

ORIGINAL ARTICLE

Empathy to Creativity: The Associations Between Empathy and Everyday Creativity

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ABSTRACT

Objective: Everyday creativity is fundamental to human existence and improved well-being. Beyond recent attention regarding how contextual, lifestyle, personality, and neurobiological differences might foster everyday creativity, empathy may also constitute an intriguing connection. However, this potential relationship has not yet been systematically assessed.

Methods: Study 1 used multiple psychometric instruments to examine the levels of emotional and cognitive empathies and everyday creativity among different samples ($n = 809$). Study 2 used a cross-lagged panel model (CLPM) to examine longitudinal behavioral data ($n = 653$ at T1, $n = 413$ at T2) to determine how cognitive empathy might predict everyday creativity.

Results: Study 1 found that cognitive but not affective empathy exhibited a significant positive correlation with everyday creativity and domain-specific creative behaviors. Study 2 also reported a positive correlation between cognitive empathy, overall creative achievement, and certain domain-specific creative achievements. Cognitive empathy was linked to greater involvement in everyday creativity.

Conclusion: To our knowledge, these studies are the first to demonstrate a robust relationship between cognitive empathy and everyday creativity across different samples, measures, and longitudinal data, providing evidence of a nuanced relationship between cognitive empathy and creative achievement. Future studies should explore how creativity or empathy may foster empathic/creative development.

Bijie Tie and Wenjing Yang contributed equally to this article.

Concern for man himself and his fate must always form the chief interest of all technical endeavors. Never forget this in the midst of your diagrams and equations.

Albert Einstein 16 February 1931.

1 | Introduction

Everyday creativity plays an important role in human life by enhancing our ability to think innovatively, to explore our own and others' identity, and to generate new knowledge (Ilha Villanova and Pina e Cunha 2020; Kaufman and Sternberg 2019; Richards 2010). Additionally, creativity contributes to the overall well-being and imparts meaning to life (Brosowsky et al. 2022; Kaufman 2018). Consequently, an understanding of multiple approaches to fostering everyday creativity is critical. While previous studies have primarily examined the influence of cognitive, emotional, and contextual or social factors such as cognitive styles, positive-emotion states, and lifestyle opportunities or social support on everyday creativity (Conner and Silvia 2015; Fürst and Grin 2018; Sundararajan and Averill 2007), recent research has further shifted focus to the exploration of the effects of even more complex or nuanced individual traits or factors (Forgeard 2024; Lebedeva et al. 2018; Silvia, Cotter, and Christensen 2017; Zhang et al. 2024). This new focus may bring fresh insights into the general concepts of creativity as well as to our understanding of how creativity might also relate to other psychological aspects.

One particularly intriguing trait that might be connected to everyday creativity is empathy. Empathy, which is integral to social interaction, cooperation, and to the understanding of others (de Waal and Preston 2017; Weisz and Cikara 2021), could be argued, much as with other emerging trait personality aspects, to play a key role in how people conceive and respond to their worlds in creative engagements. Empathy may also be an intriguing result of pursuing more creative activity itself, suggesting a potential two-way relationship. However, the link between empathy and everyday creativity has been relatively underexplored. The present paper delves into the association between empathy and daily creativity, from multiple samples, measurement tools, and longitudinal data, through two studies on this topic.

1.1 | Everyday Creativity

Everyday creativity brings originality and significance to the routine activities of our daily lives (Ilha Villanova and Pina e Cunha 2020; Richards 2010) and is evident across various domains, including work, education, or hobbies, manifesting in activities such as painting, writing, and performing. Creativity can also be found in more mundane undertakings such as cooking, woodworking, and gardening (Conner and Silvia 2015; Ilha Villanova and Pina e Cunha 2020; Lebedeva et al. 2018; Richards 2010). Frameworks to facilitate a comprehensive understanding of creativity, such as the “Four-C Model” (Beghetto and Kaufman 2007; Kaufman and Beghetto 2009), classify

creativity into four tiers: mini-c, little-c, pro-c, and big-c, with the “little-c” category being particularly pertinent to everyday creativity, signifying common forms of creative expression. Although everyday creativity may not yield groundbreaking scientific or cultural advancements such as those generated by “big-c” creativity outputs, it is pervasive in our lives and constitutes the bulk of human creative endeavors (Beghetto and Kaufman 2007; Ilha Villanova and Pina e Cunha 2020; Kaufman and Beghetto 2009).

Prior research has shown that everyday creativity is indispensable for creative achievement (Ilha Villanova and Pina e Cunha 2020; Richards 2010). People scoring high on everyday creativity are more likely to engage in actual everyday creative behaviors in their daily life and, in turn, are also more likely to produce high levels of creative achievement (Beghetto and Kaufman 2007; Kaufman and Beghetto 2009). According to the “amusement park theoretical” (APT) model of creativity (Baer and Kaufman 2005), everyday creativity can be deduced from some initial needs and general personality traits. It appears across different general thematic areas and involves specific microdomains. More big-c creative achievements, on the other hand, may require deep learning and practice in specific domains, combined with specific personality traits, to reach a high level of professional performance.

In studying the multilayered development of creativity, the APT model implied the interaction of initial requirements, domain specificity, and personality traits. Therefore, exploring the relationship between personality factors and creative behavior and achievement in different domains can reveal individual differences in creative performance and help us understand how personality influences the development of creativity.

1.2 | Empathy and Everyday Creativity

Empathy, the human capacity to understand and resonate with the mental states of others, represents one of the basic adaptive functions developed by humans over the course of evolution (Preston and de Waal 2003; Smith 2006). Probably originating as a mechanism in mammals with complex social structures, empathy is both fundamental and instinctive (de Waal and Preston 2017). However, individuals can modulate their empathetic responses according to the specific personal target or context (Cuff et al. 2014). An expanding body of research highlights the crucial role of empathy in social dynamics, emphasizing its potential to yield numerous positive outcomes such as enhanced interpersonal connections, cooperative behaviors, and, much like creativity, improved emotional well-being (Kardos et al. 2017; Morelli, Lieberman, and Zaki 2015; Morelli et al. 2017).

