = 0.036$; Study 2: $M_{combined} = 0.765$, $SD_{combined} = 0.038$), Study 1: $b = 0.016$, $t(249) = 3.31$, $p = .001$, $\eta^2 = 0.04$, 95% CI [0.007, 0.026]; Study 2: b

= 0.011, $t(273) = 2.09$, $p = .038$, $\eta^2 = 0.02$, 95% CI [0.001, 0.022]).[3] These effects were relatively small in both studies. Forward flow did not differ between the accurate (Study 1: $M = 0.778$, $SD = 0.034$; Study 2: $M = 0.765$, $SD = 0.040$) and control conditions (Study 1: $M = 0.777$, $SD = 0.038$; Study 2: $M = 0.765$, $SD = 0.036$), Study 1: $b = 0.001$, $t(249) = 0.15$, $p = .880$, $\eta^2 = 0.00$, 95% CI [-0.010, 0.012]; Study 2: $b = 0.00$, $t(273) = 0.07$, $p = .941$, $\eta^2 = 0.00$, 95% CI [-0.011, 0.012]. See Figure 1.

Figure 1

Forward Flow Scores by Experimental Condition



Note. Violin plots of mean (red dot), median (horizontal line) and interquartile range (vertical box) of forward flow scores across experimental conditions in Study 1 (left) and Study 2 (right).

[3]Because conditions were coded with a greater than 1-unit difference, regression coefficients and 95% confidence intervals are multiplied from the output to reflect the actual mean difference and 95% confidence interval for the mean difference, respectively, between conditions.

One might wonder whether verbal ability covaries with forward flow or accounts for condition effects. In Study 2, verbal ability correlated with forward flow ($r = 0.23$, $p < .001$), but did not interact with the effect of creative instructions on forward flow scores, $b = 0.00$, $t(273) = 0.16$, $p = .872$, $\eta^2 = 0.00$, 95% CI[-0.003, 0.004], and did not differ by experimental condition, $F(2, 273) = 0.11$, $p = .893$, $\eta^2 = 0.00$.

Self-Reported Creativity

There was a small omnibus effect of condition on self-reported creativity in Study 1, $F(2, 249) = 3.37$, $p = .036$, $\eta^2 = 0.03$, but not in Study 2, $F(2, 273) = 0.68$, $p = .508$, $\eta^2 = 0.01$. Participants descriptively self-reported higher creativity in the creative condition (Study 1: $M = 5.95$, $SD = 1.06$; Study 2: $M = 6.06$, $SD = 1.31$) than in the accurate and control conditions (Study 1: $M_{combined} = 5.58$, $SD_{combined} = 1.46$; Study 2: $M_{\text{combined}} = 5.87$, $SD_{\text{combined}} = 1.31$), though this difference was small in Study 1, $b = 0.37$, $t(249) = 2.10$, $p = .037$, $\eta^2 = 0.02$, 95% CI[0.02, 0.72], and non-significant in Study 2, $b = 0.20$, $t(273) = 1.13$, $p = .258$, $\eta^2 = 0.01$, 95% CI[-0.14, 0.54]. Self-reported creativity did not differ between the accurate (Study 1: $M = 5.42$, $SD = 1.63$; Study 2: $M = 5.84$, $SD = 1.40$) and control (Study 1: $M = 5.74$, $SD = 1.25$; Study 2: $M = 5.89$, $SD = 1.23$) conditions in either Study 1, $b = -0.32$, $t(249) = -1.53$, $p = .126$, $\eta^2 = 0.01$, 95% CI[-0.72, 0.09], or Study 2, $b = -0.06$, $t(273) = -0.30$, $p = .765$, $\eta^2 = 0.00$, 95% CI[-0.43, 0.31]. Self-reported creativity did not correlate with forward flow (Study 1: $r = 0.08$, $p = 0.196$; Study 2: $r = 0.08$, $p = .214$).

Individual Differences

See Table 1 for correlations between forward flow and individual differences in Studies 1 and 2. When controlling for verbal ability in Study 2, forward flow was still associated with

empathic concern, $b = 0.01$, $t(273) = 2.70$, $p = .007$, $\eta^2 = 0.03$, 95% CI[0.002, 0.013], and openness to experience**,** $b = 0.01$, $t(273) = 2.36$, $p = .019$, $\eta^2 = 0.02$, 95% CI[0.001, 0.015].

Table 1

Correlations between Creative Empathy Measure (Forward Flow) and Individual Differences

Study 1	1.	2.	3.
1. Forward Flow			
2. Openness	0.13*		
3. Empathic Concern	0.16**	0.46**	
4. Fantasy	0.12+	0.38**	0.58**
Study 2	1.	2.	3.
1. Forward Flow			
2. Openness	0.21**		
3. Empathic Concern	0.20**	0.49**	
4. Fantasy	0.11+	0.47**	0.48**

Note. *$p < .05$, **$p < .01$, +Marginally significant

Discussion

Participants showed greater forward flow when instructed to be creative (vs. accurate and a control), demonstrating that creative thought can occur when free associating within an empathic context. Although prior studies have found convergence of forward flow with other indicators (e.g., known groups such as professional actors and entrepreneurs) and measures of creativity (Gray et al., 2019), this is the first pair of studies to show that creativity instructions specifically increase forward flow, and furthermore, forward flow that is embedded within an empathic context.

Creativity instructions had little effect on self-reported creativity and there was no association between forward flow and self-reported creativity. The constraints of the forward flow task (i.e., to write exactly 10 single words) may mean that participants feel they have little room to expand and be creative on the task, and so even participants who produced more

semantically distant associations may have not felt that they were responding creatively. Prior work revealed convergence between forward flow and behavioral creativity measures; however, the relationship between forward flow and self-reported performance on the same task lacks precedence, as this was not tested by Gray et al. (2019).

Prior work has indeed found mixed evidence regarding the relationship between self-reported and behavioral assessments of creativity (Pretz & McCollum, 2014; Silvia et al., 2012), and it has been suggested that self-report should be used with caution as a criterion for creativity compared to behavioral assessments (Kaufman, 2019; Reiter-Palmon et al., 2012). In contrast, creativity instructions did influence behavioral responses on the task, and thus we believe that these studies provide initial evidence demonstrating effects of creativity manipulations on creative empathy.

