Abstract

Empathy is an important psychological process. It consists of two dissociable components: cognitive empathy (adopting another's perspective and understanding their emotions), and affective empathy (the vicarious experiences of another's emotions). Here we examined individual differences in cognitive and affective empathy, and how they were related to two different aspects of attentional control: focusing and shifting. A sample of 299 adult participants completed psychometrically validated questionnaires, the Attentional Control Scale and the Questionnaire of Cognitive and Affective Empathy. Individuals who reported a greater ability to shift their attention in everyday life exhibited higher levels of cognitive but not affective empathy, whereas individuals who reported greater ability to focus their attention demonstrated lower levels of affective but not cognitive empathy. This reveals how cognitive-attentional processes are selectively related to core social and emotional functioning, highlighting the importance of considering these distinct sub-processes of empathy and of attentional control.

Keywords: empathy; attentional control; cognitive empathy; affective empathy; focusing; shifting.

Empathy underlies the adaptive social and emotional functioning of individuals and groups. It can motivate kindness and prosocial behavior (Decety, Bartal, Uzefovsky, & Knafo-Noam, 2016; Preckel, Kanske, & Singer, 2018) and group cohesion (Decety & Cowell, 2015). There is an important distinction between *cognitive* and *affective* empathy. Affective (or emotional) empathy is phylogenetically-older and developmentally-earlier form akin to 'emotional contagion' effects of *experiencing* or *feeling* what another person is experiencing or feeling. Cognitive empathy (closely related to 'Theory of Mind') is the process of adopting someone else's perspective and *understanding* what they are feeling (Henry, von Hippel, Molenberghs, Lee, & Sachdev, 2016; Kanske, Böckler, Trautwein, & Singer, 2015; Preckel et al., 2018; Reniers, Corcoran, Drake, Shryane, & Völlm, 2011; Shamay-Tsoory, Aharon-Peretz, & Perry, 2009). There are meaningful individual-differences in empathy in the population, such that some people are more or less empathetic than others, and this is true for both the affective and cognitive components of empathy (Cox et al., 2011; Davis, 1983; Eres, Decety, Louis, & Molenberghs, 2015; Henry et al., 2016; Leiberg & Anders, 2006; Marsh, 2018; Reniers et al., 2011; Valk et al., 2017).

In healthy participants, there is strong evidence that distinct functional neural networks are implicated in the cognitive versus affective components of empathy (Cox et al., 2011; Kanske et al., 2015; Preckel et al., 2018; Tholen, Trautwein, Böckler, Singer, & Kanske, 2020). Indeed, individual-differences in these two types of empathy are even related to measurable differences in brain *structure* in addition to brain function (Eres et al., 2015; Valk et al., 2017). Further, deficits in cognitive and affective empathy are doubly dissociated in neuropsychological patients (Corradi-Dell'Acqua et al., 2020; Shamay-Tsoory et al., 2009). While cognitive and affective empathy are clearly dissociable, adaptive social behavior is thought to be the consequence of the dynamic interaction of both processes (Dvash & Shamay-Tsoory, 2014; Kanske, Böckler, Trautwein, Parianen Lesemann, & Singer, 2016; Preckel et al., 2018). Thus, it is important to consider factors that relate to both cognitive and affective empathy.

The goal of the present research was to investigate a potential mechanism that may contribute to individual differences in cognitive and affective empathy, specifically, individual differences in attentional control. Attentional control is the ability to flexibly regulate one's attentional and cognitive resources, and can be subdivided into the ability to *focus* attention to avoid distraction, and to flexibly *switch* efficiently between different tasks (Derryberry & Reed, 2002; Judah, Grant, Mills, & Lechner, 2014; Ólafsson et al., 2011). The logic behind considering the selective association between cognitive versus affective empathy and different aspects of attentional control and in particular stems from two distinct considerations. The first consideration is the functional requirements of cognitive empathy. The ability to adopt and analyze another person's perspective is relatively cognitively demanding, and involves inhibiting other potential sources of information, such as one's own emotions or perspective. Therefore, it is possible that higher levels of attentional control facilitate cognitive empathy. This account predicts a positive relationship between attentional control and cognitive empathy in particular. This prediction is also consistent with neuroscientific evidence highlighting potential shared neural mechanisms between cognitive empathy and attentional processes such as shifts of attention (Corbetta, Patel, & Shulman, 2008; Mitchell, 2008; Schuwerk, Schurz, Müller, Rupprecht, & Sommer, 2016), and the co-occurrence of executive function (related to attentional control) and cognitive empathy deficits in a range of clinical and neuropsychological conditions (Kouklari, Tsermentseli, & Auyeung, 2018; Pineda-Alhucema, Aristizabal, Escudero-Cabarcas, Acosta-López, & Vélez, 2018; Ramanan et al., 2017), which will be considered more fully in the Discussion section.