Although evidence for a link between empathy and everyday creativity is less clear, multidisciplinary research has suggested a positive association (Gerry 2017; Pei et al. 2022; Pelowski et al. 2023; Stephan 2023). On the one hand, heightened empathy can enrich social relationships, expand cognitive frameworks, and introduce novel perspectives (Gerdes et al. 2011; Main et al. 2017). Thus, empathy may enable

individuals to perceive problems from multiple viewpoints, enhancing cognitive flexibility and fostering more innovative and creative solutions (Köppen and Meinel 2015; Pavlovich and Krahne 2011; Walther, Miller, and Sochacka 2017). For instance, engaging diverse ideas during the creative process can prompt faster shifts in mindset and exploration in various creative domains, especially when transitioning between distinct cognitive categories (Nijstad, Stroebe, and Lodewijckx 2002). Greater empathy may be shared among those who are able to see the world from different perspectives or in new (e.g., creative) ways, as empathy is closely related to Openness, which is also often found to be a key trait of creativity individuals (Del Barrio, Aluja, and García 2004; Gerson and Neilson 2014; Theurer, Rogh, and Berner 2021).

Highly empathetic individuals may also be more likely to view problems from diverse angles, thus increasing individual creative performance. Creativity, at the same time, is deeply embedded in social context, deriving meaning and significance from interpersonal interactions (Csikszentmihalyi 1998; De Dreu, Nijstad, and Baas 2024). Empathy, in its ability to understand and relate to others' feelings, may significantly influence this dynamic (Cuff et al. 2014). Specifically, empathy enables the creation of a conducive environment for everyday creativity by fostering positive social interactions. For example, empathy allows designers to assimilate feedback, emotions, and viewpoints from others, thus facilitating the enhancement of their creations (Barrett, Creech, and Zhukov 2021; Gasparini 2015). Furthermore, when creative work is shared publicly, it transforms into a participatory social and cultural phenomena, with the empathetic engagement of the audience shaping its interpretation, adaptation, and reception (Suleiman and Crosman 2014). In other words, empathy may increase interpersonal interactions and enrich the creative process.

Although there is no direct research suggesting that everyday creativity can promote empathy, some studies have found that a creative mindset can facilitate perspective taking (PT) and reduce racial ingroup biases, which are closely related to empathy (Huo, Shamay-Tsoory, and Han 2023; Yang and Hung 2021). Therefore, to some extent, everyday creativity may also promote empathy as well. Additionally, a mixed-method approach suggested that creative reflective assignments can reduce stigma and promote empathy (Webster 2010). However again, this relationship—both exploring empathy as an influence on creativity and vice versa—has not yet been systematically considered.

1.3 | The Empathy Divergence Thesis in Everyday Creativity

Going beyond a basic relationship between creativity and empathy, the association between these aspects may be based on specific sub-aspects of empathy as well. Specifically, numerous studies have shown that empathy has several components, each leading to unique psychological and behavioral outcomes (Decety and Yoder 2016; Nummenmaa et al. 2008; Shamay-Tsoory, Aharon-Peretz, and Perry 2009; Vassallo et al. 2023). The empathy divergence thesis suggests two primary types of empathy, emotional and cognitive (Hall and Schwartz 2019; Smith 2006). Emotional empathy is characterized by the ability

to share and feel the emotions of others (Cuff et al. 2014), and cognitive empathy refers to the capacity to identify and understand another person's emotional state (Hall and Schwartz 2019). These forms of empathy can manifest individually or simultaneously in a person, each at varying levels (Davis 2006). Neuroscientific research supports this distinction, revealing separate neural pathways for cognitive and emotional empathies (Eres et al. 2015; Nummenmaa et al. 2008). Cognitive empathy is also considered a subset of Theory of Mind (ToM), the cognitive ability to understand and infer the mental states of others, including their thoughts, beliefs, and emotions (Frith and Frith 2005; Walter 2012).

This empathy divergence thesis may be relevant to the understanding of how empathy influences creativity, suggesting that especially cognitive empathy may be more tied to creative activities. Creativity requires the ability to understand and solve complex challenges, as well as to investigate innovative ideas and techniques from multiple perspectives (Edwards 1987; Finke, Ward, and Smith 1996). Individuals may transcend self-centered thinking and examine different viewpoints and methods via cognitive empathy (Cuff et al. 2014; Van Lissa, Hawk, and Meeus 2017), which is necessary for inventive and adaptive thinking in everyday life. A recent study in the public sector (Vassallo et al. 2023) supported a similar hypothesis, revealing a positive correlation between cognitive empathy and innovation, whereas emotional empathy was not significantly related.

On the other hand, emotional empathy may often lead to direct emotional responses, frequently linked with passive emotions, particularly anxiety (Nair et al. 2024; Wolf et al. 2015). A previous meta-analysis study found, on the other hand, that anxiety may be associated with lower creativity (Baas, De Dreu, and Nijstad 2008). In addition, executive function (e.g., shifting) is identified as a key element in creativity (Benedek et al. 2014; Pan and Yu 2016; Zabelina, Friedman, and Andrews-Hanna 2019), with a recent study highlighting that cognitive, in contrast to emotional, empathy is associated with these critical functions (Mairon et al. 2023). Neuroimaging studies, focusing, for example, on the default mode network (DMN), crucial for self-referential thoughts and imagination, further support the relationship between cognitive empathy and everyday creativity (Ovando-Tellez et al. 2022; Ruizhi et al. 2022). These suggest that the neural mechanisms underpinning cognitive empathy and everyday creativity may share common pathways. However, emotional empathy has been shown to be negatively correlated or unrelated (Oliveira Silva et al. 2018; Winters et al. 2021). Thus, we hypothesize that cognitive empathy is related to everyday creativity, while emotional empathy may not show this association.

1.4 | The Present Study

In conclusion, our research aims to advance this emerging field by exploring the connection between empathy and everyday creativity in several dimensions. Although research is again quite rare, the majority of previous studies that have begun considering this topic have used a single self-report measure of empathy and have been subject to a cross-sectional design with a single sample (Form and Kaernbach 2018; Yoon, Jo, and Kang 2020).