Study 3

In Study 3, we tested the effect of creativity instructions on creativity during an empathic divergent thinking task. The goal of this study was to conceptually replicate Studies 1 and 2 and address limitations with the forward flow measure. Particularly, open-ended responses allow participants to elaborate on the experiences of others without being restricted to 10 single-word responses. In addition, we use human ratings of creativity to measure subjective creative scores and test whether these produce similar results as forward flow's automated metric.

Studies 1 and 2 also do not tell us whether creativity instructions influence outcomes related to empathy. In Study 3, we address this limitation by measuring how responses on the task influence feelings of empathic concern for the target in the scenario, along with participants' willingness to help the target.

Method

Participants

We aimed for a sample size of 300 as this provides 95% power to detect a medium-sized effect between three conditions (calculated using G*Power; Erdfelder et al., 1996), which we determined before any data analysis. We recruited 301 participants to complete the study for $2.00 on Amazon Mechanical Turk via CloudResearch, using the same recruitment methods and CloudResearch features as Study 2. Participants were prevented from completing the study if they had already completed it or if their worker ID matched an ID from Studies 1-3. Following these exclusions, we had a final N of 269 (52.42% men, 47.58% women; M_{age} = 37.20, SD_{age} = 11.77). With this final sample size, a sensitivity analysis (using the same method as Studies 1-2) revealed a minimum detectable effect of $\eta^2 = 0.03$.

Procedure

Participants completed the empathic divergent thinking task. As a reminder, participants read several vignettes about a target undergoing an acute negative experience (adapted from Bruneau et al., 2015) and were instructed to write about the target's thoughts and feelings. Participants were randomly assigned (using the randomizer function on Qualtrics) to one of three conditions: creative (N = 97), accurate (N = 94), and control (N = 78), which, like Studies 1-2, determined whether they would receive instructions to be creative, accurate, or a control. In the *creative* condition, participants read "Your response should be as creative and imaginative as possible. There is no need to be accurate and realistic." In the *accurate* condition, participants read: "Your response should be as accurate and realistic as possible. There is no need to be creative or imaginative." We included the second sentence in these manipulations ("there is no need…") in order to more fully separate empathy with a creativity goal from empathy with an

accuracy goal, by instructing participants that they only need to be creative or accurate. In the *control* condition, participants were not provided any additional instructions other than to write 4-5 sentences reflecting on the target's thoughts and feelings.

Following the divergent thinking task, participants completed an abbreviated version of the forward flow task so we could test its convergent validity with the divergent thinking task. This task was identical to the forward flow task used in Study 1 but only included four trials (see supplemental material for specific trials used). Participants did not receive any explicit instructions to be creative or accurate while completing this version of the task.

Measures

Three undergraduate research assistants unaware of experimental condition rated the creativity of each response on the divergent thinking task on a scale of 1 (not at all creative) to 5 (highly creative), using written scoring guidelines validated by Silvia et al. (2008). See Appendix of Silvia et al. (2008) for full guidelines. Creativity scores were averaged across all vignettes and raters to compute an overall creativity score (note that throughout this section, we use the term "subjective creativity" to refer to scoring completed by raters, "self-reported creativity" to refer to participants' ratings of their own creativity on the task, and "forward flow" to refer to scores on the abbreviated forward flow task). Reliability for creativity scores between the three raters was good (ICC = 0.81).

Participants rated how *sympathetic*, *softhearted*, *warm, compassionate*, *tender*, and *moved* they felt while writing about the target to measure feelings of state empathic concern (Batson, Fultz, & Schoenrade, 1987). Participants also rated how willing they would be to help the target. These helping questions were tailored toward each scenario (e.g., for the vignette

"Laura lost $5," participants rated how willing they were to help Laura find the lost $5). Forward flow was calculated in the same manner as Studies 1-2 and scores were averaged across trials.

Results

Creativity Scores

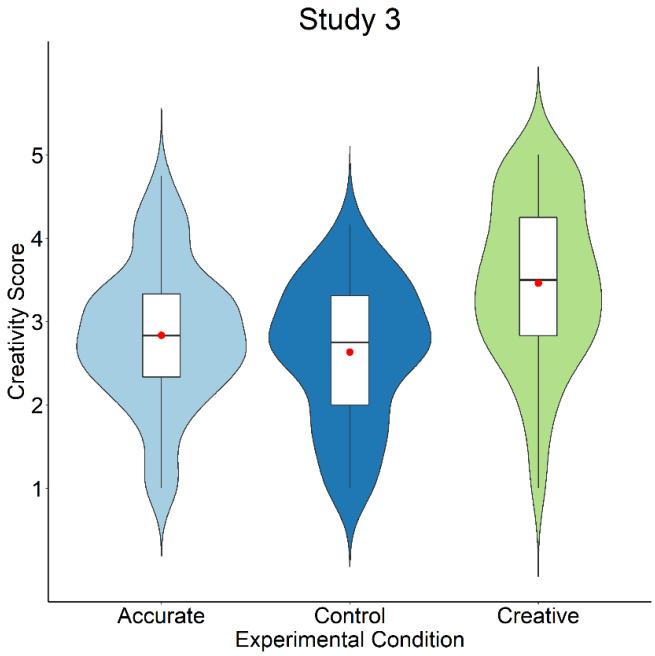
There was an omnibus effect of condition on creativity scores, $F(2, 265) = 21.17$, $p < .001$, $\eta^2 = 0.14$. We used the same planned comparisons as Studies 1 and 2 to test for differences in creativity scores between conditions, which was planned a priori. Conceptually replicating Studies 1 and 2, participants in the creative condition showed higher subjective creativity ($M = 3.46$, $SD = 0.98$) than participants in the accurate and control conditions ($M_{combined} = 2.74$, $SD_{combined} = 0.84$), $b = 0.73$, $t(265) = 6.41$, $p < .001$, $\eta^2 = 0.13$, 95% CI [0.50, 0.95]. Similar to Studies 1 and 2, there was no difference in subjective creativity between the accurate ($M = 2.84$, $SD = 0.84$) and control ($M = 2.63$, $SD = 0.83$) conditions, $b = 0.20$, $t(265) = 1.47$, $p = .142$, $\eta^2 = 0.01$, 95% CI [-0.07, 0.47]. See Figure 2.