The second consideration arises from the literature on psychopathy. Psychopathy includes behaviors and tendencies such as proactive aggression, violence, and a callous disregard for the welfare of others (Blair, Meffert, Hwang, & White, 2018; Coid, Yang, Ullrich, Roberts, & Hare, 2009; Dawel, Wright, Dumbleton, & McKone, 2019; Decety et al., 2016; Hare et al., 1990; Lamm, Bukowski, & Silani, 2016). One influential theoretical model of psychopathy proposes that an overly rigid goal focus to the exclusion of processing goal-extraneous information (including others' emotions) is one important aspect of this pathology (Hiatt, Schmitt, & Newman, 2004; Krusemark, Kiehl, & Newman, 2016; Newman, Curtin, Bertsch, & Baskin-Sommers, 2010; Wolf et al., 2012). Moreover, evidence suggests that both psychopaths, and individuals with a history of legally-relevant aggressive behavior, typically show impaired affective empathy but intact cognitive empathy (Lamm et al., 2016; Mullins-Nelson, Salekin, & Leistico, 2006; Oliver, Neufeld, Dziobek, & Mitchell, 2016; Pfabigan et al., 2014; Turner, Foster, & Webster, 2019; Wai & Tiliopoulos, 2012; Winter, Spengler, Bermpohl, Singer, & Kanske, 2017). Although sometimes deficits in both forms of empathy are seen in psychopathy (Brook & Kosson, 2013; Domes, Hollerbach, Vohs, Mokros, & Habermeyer, 2013), it was the more pronounced deficit in affective empathy that motivated our hypotheses here. In other words, psychopaths could be described as having especially high levels of selective attention and attentional control, particularly the focusing aspect of attention control, and this is accompanied by deficits in affective empathy. It is possible that this represents one end of the spectrum of a broader negative relationship between attentional control and affective empathy in the general population, which may be selective to the focusing aspect of attentional control.

Here, we sought to test these possibilities, by directly examining the relationship between individual differences in empathy and attentional control.

Method

Participants

Three-hundred and fifteen participants consented to participate and completed the study. They were recruited via the Research School of Psychology at the Australian National University's (ANU) participant recruitment website (SONA). Participants in eligible ANU courses (including Psychology, Computer Science, and Management) received course credit in exchange for participation (when completed with course-specific requirements). All participants provided informed consent by responding to a direct question after reading the study's Information Sheet, and all aspects of the study complied with a protocol approved by the chair of the ANU's delegated Human Research Ethics Committee (protocol 2017.565).

Minimum sample size was determined by a power analysis. The G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) Linear Multiple Regression function calculator was used, assuming a small-medium effect size (f^2 = .07) with three predictors. This power analysis indicated a minimum of 250 participants to achieve 95% power, and the final sample size was determined by the number of participants who completed in the 12-week timeframe that the study was available on SONA.

Sixteen participants were excluded from further analysis because they failed to respond correctly to the two spurious-response check questions (see below). This left a final sample of 299 participants. The mean reported age for these participants was 20.6 years (SD = 3.8, range 17-43)[1], and 105 identified as male, 191 as female, and 3 as other. Additional demographic information is included in the supplementary material.

Materials

To measure individual differences in attentional control, we used the Attentional Control Scale (ACS; Derryberry & Reed, 2002). Individuals with higher levels of self-reported attentional control are better equipped to successfully use attention to inhibit neural responses to fear-provoking images, as revealed by functional magnetic resonance imaging (fMRI)

[1] These age statistics do not include one participant who reported their age as "1995".

(Mathews, Yiend, & Lawrence, 2004). More recently, factor analysis has established that attentional control can be subdivided into two correlated but dissociable components: *focusing* (i.e., the ability to focus on a task and ignore distraction) and *shifting* (i.e., the ability to rapidly shift attention between different tasks) (Judah et al., 2014; Ólafsson et al., 2011). We employed the well-validated version derived by Judah et al. (2014). In this version, seven items in the Focusing scale measure the ability to ignore or suppress distraction to focus on a task, with items such as “It’s very hard for me to concentrate on a difficult problem when there are noises around”. The five items in the Switching scale measure the ease of switching between different tasks, with item such as “I can quickly switch from one task to another”. Participants respond by selecting one of four response options: *Almost Never, Sometimes, Often,* or *Always*. These responses were scored from Almost Never = 1 to Always = 4, except that the Focusing items were reversed scored, such that for both scales higher scores indicate greater attentional control. Possible scores on Focusing range from 7 to 28, while possible scores on Switching range from 5 to 20 (Judah et al., 2014).