Using only one self-report measure challenges the generalizability of findings, especially in empathy research, as similar measures often show only moderate correlations, and different types of empathy measures usually exhibit nonsignificant correlations (Baldner and McGinley 2014; Melchers et al. 2015). Similarly, using a single sample significantly limits the generalizability of results across different populations, contexts, and procedures. Furthermore, these studies have often overlooked domain-specific creativity, which is essential for understanding the relationship between empathy and various types of creative expression. Additionally, cross-sectional studies, which are prone to common method variance, could not determine directionality. It is possible that higher or lower levels of empathy could influence everyday creativity or, conversely, that changes in everyday creativity could affect empathy levels over time (Huo, Shamay-Tsoory, and Han 2023; Webster 2010; Yang and Hung 2021; Yaniv 2012). Of course, the two causal directions are not mutually exclusive. Therefore, we conducted two studies to address these gaps: Study 1 assessed this relationship in community samples and college students from two distinct geographic regions by using multiple psychometric instruments. Study 2 examined the relationship between empathy and creative achievement, as well as the direction of prediction, to determine whether everyday creativity follows from empathy or vice versa.

2 | Study 1

2.1 | Study Design

We sought to determine whether cognitive empathy, as compared with emotional empathy, was associated with everyday creativity. We hypothesized an association between cognitive empathy and everyday creativity across different participant populations and measurements, whereas emotional empathy was not expected to show a significant correlation. Because individual capacities for empathy and creativity vary across different participant populations (Baron-Cohen et al. 2023; Rietzschel, Zacher, and Stroebe 2016) and since results may differ depending on the psychological instruments used (Casas et al. 2012; Faravelli, Albanesi, and Poli 1986; Raykov 2004), we specifically used the Inventory of Creative Activities and Achievements (ICAAs) and the Biographical Inventory of Creative Behaviors (BICBs), as both provide a broad representation of creative behavior across domains, but they differ in their approaches. For example, BICB measures creative behavior through binary choices (whether a behavior was performed), while ICAA focuses on the frequency of the behavior (Batey 2007; Diedrich et al. 2018). We tested our hypothesis with diverse participant groups of college students and adults in two distinct geographic regions to improve the generalizability of our findings.

2.2 | Method

2.2.1 | Participants

Demographic and descriptive data of Study 1 participants are presented in Table 1. All participants were subject to Southwest University ethical standards, the 1964 Helsinki Declaration,

and subsequent amendments or comparable ethical standards. Data collection was conducted through the Wenjuanxing online survey platform (www.wjx.cn). To prevent repeated entries, we restricted submissions to one entry per IP address.

The survey began with the completion of an informed consent form, which was mandatory for access to the questionnaires. Because the questionnaires were short and the platform had a default setting that would alert respondents if they missed any items, all data were included in the analysis. Since the survey measurement time in Study 1 was short, we did not impose any time limits. The order of tasks for both Studies 1a and 1b was consistent: first, measuring everyday creativity, followed by assessing empathy, and then measuring everyday creativity again. Study 1c tested creative behavior and then empathy. Our three samples consisted of (Study 1a) 200 adults, who had graduated from universities in China recruited through alumni QQ or Wechat groups, with an average age of 27.46 years ($SD = 3.44$, range 21–57; 45.0% men); (Study 1b) 248 current undergraduates from universities in Southern China engaged through student QQ groups, with an average age of 19.24 years ($SD = 0.96$, range 18–25; 39.5% men); (Study 1c) 361 current undergraduates from universities in Northern China recruited similarly, with an average age of 20.58 years ($SD = 1.16$, range 18–23; 48.5% men).

2.2.2 | Measures

2.2.2.1 | Empathy—Interpersonal Reactivity Index (IRI). To measure trait empathy, we employed two batteries. First, we administered the Chinese-language version of the Interpersonal Reactivity Index (IRI), including 22 items with participants responding on a five-point scale (0 = “strongly disagree,” 4 = “strongly agree”) (Davis 1983). The IRI has four subscales: PT and fantasy (FS) for cognitive empathy, and empathic concern (EC) and personal distress (PD) for emotional empathy (Davis 1983). The Chinese version has demonstrated good internal consistency reliability. We measured cognitive empathy in our study by summing the scores of each of the PT and FS items and emotional empathy by summing the scores of each of the EC and PD items.

2.2.2.2 | Questionnaire of Cognitive and Affective Empathy (QCAE). Additionally, participants answered the Chinese-language version (Liang et al. 2019) of the Questionnaire of Cognitive and Affective Empathy (QCAE) (Reniers et al. 2011). This contains 31 items using a four-point Likert-type scale (1 = “strongly disagree,” 4 = “strongly agree”). Higher total QCAE scores indicate more highly developed empathy. QCAE is divided into five subscales: two subscales, which include “perspective taking” and “online simulation,” measuring cognitive empathy (QCE), and three subscales, which include “emotion contagion,” “proximal responsivity,” and “peripheral responsivity,” measuring emotional empathy (QAE). Cognitive and emotional empathy scores were obtained by summing the items from their respective subscales. This scale has also been validated in Chinese adults and has demonstrated robust internal consistency reliability (Liang et al. 2019).

2.2.2.3 | Inventory of Creative Activities and Achievements (ICAAs). To measure creativity, participants completed the inventory of ICAAs (Diedrich et al. 2018). This is a

TABLE 1 | Demographic and descriptive information of Study 1 and Study 2.