Subjective creativity was correlated with forward flow ($r = 0.21$, $p < .001$). This moderate correlation is comparable to observed relationships between forward flow and subjectively scored creativity measures observed by Gray et al. (2019).[4]

[4]We also looked at forward flow by condition to test for possible carryover effects from the divergent thinking task instructions. There was no difference in forward flow across conditions, $F(2, 266) = 1.70$, $p = .185$, $\eta^2 = 0.01$. Note that our primary prediction was for the divergent thinking measure, given that the creativity manipulation was embedded within that measure to test for its influence. In this study, forward flow is incorporated to test for construct validation and convergence with the divergent thinking task.

Figure 2

Subjective Creativity by Condition



Note. Violin plot of mean (red dot), median (horizontal line), and interquartile range (vertical box) of subjective creativity across conditions in Study 3.

Self-Reported Creativity

There was a significant omnibus effect of condition on self-reported creativity, $F(2, 266) = 23.98$, $p < .001$, $\eta^2 = 0.15$. Self-reported creativity was lower in the accurate condition ($M = 4.06$, $SD = 1.81$) compared to the creative and control conditions ($M_{combined} = 5.40$, $SD_{combined} = 1.31$), $b = -1.33$, $t(266) = -6.91$, $p < .001$, $\eta^2 = 0.15$, 95% CI[-1.72, -0.96]. There was no difference in self-reported creativity between the creative ($M = 5.40$, $SD = 1.20$) and control ($M = 5.40$, $SD = 1.45$) conditions, $b = 0.00$, $t(266) = 0.02$, $p = .984$, $\eta^2 = 0.00$, 95% CI[-0.45, 0.46].[5] Self-reported creativity was not correlated with forward flow ($r = 0.01$, $p = .904$) and was significantly correlated with subjective creativity ($r = 0.15$, $p = .011$).

[5]This test was conducted using contrasts comparing the accurate condition (2) with the combination of the creative (-1) and control (-1) conditions and comparing the control (-1) with the creative (1) condition.

State Empathic Concern & Willingness to Help

We collapsed the state empathic concern adjectives into a single index, which was highly reliable ($\alpha = 0.97$). State empathic concern was also highly correlated with willingness to help though we analyzed them separately given that they are conceptually distinct. Collapsing across conditions, state empathic concern was marginally *negative*ly correlated with subjective creativity on the divergent thinking task and significantly negatively associated with forward flow. Help ratings were negatively correlated with subjective creativity. The correlation between forward flow and willingness to help did not reach significance. See Table 2 for correlations between creative empathy and empathic outcomes of state empathic concern and help willingness. Condition did not influence state empathic concern, $F(2, 266) = 0.38$, $p = .683$, $\eta^2 = 0.00$, or willingness to help, $F(2, 266) = 1.25$, $p = .287$, $\eta^2 = 0.01$.

When examining partial correlations (controlling for experimental condition as a random effect), state empathic concern was not associated with subjective creativity ($r = -0.10$, $p = .109$) and remained negatively associated with forward flow ($r = -0.15$, $p = .012$). Help ratings remained negatively associated with subjective creativity ($r = -0.14$, $p = .022$) and were not associated with forward flow ($r = -0.09$, $p = .138$).

Individual Differences

See Table 2 for correlations between creative empathy measures and openness to experience, trait empathic concern, and fantasy in Study 3.

Table 2

Correlations between Creative Empathy, Empathic Outcomes, and Individual Differences

	1.	2.	3.	4.	5.	6.
1. Forward Flow						
2. Subjective Creativity	0.21**					
3. Openness	0.15*	0.24**				
4. State Empathic Concern	-0.15*	-0.11+	-0.07			
5. Help Willingness	-0.09	-0.15*	-0.01	0.74**		
6. IRI Empathic Concern	0.10	0.20**	0.38**	0.28**	0.23**	
7. IRI Fantasy	0.11+	0.08	0.45**	0.13*	0.13*	0.46**

Note. *$p < .05$, **$p < .01$, +Marginally significant

Discussion

Creativity instructions increased subjective creativity scores on the divergent thinking task ("subjective creativity"), conceptually replicating Studies 1 and 2. However, condition did not influence state empathic concern or willingness to help and both subjective creativity and forward flow were associated with lower state empathic concern and helping intentions – suggesting that creative empathy may be weakly associated with felt concern towards the target.

This study provides convergent validity for the forward flow and divergent thinking tasks: these measures were significantly associated with each other and have both been demonstrated to increase under creativity instructions. Although instructions to be creative on the divergent thinking task did not subsequently increase scores on the forward flow task in this study, this is not surprising given that participants were only provided with creativity instructions on the divergent thinking task (i.e., participants did not receive direct creativity instructions on the forward flow task as they did in Studies 1-2).

Self-reported creativity was positively associated with subjective creativity despite null associations with forward flow. As we have discussed previously, the constraints of the forward

flow task (i.e., 10 single words) – in contrast to the open-ended nature of the divergent thinking task – may lead participants to feel less confident that their responses were indeed creative.

Across all studies so far, creativity instructions did not increase participants' self-assessment of creativity despite increasing creativity assessed behaviorally. This may reflect a lay uncertainty about what being "creative" in the context of empathy consists of: although participants showed higher creativity in the creative conditions, they nonetheless may have been uncertain of how creativity would be assessed. It is also possible that answering the creativity self-report item draws in other aspects of the self-concept or salient conceptual information that does not have to do with actual creative performance. The discrepancies between self-reported and behavioral creative empathy speak to interesting questions regarding lay conceptions of "creativity" within empathic contexts and may reflect the complex relationship between self-reported and behavioral assessments of creativity in the broader literature (Reiter-Palmon, et al., 2012).