Focusing and Shifting as measured by items from the Attentional Control Scale relate differentially to objective behavioral performance in laboratory tasks that gauge these different aspects of attentional control, including The Letter-Number Sequencing Subtest of the Weschler Adult Intelligence Scale, inhibiting prepotent responses as gauged by performance on an anti-saccade task, focusing as measured by flanker interference, and attentional orienting to emotionally-significant cues as measured via the dot-probe task, and they also relate differentially to clinically-relevant variables such as anxiety and depression (Judah et al., 2014; Ólafsson et al., 2011; Reinholdt-Dunne, Mogg, & Bradley, 2013; Taylor, Cross, & Amir, 2016). Moreover, individuals scoring high in focusing but not switching are less prone to cognitive failures (Judah et al., 2014), as gauged by the widely-used Cognitive Failures Questionnaire (CFQ) (Broadbent, Cooper, FitzGerald, & Parkes, 1982). The CFQ has been found to predict individual differences in real-world errors such as work accidents and car crashes (Wallace & Vodanovich, 2003), and is reliably associated with differences between individuals in terms of both brain function and structure (Deprez et al., 2011; Garavan, Hester, Murphy, Fassbender, & Kelly, 2006; Garavan, Ross, Murphy, Roche, & Stein, 2002; Hester, Fassbender, & Garavan, 2004). Altogether, this indicates that individual-differences in the focusing and shifting have strong differential predictive validity for a myriad of important attentional-cognitive outcomes.

To measure individual-differences in empathy, we used the Questionnaire of Cognitive and Affective Empathy (QCAE; Reniers et al., 2011). The 31-item QCAE consists of two scales, one with 19 items measuring Cognitive Empathy, and one with 12 items measuring Affective Empathy. The QCAE was derived from a content and empirical analysis of items from a number of previous scales, including the widely-used Interpersonal Reactivity Index (Davis, 1983). The QCAE is copyrighted, and so readers are referred to Reniers et al. (2011) for individual items. Participants responded by selecting one of four response options: *Strongly Disagree, Slightly Disagree. Slightly Agree,* or *Strongly Agree*. Items were scored from 1 (Strongly Disagree) to 4 (Strongly Agree), with the exception of one item from the Cognitive Empathy scale and three items from the Affective Empathy scale that were reverse scored. Possible Cognitive Empathy Scores range from 19 to 76, whereas possible Affective Empathy scores range from 12 to 48. The QCAE has a moderate correlation between the two factors ($r = .31$) and excellent psychometric properties (Reniers et al., 2011). For example, QCAE responses show convergent validity with other empathy measures (e.g., Basic Empathy Scale; Jolliffe & Farrington, 2006), and show construct validity in their associations with other related factors, such as psychopathy, aggression, and moral reasoning (Reniers et al., 2011; Yoder & Decety, 2014). Furthermore, self-reported cognitive versus affective empathy as measured via the QCAE are differentially associated with differences in brain structure (i.e., gray matter density differences) in areas known to be implicated in the different components of empathy (Eres et al., 2015), as well as differences in electrical brain activity during reasoning about prosocial and antisocial actions (Yoder & Decety, 2014).

The QCAE subscales can be further divided, however, our theoretical predictions related only to the broader distinction between Cognitive and Affective empathy, and Reniers et al. (2011) highlight that the two-factor structure provided the best and most parsimonious fit. Therefore, here we used the two-factor structure. We also adjusted the wording of three items to remove sexist terminology (i.e., changing "his shoes" to "their shoes" and "other guy's" to "other person's" and "other fellow" to "other person").

Two additional items were included in this study to identify spurious responses (for details, see supplementary material). Finally, participants were asked a series of demographic questions.

Design and Procedure

After providing consent, participants completed the ACS, then the QCAE, followed by the demographic questions. The specific instructions at the beginning of each questionnaire can be found in the supplementary material. Throughout, if participants failed to answer a question before proceeding, they were prompted regarding whether they would like to answer, but were not forced to respond before continuing (with the exception of the consent question at the beginning, which forced a yes/no response, and the survey did not commence if a "no" response was entered). All data collection was fully online via Qualtrics.

Results

Raw data are available via OSF: https://osf.io/3egh9/. There was no missing data. Descriptive statistics are shown in Table 1.