		Mean (Range)	SD	Cronbach's α
Study 1a; community adults (M age = 27.46, N = 200, 90 men)				
	CAct	40.21 (0–191)	24.92	0.92
	BICB	4.57 (0–34)	5.13	0.89
	IRI-CE	25.54 (8–42)	6.84	0.76
	IRI-EE	23.10 (4–41)	5.71	0.66
Study 1b; college students (M age = 19.24, N = 248, 98 men)				
	CAct	41.69 (2–133)	25.22	0.94
	BICB	5.25 (0–23)	3.75	0.76
	IRI-CE	29.66 (13–43)	5.56	0.76
	IRI-EE	25.45 (11–39)	5.15	0.66
Study 1c; college students (M age = 20.58, N = 361, 175 men)				
	BICB	5.13 (0–23)	3.49	0.76
	IRI-CE	30.76 (11–44)	5.34	0.73
	IRI-EE	26.75 (8–40)	5.15	0.56
	QCAE-CE	44.96 (27–57)	5.11	0.80
	QCAE-EE	23.28 (16–31)	2.53	0.75
Study 2; (M age = 20.58, T1, N = 653, 184 men)				
	BICB	6.87 (0–34)	4.95	0.85
	CAQ	3.14 (0–11)	2.03	0.63
	IRI-CE	25.80 (5–44)	6.77	0.79
	IRI-EE	23.65 (7–41)	5.58	0.67
Study 2; (T2, N = 413, 119 men)				
	BICB	5.12 (0–33)	4.72	0.86
	IRI-CE	25.83 (6–44)	6.20	0.75
	IRI-EE	24.42 (8–40)	5.19	0.60

Abbreviations: BICBs = Biographical Inventory of Creative Behaviors; CAct = ICAAs-Creative Activities; CAQ = Creative Achievement Questionnaire; IRI-CE = Interpersonal Reactivity Index-Cognitive Empathy; IRI-EE = Interpersonal Reactivity Index-Emotional Empathy; QCAE-CE = Questionnaire of Cognitive and Affective Empathy-Cognitive Empathy; QCAE-EE = Questionnaire of Cognitive and Affective Empathy-Emotional Empathy; T1 = Time 1, T2 = Time 2. M = mean.

broad assessment of individual differences in real-life creativity. Using self-reported measures, activities (CAct) and achievements are assessed on different scales in eight areas, including literature, music, arts and crafts, creative cooking, sports, visual arts, performing arts, and science and engineering. An overall field score is obtained by summing the eight areas (Diedrich et al. 2018). CAct scores are calculated by summing points from domain-specific activities, and a total score is then derived by aggregating these domain scores.

2.2.2.4 | Biographical Inventory of Creative Behaviors (BICBs). Additionally, we employed the BICBs, which include 34 items, each describing a different common creative activity

(Batey 2007). This uses a binary checklist response format, where participants indicate if they have engaged (“Yes” = 1 point) or not engaged (“No” = 0 points) in each activity during the past year. We summed the scores of each item, with a higher total score suggesting greater everyday creativity.

2.3 | Results

All measures showed good reliability across our sample (see Table 1). The IRI-C showed Cronbach's alpha coefficients of 0.80, 0.76, and 0.74 for samples 1a, 1b, and 1c, respectively. Cronbach's alpha coefficients of IRI-CE and IRI-EE ranged from 0.73 to 0.76

and from 0.56 to 0.66, respectively. The QCE and QAE scales exhibited alpha coefficients of 0.80 and 0.75, respectively. CAct showed high consistency with alpha coefficients of 0.92 and 0.94 for samples 1a and 1b, respectively. The BICB demonstrated strong internal consistency with alpha coefficients of 0.89 for sample 1a and 0.76 for samples 1b and 1c.

As shown in Table 2, regardless of the sample and measurements, everyday creative activities were associated with cognitive empathy but not with emotional empathy. For example, we found that CAct was positively correlated with IRI-CE ($r = 0.27$, $p < 0.001$), while not correlated with IRI-EE ($r = 0.12$, $p = 0.10$) in sample 1a. In addition, we found that after controlling for emotional empathy, the relationship between cognitive empathy and daily creative behavior changed little. After controlling for IRI-EE, the correlation coefficients among IRI-CE, CAct, and BICB demonstrated a little change in sample 1b ($rs = 0.28$, $p < 0.001$).

Further, we analyzed the CAct domain scores (see Table 3). In both Study 1a and Study 1b, IRI-CE showed significant positive correlations with various domains of creative activities. For example, in the literature, the correlation was $r = 0.16$, $p = 0.02$ in Study 1a and $r = 0.19$, $p = 0.002$ in Study 1b. The IRI-EE showed weaker or nonsignificant correlations with creative activities in Study 1a. IRI-EE even showed negative correlations with creativity in some domains (e.g., performing arts; $r = -0.18$, $p = 0.006$) in Study 1b. And after controlling for IRI-EE, the relationship between IRI-CE and CAct domains remained essentially

unchanged. However, after accounting for IRI-CE, the IRI-EE showed a negative correlation in some CAct domains. For example, in science and engineering, the correlation was $rs = -0.17$, $p = 0.017$ in Study 1a and $rs = -0.15$, $p = 0.016$ in Study 1b.

2.4 | Discussion

Study 1 provided support for both a relationship between empathy and everyday creativity as well as for a more specific empathy divergence thesis. Specifically, we found that cognitive empathy was associated with everyday creativity across multiple samples and numerous instruments, while emotional empathy was not. After controlling for emotional empathy, the relationship between cognitive empathy and daily creativity did not change significantly. We discovered a relationship between cognitive empathy and almost all creativity domains. This indicates that the relationship between cognitive empathy and creative activities is consistent across various domains. This finding highlights shared characteristics of creative activities across different domains. Previous studies have made similar observations, suggesting that, although there are differences in creative activities across domains, they may share many common cognitive and neural mechanisms as well as similar influencing factors (Chen, Beaty, and Qiu 2020; Glaveanu et al. 2013; Zhang et al. 2020). Interestingly, after controlling for cognitive empathy, we found that emotional empathy showed a negative correlation in some domains of creative activities, particularly in science and engineering. Creative behavior in science and engineering typically

TABLE 2 | Zero order and partial correlations of each variable in study 1.