Study 4

Studies 1-3 demonstrate that the forward flow and divergent thinking tasks measure creativity within an empathic context and are influenced by creativity instructions. However, creativity instructions did little to influence state empathic concern and creativity scores were somewhat negatively associated with state empathic concern towards the target. It may be possible that the aspect of empathy captured in the creativity task (i.e., perspective-taking) under creativity instructions differs in important respects from the aspect of empathy assessed in the state items (i.e., feelings of compassionate concern). It is unclear whether these tasks measure empathy per se or domain-general creative thinking applied to empathy.

In Study 4, we looked to clarify two unresolved questions: 1) to what extent do creative empathy tasks measure capture empathy versus creative thinking, and 2) to what degree, if any, does "creative" empathy differ from ordinary empathy. We test these questions by experimentally inducing empathy and testing its effects on creativity compared to a non-empathy, "be objective" condition (similar to Batson et al., 1997) – do people become more creative when they are simply instructed to be empathic? We also compared this "be empathic" condition to a third, "be creative and empathic" condition to test whether adding creativity instructions to an empathy induction produces unique empathic outcomes compared to the empathy induction alone. By testing these questions, we hoped to better clarify the interplay between creativity and empathy. It may be that creativity instructions enhance empathic outcomes, and that empathy inductions (with or without the additional creativity prompting of the creative-and-empathic condition) enhance creativity. To our knowledge, little work has attempted to parse these relationships in a specific, discriminant manner as we do here.

We also introduced an additional automated measure of creativity on the divergent thinking task called word-to-word semantic diversity (w2w SemDiv), which captures a person's ability to connect distantly related concepts in short segments of text (Johnson et al., 2021). We included this measure to test convergence across automated and subjective scoring methods of the divergent thinking task.

Method

Participants

We recruited 300 participants to complete the study for $2.00 on Amazon Mechanical Turk via CloudResearch. We used the same recruitment criteria as in Studies 2-3, with the addition of the "Block Low Quality Participants" feature on CloudResearch, which prevents

participants with a history of providing low quality data from completing the study. Because this study followed a similar design as Study 3 (i.e., three between-subjects conditions), we aimed for a similar sample size here, which was determined before any data analysis. Like Study 3, participants were excluded if they provided at least one response on the divergent thinking task that was either blank or clearly unrelated to the target and/or prompt. We also excluded several participants who received extreme scores on the automated semantic distance measure (>3 SD from the mean), using a similar approach as forward flow in prior studies. This left us with a final *N* of 277 (50.54% men, 49.10% women, 0.36% non-binary; M_{age} = 39.49, SD_{age} = 11.54).

Procedure

Participants completed the divergent thinking task from Study 4 and were randomly assigned to receive one of three sets of task instructions: *creative empathy, empathy,* or *objective*. In the *creative empathy* condition (*N* = 94), participants were instructed to "try to both have empathy and be creative. You should empathically explore different possibilities for what the person is thinking and feeling. To be creative and empathic, try to creatively imagine the internal experience of the person." In the *empathy* condition (*N* = 91), participants were instructed to "try to have empathy. You should empathically focus on what each person is thinking and feeling. To be empathic, try to imagine the internal experience of the person." While we use the term "empathy" when implementing these experimental conditions, these tasks are primarily based on the perspective-taking facet of empathy, similar to prior studies. In the *objective* condition (*N* = 92), participants were instructed to "try to be objective. You should take an objective perspective towards the event described. Try not to get caught up in how the person thinks or feels; just remain objective and detached." Other than this experimental manipulation, all aspects of the divergent thinking task were identical to Study 3.

Measures

Participants completed the same six-item measure of state empathic concern as Study 3 ($\alpha = 0.98$) and rated how willing they were to help each target. We included these measures to test two critical questions: 1) as manipulation checks to verify that the empathy inductions produced higher empathy relative to the control, and 2) whether there are differences in empathic between outcomes between people instructed to "be creative and empathic" and those only instructed to "be empathic." To test how the empathy inductions influenced creativity, we used two methods to compute creativity scores on the divergent thinking task. First, we measured subjective creativity with the same protocol as Study 3 (i.e., using written guidelines from Silvia et al., 2008; ICC = 0.81). Second, we uploaded participant responses to an online platform that computes automated metrics of creativity (semdis.wlu.psu.edu). We used word-to-word semantic diversity (w2w SemDiv) to compute the semantic distance between all words in participants' responses. This automated metric was previously validated across several narrative creativity tasks (e.g., short stories), showing robust associations with human creativity ratings (Johnson et al., 2021). Using the distributional semantic model, BERT—a powerful "transformer" model developed by Google that is widely used in natural language processing (NLP) research—the w2w SemDiv algorithm computes cosine dissimilarity between all possible combinations of words in a text, thus capturing a person's ability to connect distantly-related concepts. This approach is similar to the semantic algorithm used to compute forward flow, though it uses a different semantic model (i.e., BERT as opposed to LSA) and it does not take the serial position of words into account (i.e., forward flow computes semantic distance in relation to prior words in the list whereas w2w SemDiv does not). These semantic distance scores were averaged across all trials to compute an overall automated creativity score ($\alpha = 0.74$).