Study 1a	CAct	BICB	IRI-CE	IRI-EE	
CAct	1				
BICB	0.63***	1			
IRI-CE	0.27*** (0.25***)	0.16* (0.15*)	1		
IRI-EE	0.12 (−0.02)	0.07 (−0.01)	0.47***	1	
Study 1b	CAct	BICB	IRI-CE	IRI-EE	
CAct	1				
BICB	0.45***	1			
IRI-CE	0.25*** (0.28***)	0.23*** (0.27***)	1		
IRI-EE	−0.07 (−0.15*)	−11 (−0.18**)	0.27***	1	
Study 1c	BICB	IRI-CE	IRI-EE	QCAE-CE	QCAE-EE
BICB	1				
IRI-CE	0.19*** (0.20***)	1			
IRI-EE	0.04 (−0.02)	0.42***	1		
QCAE-CE	0.21*** (0.21***)	0.57***	0.11*	1	
QCAE-EE	0.01 (−0.09)	0.41***	0.39***	0.29***	1

Abbreviations: BICBs, Biographical Inventory of Creative Behaviors; CAct, ICAs-Creative Activities; IRI-CE, Interpersonal Reactivity Index-Cognitive Empathy; IRI-EE, Interpersonal Reactivity Index-Emotional Empathy; QCAE-CE, Questionnaire of Cognitive and Affective Empathy-Cognitive Empathy; QCAE-EE, Questionnaire of Cognitive and Affective Empathy-Emotional Empathy.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

TABLE 3 | Zero order and partial correlations of specific creative activity and cognitive and affective empathies for Study 1.

	CActLit	CActMus	CActA&C	CActCook	CActSpo	CActVA	CActPA	CActS&E	IRI-CE	IRI-EE
Study 1a										
IRI-CE	0.16* (0.14*)	0.17* (0.14*)	0.22** (0.17*)	0.21** (0.16*)	0.11 (0.09)	0.20** (0.20**)	0.12 (0.10)	0.19** (0.24***)	1	
IRI-EE	0.08 (0.001)	0.11 (0.04)	0.15* (0.06)	0.15* (0.06)	0.08 (0.03)	0.05 (−0.05)	0.07 (0.01)	−0.06 (−0.17*)	0.47**	1
Study 1b										
IRI-CE	0.19** (0.23***)	0.30 (0.32***)	0.10 (0.10)	0.16* (0.18**)	0.22*** (0.22***)	0.11 (0.14*)	0.14* (0.20**)	0.31** (0.33***)	1	
IRI-EE	−0.11 (−0.17**)	−0.01 (−0.10)	0.02 (−0.01)	−0.03 (−0.08)	0.02 (−0.04)	−0.06 (−0.10)	−0.18** (−0.22***)	−0.06 (−0.15*)	0.27***	1

Abbreviations: A&C = Arts & Crafts; CAct = IC&A-Creative Activities; Cook. = Creative Cooking; IRI-CE = Interpersonal Reactivity Index-Cognitive Empathy; IRI-EE = Interpersonal Reactivity Index-Emotional Empathy; Lit. = Literature; Mus. = Music; PA = Performing Arts; Spo. = Sports; S&E = Science & Engineering; VA = Visual Arts.

* $p < 0.05$.

** $p < 0.01$.

*** $p > 0.001$.

requires rigor logical reasoning and rational analysis, relying on objective data analysis, systematic problem-solving, and a deep understanding of complex systems.

3 | Study 2

3.1 | Study Design

In Study 2, we addressed a major limitation in previous studies including Study 1 above: cross-sectional data, which cannot determine directionality. Furthermore, according to the Four-C Model (Beghetto and Kaufman 2007; Kaufman and Beghetto 2009), creativity can be divided into four levels: mini-c, little-c, pro-c, and big-c. Study 1 primarily focused on everyday creativity (mini-c and little-c) while overlooking the importance of creative achievement (pro-c and big-c). Building upon the findings of Study 1, we first replicated the results of Study 1 to assess the relationship among cognitive empathy, affective empathy, and everyday creativity. Second, we introduced creative achievement in order to investigate its relationship with cognitive empathy and affective empathy. Finally, we used a cross-lagged panel model (CLPM) to examine the unique effects of Time 1 (T1) empathy on subsequent Time 2 (T2) everyday creativity while controlling for the autoregressor effects of Time 1 (T1). In addition, we also examined the quasi-causal relationship between everyday creativity and empathy using CLPM by assessing the stability of predictor and outcome variables at two different times (autoregressor effects) and the relationships between predictor and outcome variables at T1 and T2 (cross-lagged effects).

Specifically, based on Study 1, we formulated the following hypotheses for Study 2: first, consistent with Study 1, cognitive empathy would be positively associated with everyday creativity, whereas emotional empathy would not. Second, cognitive empathy would be positively associated with creative achievement, whereas emotional empathy would not. Third, T1 cognitive empathy would positively predict T2 everyday creativity even after controlling for autoregressor effects and T1 emotional empathy. Fourth, T1 everyday creativity would positively predict T2 cognitive empathy even after controlling for autoregressor effects and T1 emotional empathy. Fifth, T1 emotional empathy would not predict T2 everyday creativity even after controlling for autoregressor effects and T1 cognitive empathy. Finally, T1 everyday creativity would not predict T2 emotional empathy even after controlling for autoregressor effects and T1 cognitive empathy.

3.2 | Participants

3.2.1 | Participants and Procedures

Study 2 employed data from the larger Gene–Brain–Behavior (GBB) project (Chen et al. 2019, 2018; Liu et al. 2017). A wide range of behavioral factors, including creativity, emotion, personality, developmental experience, and health, are measured in GBB's database; see our prior publications outlining the recruiting campaign and its inclusion and exclusion criteria (Chen et al. 2019, 2018; Liu et al. 2017). In this study, we used data collected at two different time points. First, at T1 (2015–2016), we

TABLE 4 | Zero order and partial correlations of each variable in Study 2.

Study 2	BICB T1	CAQ T1	IRI-CET1	IRI-EE T1	BICI T2	IRI-CET2	IRI-CET2
BICB T1	1						
CAQ T1	0.50***	1					
IRI-CET1	0.22*** (0.22***)	0.21*** (0.23***)	1				
IRI-EE T1	0.06 (−0.05)	0.003 (−0.10**)	0.44***	1			
BICB T2	0.39***	0.35***	0.22***	0.08	1		
IRI-CET2	0.17*** (0.20***)	0.24*** (0.25***)	0.53***	0.26***	0.23*** (0.20***)	1	
IRI-EE T2	0.02 (−0.01)	0.03 (−0.09)	0.26***	0.59***	0.10* (−0.01)	0.46***	1

Abbreviations: BICBs = Biographical Inventory of Creative Behaviors; CAQ = Creative Achievement Questionnaire; IRI-CE = Interpersonal Reactivity Index-Cognitive Empathy; IRI-EE = Interpersonal Reactivity Index-Emotional Empathy; T1 = Time 1, T2 = Time 2.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

obtained behavioral data on 653 people who completed everyday creativity and empathy assessments. Then, at T2 (2017–2018), we used behavioral data from T2 time period's behavioral tests. Therefore, Study 2 included behavioral data from 653 people at T1 (184 men; average age 19.38 ± 1.38 years) and 413 people at T2 (Table 1).

3.2.2 | Measures

In Study 2, we used some of the same psychometric instruments as in Study 1, including IRI-C and BICB. For assessing creative achievement, we used the Creative Achievement Questionnaire (CAQ) (Carson, Peterson, and Higgins 2005), a self-report inventory measuring creative accomplishments. The questionnaire consists of 96 items divided into three sections. Part 1 lists 13 talent areas, where participants indicate those in which they believe they excel compared to the general public. Part 2 details achievements across 10 domains: visual arts, music, dance, architectural design, creative writing, humor, inventions, scientific discovery, theater and film, and culinary arts. Participants can indicate their accomplishments on eight ranked items (scored from 0 to 7) and note the frequency of achievements marked with an asterisk. Part 3 allows researchers to add creativity-related questions. We followed (Silvia et al. 2012), categorizing individuals with a score of zero in a domain as 0, those with scores between 1 and 10 as 1, and those with scores of 10 or greater as 2. This transformation of the CAQ scores allows for the use of parametric statistics, specifically the Pearson correlation coefficient (Dostál, Plháková, and Zášková 2017). The total CAQ score was calculated by summing the scores across the 10 domains.

3.2.3 | Analysis

Data analyses were performed with SPSS (version 27.0) and Mplus version 8.0. First, as in Study 1, we conducted correlation and partial correlation analyses. Second, to test the longitudinal relationships among cognitive empathy, affective empathy, and everyday creativity, a CLPM was included to produce a saturated model was

used. This approach allowed us to detect quasi-causal effects in longitudinal measures while controlling for auto- and synchronous correlations as well as random measurement errors in the variables (Kenny 1975). The maximum likelihood robust (MLR) estimator was employed to test. Gender and age were control variables in the CLPM, and all results were standardized.

3.3 | Results

All measures again showed good reliability (see Table 1). The IRI-C demonstrated consistent reliability over two time points with overall Cronbach's alpha coefficients of 0.81 at T1 and 0.78 at T2. Subscale scores varied slightly between T1 and T2; subscale scores varied slightly between T1 and T2; IRI-CE scored 0.79 at T1 and 0.75 at T2; and IRI-EE scored 0.67 at T1 and 0.60 at T2. BICB demonstrated strong internal consistency, with Cronbach's alpha coefficients of 0.85 at Time 1 (T1) and 0.86 at Time 2 (T2).

The correlation and partial correlation results of Study 2 were similar to those of Study 1 (Table 4). Cognitive empathy (at both T1 and T2) was associated with everyday creativity (at both T1 and T2). In contrast, emotional empathy (T1, T2) was not associated with everyday creativity (T1, T2). Our analysis also examined the relationship among creative achievement (Table 4), cognitive empathy, and emotional empathy. The results indicated that CAQ scores were positively correlated with IRI-CE scores but not with IRI-EE scores. When controlling for IRI-EE, the correlation between IRI-CE and CAQ scores was minimal. Conversely, when controlling for IRI-CE, there was a weak negative correlation between IRI-EE and CAQ scores (e.g., IRI-EE T1 and CAQ T1, $r_s = -0.10$, $p = 0.008$).

Furthermore, we analyzed the CAQ domain scores (see Table 5). IRI-CE had significant positive effects on various creative achievements at different time points, especially in visual art (T1, $r = 0.10$, $p = 0.01$; T2, $r = 0.12$, $p = 0.01$), creative writing (T1, $r = 0.19$, $p < 0.001$; T2, $r = 0.17$, $p < 0.001$), inventions (T1, $r = 0.12$, $p = 0.002$; T2, $r = 0.10$, $p = 0.04$), scientific discovery (T1, $r = 0.14$,

TABLE 5 | Zero order and partial correlations of domain-specific creative achievement and cognitive and affective empathies for Study 2.

	Visual Arts	Music	Dance	Architectural Design	Creative Writing	Humor	Inventions	Scientific Discovery	Theater and Film	Culinary Arts
IRI-CET1	0.10* (0.14***)	0.08 (0.12**)	0.05 (0.06)	0.002 (0.02)	0.19*** (0.19***)	0.07 (0.08*)	0.12** (0.16***)	0.14*** (0.14***)	0.08* (0.08*)	0.14*** (0.10*)
IRI-EE T1	-0.06 (-0.12**)	-0.07 (-0.11**)	-0.03 (-0.05)	-0.04 (-0.04)	0.04 (-0.04)	-0.004 (-0.04)	-0.06 (-0.13**)	0.04 (-0.03)	0.03 (-0.01)	0.13*** (0.08)
IRI-CET2	0.12* (0.13**)	0.08 (0.09)	0.09 (0.08)	0.05 (0.07)	0.17*** (0.16**)	0.12* (0.13**)	0.10* (0.15**)	0.12* (0.15**)	0.04 (0.04)	0.20*** (0.17**)
IRI-EE T2	0.01 (-0.05)	-0.004 (-0.05)	0.04 (-0.01)	-0.01 (-0.04)	0.07 (-0.01)	-0.006 (-0.07)	-0.08 (-0.14**)	-0.01 (-0.08)	0.001 (-0.02)	0.11* (0.02)

Abbreviations: IRI-CE = Interpersonal Reactivity Index-Cognitive Empathy; IRI-EE = Interpersonal Reactivity Index-Emotional Empathy; T1 = Time 1, T2 = Time 2.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

$p < 0.001$; T2, $r = 0.12$, $p = 0.01$), and culinary arts (T1, $r = 0.14$, $p < 0.001$; T2, $r = 0.20$, $p < 0.001$). In contrast, IRI-EE showed low, nonsignificant correlations with CAQ domain scores. There was no significant change in the results after controlling for IRI-EE or IRI-CE. We analyzed relationships among IRI-CE, IRI-EE, BICB, and CAQ while controlling for openness to experience (see Table S1). The relationships between IRI-CET1 and BICB T1 ($r_s = 0.13$, $p = 0.001$), IRI-CET1 and CAQ ($r_s = 0.13$, $p = 0.001$), and IRI-CET2 and BICB T2 ($r_s = 0.16$, $p = 0.003$) remained significant. However, the relationship between IRI-EE and either BICB or CAQ was still not significant. Detailed information is provided in the [Supporting Information](#).