Results

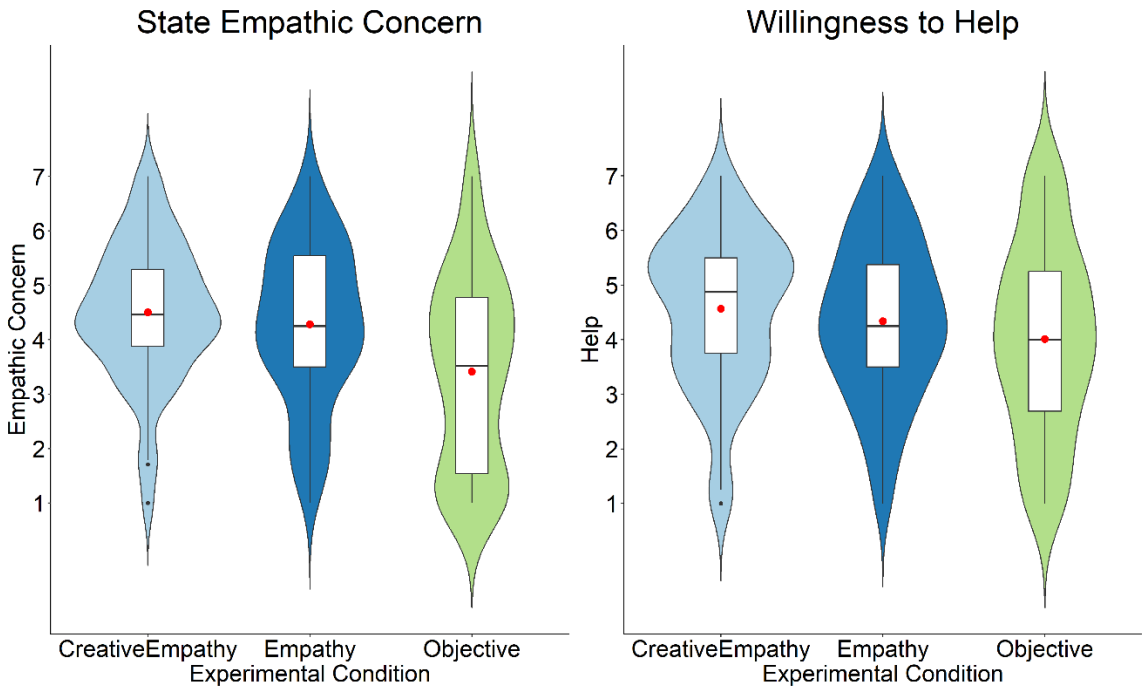
State Empathic Concern and Help Willingness

To test the efficacy of our empathy manipulations,[6] we examined state empathic concern and willingness to help as a function of condition. There was an omnibus effect of condition on state empathic concern, $F(2, 273) = 13.51$, $p < .001$, $\eta^2 = 0.09$. State empathic concern was significantly higher in the creative empathy condition ($M = 4.50$, $SD = 1.28$) compared to the objective condition ($M = 3.41$, $SD = 1.75$), $b = -1.09$, $t(273) = -4.92$, $p < .001$, $\eta^2 = 0.08$, 95% CI [-1.53, -0.65], and was higher in the empathy condition ($M = 4.28$, $SD = 1.45$) compared to the objective condition, $b = -0.87$, $t(273) = -3.91$, $p < .001$, $\eta^2 = 0.05$, 95% CI [-1.31, -0.43]. There was no difference in state empathic concern between the creative empathy and empathy conditions, $b = 0.22$, $t(273) = 0.99$, $p = .324$, $\eta^2 = 0.00$, 95% CI [-0.22, 0.66]. See Figure 3. The omnibus effect of condition on help willingness did not reach statistical significance, $F(2, 274) = 3.02$, $p = .050$, $\eta^2 = 0.02$. Participants also reported higher willingness to help in the creative empathy condition ($M = 4.57$, $SD = 1.43$) than in the objective condition ($M = 4.01$, $SD = 1.74$), $b = -0.56$, $t(274) = -2.45$, $p = .015$, $\eta^2 = 0.02$, 95% CI [-1.00, -0.11]. There was no difference in help willingness between the empathy ($M = 4.34$, $SD = 1.45$) and objective conditions, $b = -0.32$, $t(274) = 1.42$, $p = .157$, $\eta^2 = 0.01$, 95% CI [-0.78, 0.13], or between the creative empathy and empathy conditions, $b = -0.23$, $t(274) = -1.02$, $p = .310$, $\eta^2 = 0.00$, 95% CI [-0.68, 0.22]. See Figure 3.

[6]To test experimental effects, we dummy-coded condition once with the Creative Empathy condition as the reference category, and again with the Empathy condition as the reference category. We used this coding strategy (as opposed to planned comparisons) because we did not have precise predictions about how conditions would differ.

Figure 3

State Empathic Concern and Willingness to Help by Condition



Note. Participants showed higher state empathic concern (left) and willingness to help (right) in the empathy conditions compared to the objective condition.

Creativity Scores

The automated and subjective creativity measures were strongly correlated ($r = 0.55$), consistent with past work (Beaty & Johnson, 2021; Johnson et al., 2021). Thus, we operationalized creativity through a creativity index by summing the z-scores for each measure. We should note that this deviates from our operationalization of creativity in Study 3, where we only measured creativity on the divergent thinking task via subjective scoring.[7] We changed this scoring approach because unlike in Study 3, where subjective creativity was measured via the divergent thinking task (which varied instructions by experimental condition) and automated

[7]Effects on the individual automated and subjective scoring outcomes yielded similar results in this study and are reported in the supplement.

creativity was measured via the forward flow task (which did not vary instructions by experimental condition), here we derived the two measures of creativity from the same task (divergent thinking) and so expected the experimental manipulation to have an effect on both.

There was an omnibus effect of condition on overall creativity, $F(2, 274) = 4.32$, $p = .014$, $\eta^2 = 0.03$. Overall creativity was higher in the creative empathy condition ($M = 0.299$, $SD = 1.89$) than in the objective condition ($M = -0.422$, $SD = 1.59$), $b = -0.72$, $t(274) = -2.83$, $p = .005$, $\eta^2 = 0.03$, 95% CI [-1.22, -0.22]. Overall creativity was also higher in the empathy condition ($M = 0.117$, $SD = 1.71$) than in the objective condition, $b = -0.54$, $t(274) = -2.10$, $p = .037$, $\eta^2 = 0.02$, 95% CI [-1.05, -0.03]. There was no difference in creativity between the creative empathy and empathy conditions, $b = 0.18$, $t(274) = 0.71$, $p = .476$, $\eta^2 = 0.00$, 95% CI [-0.32, 0.69].[8]

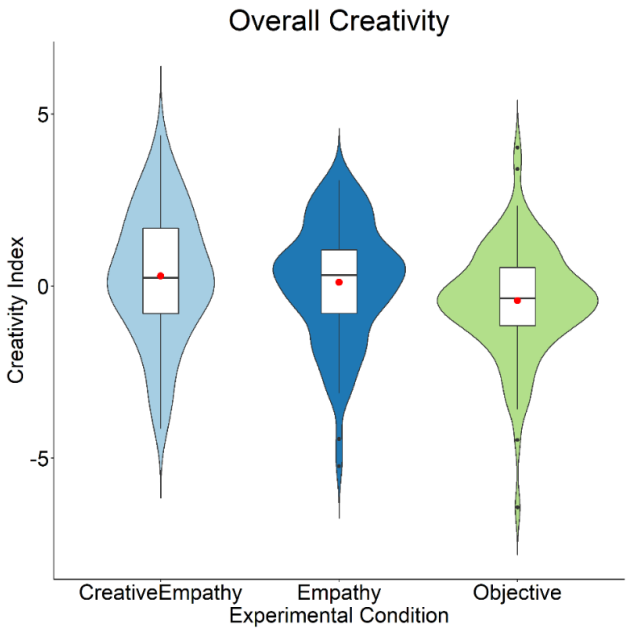
Correlational Results

Although there was general convergence among empathy measures, creativity scores via either automated or subjective metrics were largely not associated with empathy measures. State empathic concern was negatively associated with overall creativity and automated creativity (see Table 3 for raw correlations). When examining partial correlations (controlling for experimental condition as a random effect), state empathic concern remained negatively associated with overall creativity ($r = -0.18$, $p = .002$) and automated creativity ($r = -0.22$, $p < .001$), but not subjective creativity ($r = -0.10$, $p = .092$); help willingness was not associated with overall creativity ($r = -0.10$, $p = .110$) or subjective creativity ($r = -0.05$, $p = .410$) but was slightly associated with automated creativity ($r = -0.12$, $p = .048$).

[8]Because the two empathy conditions were at least descriptively higher than the objective condition on all measures, we ran a follow-up targeted contrast analysis comparing the two empathy conditions (2) with the objective condition (-1). This analysis confirmed that the empathy conditions were significantly higher than objective across all creativity and empathy measures (ps < .031).

Figure 4

Overall Creativity by Condition



Note. Participants showed higher creativity in the empathy conditions than in the objective condition

Table 3

Correlational Results from Study 4

Variable	1	2	3	4	5
1. Overall Creativity					
2. Subjective Creativity	0.88**				
3. Automated Creativity	0.88**	0.55**			
4. State Empathic Concern	-0.12*	-0.05	-0.16**		
5. Help Willingness	-0.07	-0.03	-0.10	0.68**	
6. IRI Empathic Concern	-0.06	0.01	-0.12	0.39**	0.41**

Note. *$p < .05$, **$p < .01$, +Marginally significant

Individual Differences

See Table 3 for correlations between creative empathy and IRI empathic concern.

Discussion

This study compared the effects of creative empathy, empathy, and objective instructions on creativity and empathy during the empathic divergent thinking task. Instructions to be empathic (in both the creative empathy and empathy conditions) increased both felt empathy towards and willingness to help the target, indicating that these instructions successfully induced empathy and its typical behavioral consequences. These empathy inductions also increased creativity scores, demonstrating a connection between approaching other minds empathically and approaching other minds creatively. As a reminder, the outcome creativity measures themselves are also empathic in nature because they pertain to others' mental states and so are set within an empathic context. Thus, there appears to be some initial evidence of mutual coordination between empathy and creativity, triangulated through manipulations of creativity and empathy with outcome measures of empathy-relevant creativity.

Yet, at the same time, subjective and automated creativity measures were not associated with state empathic concern, and in some cases, these were slightly negatively correlated. These conflicting findings suggest that although the empathy induction increased creativity scores, this was not because of an increase in felt empathic concern towards the targets (given the lack of convergence between state empathic concern and the creativity scores). This suggests an unmeasured variable accounting for the effects of empathy instructions on creativity. Our studies do not provide direct evidence for such a variable but suggests that creativity may be a feature of the empathic process that is distinct from felt empathic concern. It is possible as well that these seemingly conflicting results are related to variation in empathy facets between the induction (which tend to focus on perspective-taking) and the state empathy outcomes (which use compassion/concern adjectives). Although perspective-taking has often been used to induce

compassion (Batson et al., 1987), it is possible that creativity and concern, each induced through our perspective-taking manipulations, did not themselves coordinate because of possibly conflicting goals. If effective concern is, for example, thought to be at odds with novel responses, then this might be one potential explanation for these conflicting results.

In addition, we did not find differences between the creative empathy or empathy conditions in state empathic concern or willingness to help. This is consistent with our findings from Study 3 (where we found no effects of creativity instructions on empathy or help willingness), along with our interpretation above: creativity may be a feature of the empathic process but for reasons other than felt empathic concern. Creativity also did not differ between the creative empathy and empathy conditions. One explanation for this result is that the creativity portion of the instructions may have been simply too weak to elicit a creative response when paired with empathy instructions. Because these instructions occurred alongside empathy instructions within an empathy-based task, the empathy instruction may have overpowered the influence of creativity instructions. In sum, within this study, there did not appear to be noticeable incremental differences between the empathy and creative empathy manipulations on either empathy or creativity outcomes.

Individual Differences: Meta-Analysis

We conducted random effects meta-analyses (using the "metafor" package in R; Viechtbauer, 2010) to estimate the size of correlations between individual difference measures and creative empathy measures across studies. We specifically meta-analyzed correlations for openness to experience and IRI empathic concern, given that these measures were often associated with creative empathy within studies. Across the pilot study and Studies 1-3, forward flow was associated with openness to experience ($M\,r = 0.17$, $Z = 5.14$, $p < .001$) and empathic

concern ($M\ r = 0.15$, $Z = 4.59$, $p < .001$). For these correlations, there was low heterogeneity between studies (see supplemental material for Q and I^2 statistics). Subjective creativity was associated with IRI empathic concern in Study 3 but not in Study 4; meta-analyzing these effects reveals a non-significant relationship ($M\ r = 0.11$, $Z = 1.10$, $p = .271$) but with high heterogeneity between studies ($Q = 4.99$, $p = 0.025$; $I^2 = 79.98\%$).