Regarding cross-lagged effects, IRI-CET1 was positively associated with BICB T2 ($\beta = 0.11$, 95% CI, 0.02 to 0.14, $p = 0.01$) after controlling for autoregressor effects and T1 emotional empathy. However, BICB T1 was not associated with IRI-EE T2 ($\beta = 0.06$, 95% CI, -0.03 to 0.18, $p = 0.15$) after controlling for autoregressor effects and T1 emotional empathy. Consistent with our hypothesis, T1 emotional empathy did not predict T2 everyday creativity ($\beta = 0.02$, 95% CI, -0.06 to 0.09, $p = 0.69$) even after controlling for autoregressor effects and T1 cognitive empathy. Additionally, T1 everyday creativity did not predict T2 emotional empathy ($\beta = -0.02$, 95% CI, -0.10 to 0.06, $p = 0.58$) after controlling for autoregressor effects and T1 cognitive empathy (see Figure 1).

3.4 | Discussion

The correlation and partial correlation results of Study 2 aligned with those of Study 1, correlating cognitive empathy and everyday creativity, while emotional empathy was unrelated. In addition, our analysis of empathy and creative achievement found that, consistent with the results for everyday creativity, cognitive empathy was related to creative achievement, whereas emotional empathy was unrelated. The relationship between creative achievement and empathy in the field suggested that cognitive empathy has significant positive effects on various creative achievements, especially in visual arts, creative writing, inventions, scientific discovery, and culinary arts. This may be because cognitive empathy fosters prosocial motivation to help others, which serves as a key driving force behind everyday creativity (Benedek, Bruckdorfer, and Jauk 2019; Weisz and Cikara 2021). To fulfill others' needs, individuals engage in creative activities, thereby increasing their participation in everyday creative endeavors. In addition, cognitive empathy may enhance individuals' ability to understand and express emotions and ideas (Hall and Schwartz 2019; Weisz and Cikara 2021). This, in turn, could encourage greater participation in creative activities, resulting in a higher quantity of creative behavior. For example, a recent review of 4P models for culinary creativity shows that chefs in the culinary arts need to understand and anticipate customer needs to enhance the appeal of creative dishes and the overall dining experience (Öztürk 2024). Conversely, emotional empathy is not associated with creative achievement in almost any field.

The CLPM results indicated that cognitive empathy was associated with greater involvement in everyday creativity. In contrast, emotional empathy did not show a similar association.

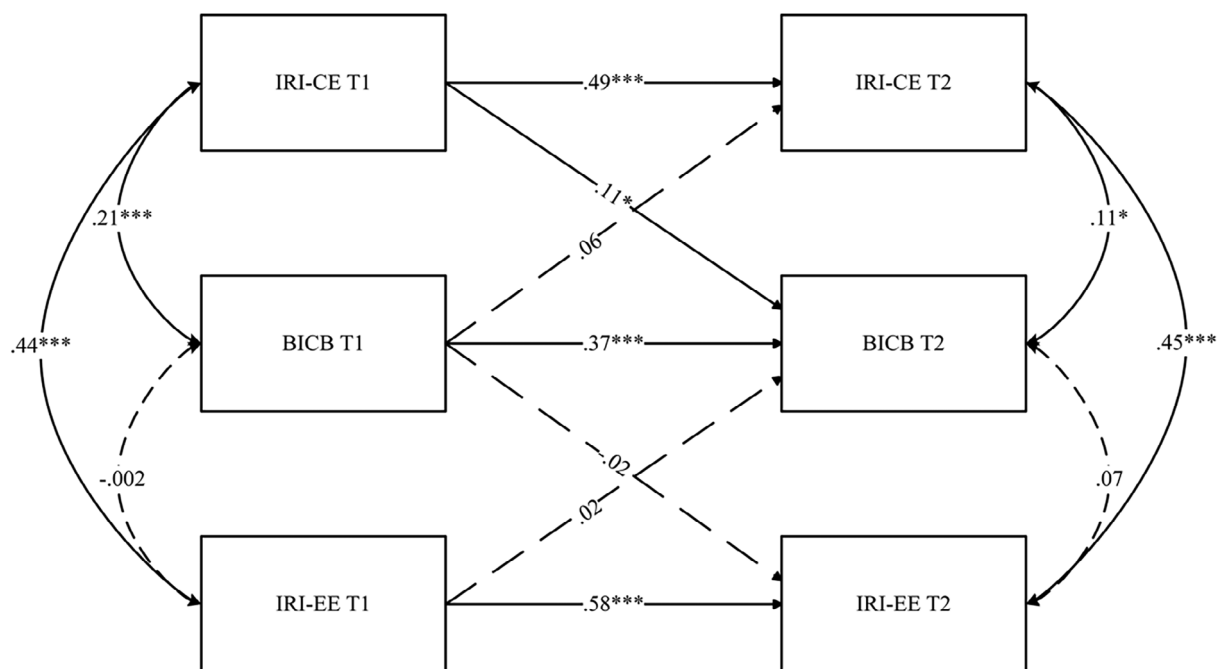


FIGURE 1 | Cross-lagged panel model on the relations between empathy and everyday creativity. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

These results further explain the positive effects of cognitive empathy on everyday creativity. Conversely, everyday creativity did not predict relative increases in cognitive empathy. These findings suggest that while cognitive empathy enhances everyday creativity, the reverse may not hold true. This unidirectional relationship highlights the unique role of cognitive empathy in driving creativity. In summary, the CLPM results emphasize the quasi-causal relationship between cognitive empathy and everyday creativity, indicating that this relationship is unidirectional, from cognitive empathy to everyday creativity.