Overall, the meta-analytic tests of correlations reveal consistent relationships for openness to experience, consistent with prior creativity research (King et al., 1996; McCrae, 1987; Silvia et al., 2009). Correlations between forward flow and trait empathic concern were significant, but the effect was small. In addition, correlations between empathic concern and subjective creativity were heterogenous between Studies 3 and 4. It is possible that these inconsistent effects reflect broader concerns about relationships between trait self-report and behavioral measures (Murphy & Lilienfeld, 2019), which we elaborate below.

General Discussion

These studies explored creative empathy. We tested whether creativity occurs within empathic contexts, if this creativity can be measured, and whether it is associated with relevant constructs. In Studies 1-2, creativity instructions increased semantic distance on a forward flow task where participants freely-associated a target's mental states (thus, by design, putting forward flow in an empathic context). In Study 3, creativity instructions increased subjectively scored creativity on an empathy-based divergent thinking task where participants wrote sentences reflecting on a target's mental state. In Study 4, instructions to be empathic significantly increased creativity scores on the empathy-based divergent thinking task when compared to a "be objective" control condition, though adding "creativity" to the empathy manipulation in a separate condition did not appear to have incremental effects on empathy or creativity outcomes.

Overall, our studies demonstrate that *creativity occurs and varies within empathic contexts*. This creativity can occur when people are prompted to empathize with others (Study 4) and can be brought out with explicit instructions (Studies 1-3). We do not suggest that recognizing these creative elements of empathizing should negate existing approaches to studying empathy. Rather, we suggest that empathy can consist of creative elements and provide novel methods of measuring empathy that incorporates these elements.

Our creativity metrics were typically associated with each other, openness to experience, and increased upon creative instruction, which would suggest that they measure domain-general creative thinking. However, empathy instructions increased both empathy and creativity in Study 4, suggesting a connection between empathy and creativity. In addition, in Study 4, empathy instructions increased creativity scores, yet these scores were not associated with state empathy measures and there were no differences between participants instructed to be empathic and those instructed to be creative and empathic. These findings raise some unresolved questions about the interplay between creativity and empathy, which remains the primary limitation of these studies that can be explored in future work.

We found modest correlations between creativity and individual differences in trait empathic concern, suggesting that more empathic people may be more likely to approach empathy creatively. However, these correlations were not consistently significant when looking within each of the studies and creativity measures were not associated with other individual differences in empathy or with state feelings of concern towards the targets. In addition, in Study 4, creativity and trait empathic concern were uncorrelated, although exploratory moderation analyses (reported in the supplemental material) indicate that these correlations depended on

experimental condition. Thus, it is unclear how approaching empathy creatively might be associated with individual differences in empathy.

Despite these mixed results, we reiterate that our findings point to a novel approach to measuring empathy that focuses on the creative process of empathic thought. Because these measures demonstrate creativity *within an empathic context*, they show that creativity can be oriented around empathy. This new approach can reshape how researchers think about the empathic process. The research here is the first to jointly conceptualize empathy and creativity and integrate methodological approaches to studying both constructs. The mixed results here likely reflect the complexity of both the empathy and creativity literatures, which often reveal heterogeneous findings themselves (e.g., Barbot, 2018; Murphy & Lillienfeld, 2019; Said-Metwaly et al., 2017). We intend this research to be both theoretically and methodologically generative, stimulating new questions in the science of empathy and creativity.

The Role of Creativity and Accuracy in Empathy

In Studies 1-3, we did not find differences in creativity between accuracy and control conditions. This suggests that people may commonly assume empathy is about accuracy: when asked to empathize without any instruction regarding creativity or accuracy, people may assume that they should try to be accurate. However, in Study 4, instructions to be empathic increased creativity, suggesting that empathizing with a target involves greater creativity than not empathizing at all. This indicates that while accuracy may be prioritized in empathic situations, people exert some additional degree of creativity as well when asked to empathize. In addition, although people may usually prioritize accuracy over creativity, our studies demonstrate that this is not an inevitable goal of empathy: people have the capacity to express creativity in certain conditions (i.e., under explicit creativity instructions).

Given that creativity and accuracy can both be features of empathy, there are additional questions for how creativity in an empathic setting may facilitate accuracy and vice versa. Although our data cannot answer these questions – given that we did not behaviorally measure empathic accuracy – we can make multiple predictions. On one hand, a varied and divergent interpretation of another mind may mean that a person has a greater selection of mental state concepts to choose from, which may assist in accurately interpreting another's experience. On the other hand, greater divergence while thinking about another mind may mean that a person moves further away from the "correct" answer.

While it is possible that creativity can result in decreased empathic accuracy, we note that this would not be unique to creative empathy and can occur for a variety of empathic phenomena. For example, perspective-taking – a central facet of empathy – can be associated with lower empathic accuracy (Eyal et al., 2018; Sassenrath et al., 2022), leading to negative outcomes in intergroup contexts (Zaki & Cikara, 2015) and in close relationships (Vorauer & Sucharyna, 2013). We welcome future research on the relationship (or lack thereof) between creativity and accuracy, which would be highly informative for the study of empathy. For example, if creative empathy is associated with empathic accuracy, this would provide insight into the process by which people accurately understand other minds; if creative empathy is negatively associated with empathic accuracy, this would provide insight into how people may be led astray when interpreting others' mental states. Importantly, we reiterate that creativity primarily reflects the empathic process, while accuracy or inaccuracy reflects the outcomes of this process.

Limitations & Extensions

Associations between Creativity and Empathy

It is possible that creativity reflects facets of empathy that we did not measure in our studies. For example, perspective-taking – which often involves imagination and mentalizing about a target – may play a role in creative empathy. Our creative empathy measures asked participants to reflect on what the target was experiencing, and thus these measures are most similar to perspective-taking. We did not find a relationship between creativity and the perspective-taking sub-scale of the IRI in the pilot study or in Study 4 and did not include any behavioral perspective-taking measures across studies. However, prior work has indeed pointed out null correlations between self-reported and behavioral perspective-taking measures (Murphy & Lilienfeld, 2019), which raises questions about how these creative empathy measures might converge with behavioral, rather than self-reported, perspective-taking measures. While we included exploratory behavioral empathy tasks in some of our studies (e.g., the Empathy Selection Task), these measures also yielded heterogenous results (see supplement). Thus, future work could also examine how creative empathy be associated with self-report and behavioral measures across multiple facets (e.g., experience sharing; Zaki & Ochsner, 2011).

We also found mild evidence that creative empathy links with lower feelings of state empathic concern and willingness to help a target. It is possible that thinking creatively distracts people from becoming fully attuned to the needs of targets, leading to lower feelings of concern and/or helping intentions. Alternatively, some work found associations between creative thinking and immorality, arguing that creativity affords a greater ability to justify unethical behavior (e.g., Gino & Ariely, 2012). Thus, we can speculate that a greater effort towards creative thinking may afford a greater capacity to disengage from the plight of the target. Future work could unpack

specific contexts in which creative empathy may (or may not) be associated with state empathic feelings and helping motivation.

Validity of Automated Creativity Measures

Automated measures prioritize novelty (Beaty & Johnson, 2021). We believe that this possibility does not undermine our results, for several reasons. A prior study by Heinen and Johnson (2018) found that even automated measures of semantic distance were strongly correlated with subjective creativity ratings (which accounted for both novelty and appropriateness) on the same task. We similarly showed convergence between automated and subjective measures of a single writing task here, and additionally excluded participants who received either extreme scores on the automated measures or wrote responses that were random and thus inappropriate.

One additional limitation of automated measures (particularly LSA) is the choice of corpus of text. Using a single text corpus and semantic model could subtly influence resulting semantic distance scores. The forward flow measure is limited to the TASA corpus (explained in the supplement): although this is a commonly used corpus in LSA studies (Ștefănescu, Banjade, & Rus, 2014), future work should seek to study empathic semantic associations across a range of corpora. However, we do not believe this strongly limits the generalizability of our results. Scores on the forward flow task were associated with openness in each study and increased upon creative instruction, supporting their reliability. In addition, forward flow yielded similar results as subjective creativity, which did not rely on a corpus. Finally, the automated creativity metric employed in Study 4 (w2w SemDiv; Beaty & Johnson, 2021) used a different semantic model (i.e., BERT) and text corpora (i.e., BooksCorpus and Wikipedia), and was strongly associated with subjective ratings on the same task.

Adaptation of Forward Flow

Our use of "forward flow" deviates from Gray et al. (2019). Forward flow is conceptualized by Gray et al. as a measure of naturalistic thought: the evolution of semantic associations when there is no explicit task goal (see Kenett et al. (2020) for further elaboration). As a result, in the original forward flow measure, participants are instructed to write each word in reference to the prior word in a "chain" free association (Marron & Faust, 2018) and are not provided a specific task goal other than to free associate from a seed word.

In our empathy-based version of the task, we modified Gray et al. (2019)'s approach in two significant ways. First, participants were instructed to make each association in reference to the visual target (i.e., "targeted" free association; Marron & Faust, 2018). We made this change so that participants would focus on empathizing with the target throughout. In a chain free association, participants may only infer the target's mental states on their initial word and then simply write concepts associated with this word (i.e., not in reference to the target), meaning that the task would primarily capture semantic associations. We acknowledge that instructing participants to attend to the target throughout does not guarantee that all participants followed this instruction. Nevertheless, we took steps to exclude inattentive participants in our analyses and found similar results for a divergent thinking task that does not feature the same limitations.

Unlike Gray et al. (2019)'s task, participants in Studies 1-2 were provided with an explicit goal to be creative or accurate. Compared to the original forward flow task, the inclusion of this constraint – along with the instruction to attend to the target throughout – likely invokes greater top-down executive processing (Beaty et al., 2014) than the original version of the task. However, despite these modifications to the task, forward flow increased upon creative instructions when freely-associating a target's mental states, demonstrating that the task is not

limited to naturalistic contexts and is flexible across different processes, contexts, and task goals. Thus, our findings support and expand on forward flow's original conceptualization: the evolution of semantic associations – due its importance in the dynamics of creative thought – predicts creativity outcomes across a range of contexts. Future work can examine whether different versions of the empathy-based forward flow task – i.e., targeted vs. chain association, presence or absence of explicit task goals – involve different cognitive processes and what this might mean within empathic contexts.

Ecological Validity

Choice of stimuli can constrain the generalizability of effects (Hester & Gray, 2018). In the forward flow task, targets were all white men and women, while in the divergent thinking task, identity was only indicated by the target's name. While our studies offer some generalizability by using a range of scenarios and emotional expressions, there remain questions for how our results hold across different social categories and contexts.

In this paper, we defined appropriateness as relevance to the mental states of another. When examining creative empathy outside of the lab context, different conceptualizations of appropriateness – such as a person's level of empathic accuracy – may at times be desirable and may require different methods of assessing creative empathy than we have provided here. For example, consider a situation in which a person sees their friend smiling, but knows that their friend is actually feeling sad due to just having discovered that their pet passed away, and is smiling because doing so is considered socially appropriate. The uncommon response that a smiling person is "sad" may be highly accurate, but this can only be captured if a person is able to explain or provide context surrounding their response. Our lab-based tasks likely cannot

capture these subtleties, and we encourage future research that incorporates variations of novelty and appropriateness in these complex naturalistic contexts.

We reiterate that, while the tasks here are relatively decontextualized, people nevertheless demonstrated creativity in a context appropriate to empathy. Future studies can build off this foundation and examine when and where this creativity occurs in naturalistic empathic contexts. In addition, although automated measures primarily assess novelty, these measures have been linked to creativity in the real-world (Gray et al., 2019), and future research can similarly examine how creative empathy may predict creative performance.

Conclusion

How we understand other minds is a deeply studied topic in psychology, neuroscience, and philosophy. Yet there are different roads to creating a mind. Some are direct, while others follow detours, scenic routes, and winding paths. We suggest that more careful consideration of the possibly bidirectional relationships between empathy and creativity – using a complement of self-report and behavioral measures from both research literatures – opens up new questions about how people approach and relate to empathic engagement with others. We conclude that the *creation* of other minds may be an integral, yet unstudied ingredient in the experience of empathy.

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