4 | General Discussion

To our knowledge, these studies are the first to demonstrate a robust relationship between cognitive empathy and everyday creativity across different samples, measures, and longitudinal data. Specifically, we conducted two studies to explore the link between empathy and everyday creativity, taking into account participant populations, assessment instruments, and multiple time points. We also examined the relationship between empathy and domain-specific creativity. Our findings suggest that cognitive empathy has a stable effect on everyday creativity, whereas emotional empathy does not. Conversely, everyday creativity did not predict cognitive empathy. For domain-specific creativity, cognitive empathy is related to nearly all fields of creative behavior but is closely related to creative achievement in only a few domains. These findings have important implications for the cultivation and enhancement of everyday creativity.

4.1 | Theoretical Implications

Our research redefines the relationship between empathy and everyday creativity. While previous studies have suggested a potential link (Gerry 2017; Pei et al. 2022; Pelowski et al. 2023;

Stephan 2023), our investigation delves into how different dimensions of empathy—cognitive and affective—may impact everyday creativity. Specifically, we found that cognitive empathy has a positively effect on everyday creativity. This discovery broadens the range of antecedent variables affecting everyday creativity and underscores the significance of understanding the perspectives and needs of others in daily creative activities. In contrast, our findings suggest that emotional empathy may not correlate significantly with everyday creativity, which may indicate that everyday creativity is influenced more by social interactions than by a profound understanding of other people's emotional experiences.

In addition, our study enriches the discourse on the “empathy divergence thesis” substantially by applying it to the context of everyday creativity. Our results demonstrate that empathy should not be seen as a singular construct in the context of everyday creativity, highlighting the need for a more differentiated and context-specific analysis. Finally, the results of domain-specific creative behaviors and achievement further support the APT model (Baer and Kaufman 2005), indicating that certain personality traits such as cognitive empathy may serve as foundational influences of creativity and are closely related to everyday creativity. While cognitive empathy appears closely linked to creative achievements of some specific domains, it may be less influential in others.

4.2 | Practical Implications

Beyond positing a relationship between two key aspects of human personality, behavior, and interindividual engagement, our study has several practical implications. At the school level, cognitive empathy may be used to enhance students' everyday creativity. It may facilitate the development of creativity. Scholars are increasingly calling for the incorporation of empathy-related educational tactics or approaches such as empathy maps into classroom

activities to enable students to develop their creative and critical thinking skills (Fernandez Rivas and Husein 2022; Yeung and Ng 2024). Our results highlight the importance of developing empathy, especially cognitive empathy, as a strategy for increasing everyday creativity and some domain-specific creative achievements. In certain specific fields of creative activities, emotional empathy might, on the other hand, have a hindering effect. This phenomenon suggests that not all components of empathy may enhance creativity. It is important to consider the specific creative domain when evaluating the impact of empathy on creativity.

At the personal level, enhanced cognitive empathy expedites creative problem-solving in work and life. This is consistent with previous public sector results (Vassallo et al. 2023) that showed that empathy facilitates the anticipation of problems, the understanding of the needs of diverse stakeholders, and the generation of proactive and innovative solutions. At the social level, cognitive empathy is critical to the creation of an innovative culture and increased societal resilience. This partnership promotes an open, inclusive atmosphere that fosters creative thinking. Individuals with greater cognitive empathy may have a deeper awareness of other perspectives, which stimulates the generation of unique ideas and solutions that render a more imaginative society that is more adaptive to rapid change and complex issues.

4.3 | Limitations and Future Directions

The present study not only has limitations that must be addressed but also provides direction for future research. Our findings, based on self-reported data, are of course potentially at risk of bias or errors in the associations between variables. Future research should use experimental designs to more accurately investigate the relationship between empathy and creativity. Additionally, because our study participants were university students, factors such as academic year changes and variations in the external environment could have affected the longitudinal data (Kuh et al. 2008). Therefore, future research should increase the frequency of measurements and more rigorously control external environmental factors to mitigate these influences on the results. This study cannot rule out the influence of other variables on the relationship between empathy and creativity. For example, previous research has shown that openness to experience is an important factor in both empathy and creativity (Hirsh et al. 2010; Lawn et al. 2023; Theurer, Rogh, and Berner 2021). Therefore, future studies should consider the potential influence of additional variables to better understand the relationship between empathy and creativity. In addition, although we measured creative achievement, in our sample, these accomplishments still fall under everyday creativity. Participants are not experts in the field. The achievements reflect personal or hobbyist-level efforts rather than professional ones. Future research should focus on how empathy influences creativity among experts across different fields. Lastly, while different frameworks offer dissimilar classifications of empathy (Hall and Schwartz 2019), this study only addressed the interplay between cognitive and emotional empathies in everyday creativity. Future research should thoroughly investigate the impact of diverse types of empathy on everyday creativity.

5 | Conclusion

Everyday creativity stands as a cornerstone of human existence. It is not just a conduit for monumental creative achievements but constitutes a vital part of our daily life (Ilha Villanova and Pina e Cunha 2020; Richards 2010). Our research has revealed that cognitive empathy positively affects everyday creativity, thus expanding the avenues through which it may be augmented. As Einstein said, “Concern for man himself and his fate must always be the chief interest of all technical endeavors.” Future research must delve deeper into how empathy is associated with everyday creativity and explore the potential mechanisms underlying this relationship.

Author Contributions

Bijie Tie: conceptualization; funding acquisition; investigation; methodology; writing – original draft; writing – review and editing. **Tengbin Huo** and **Yixin Gao:** conceptualization; review and editing. **Xiongjian Yang, Dingyue Tian, and Wenjing Yang:** conceptualization; data curation; writing – review and editing. **Matthew Pelowski:** conceptualization; writing – original draft; writing – review and editing. **Jiang Qiu:** conceptualization, supervision, writing – review and editing.

Ethics Statement

This study involving human participants was in accordance with the ethical standards of Southwest University and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting Information

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