Table 1

Descriptive statistics for the four scales in the present study

Variable	Mean	SD	SSD	Cronbach's alpha
Focusing	18.22	3.81	0.18	.77
Shifting	12.62	2.64	0.18	.68
Cognitive Empathy	59.20	7.83	0.14	.87
Affective Empathy	35.09	5.56	0.15	.76

Note. SD = standard deviation; SSD = standardized standard deviation, a measure of variance that is comparable across different scales (Goodhew, Dawel, & Edwards, 2020). Specifically, SSD = SD / total possible range of scores on that scale. The descriptive statistics for Focusing and Shifting in the present study are very similar to those reported in previous literature, e.g., Focusing M = 18.07 (SD = 4.66; SSD = 0.22), Shifting M = 12.38 (SD = 2.84, SSD = 0.19) in an undergraduate sample (Mills et al., 2016). The Cognitive and Affective Empathy scores were also similar to previous research with the QCAE, where Cognitive Empathy, M = 58.5 (SD = 8.5; SSD = .15), and Affective Empathy, M = 30.5 (SD = 5.5; SSD = .15) (Reniers et al., 2012), although there appeared to be somewhat higher levels of Affective Empathy in our sample.

The data for these variables were not all normally distributed, and therefore non-parametric correlation coefficients (Spearman's rho) were used to assess associations. Consistent with previous research (Judah et al., 2014), ACS Shifting was correlated with ACS Focusing, $r_s (297) = .41$, $p < .001$, Similarly, consistent with previous research (Reniers et al., 2011), Cognitive and Affective Empathy were correlated, $r_s (297) = .24$, $p < .001$.

Next, the relationship between the two Attentional Control scales and the two Empathy scales was assessed. This entailed four comparisons, and therefore a critical alpha level of .013 was used. Cognitive Empathy was related to Shifting, r_s (297) = .29, p < .001 (see Figure 1), but was not related to Focusing, r_s (297) = .08, p = .189. In contrast, Affective Empathy was *negatively* related to Focusing, r_s (297) = -.26, p < .001 (see Figure 2), whereas it was not reliably related to Shifting, r_s (297) = -.13, p = .030.

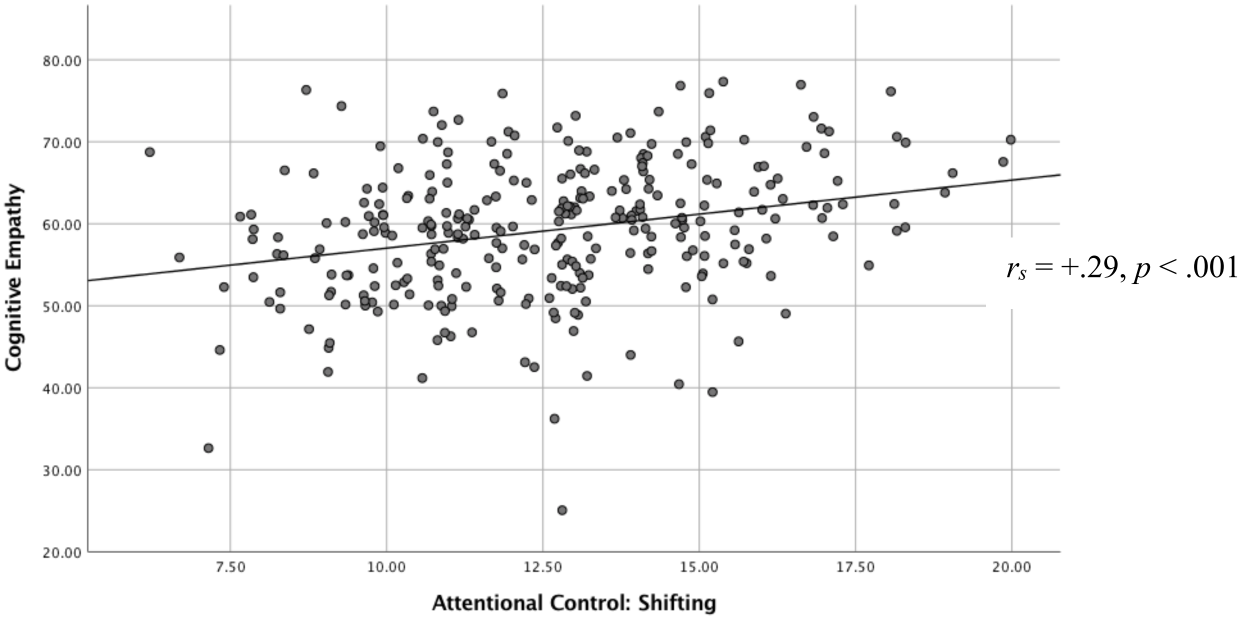

Figure 1. The positive relationship between Cognitive Empathy and Shifting (N = 299). R^2 Linear = .078. Note that the jitter function in SPSS was used to best represent the relationship while minimizing point overlap.

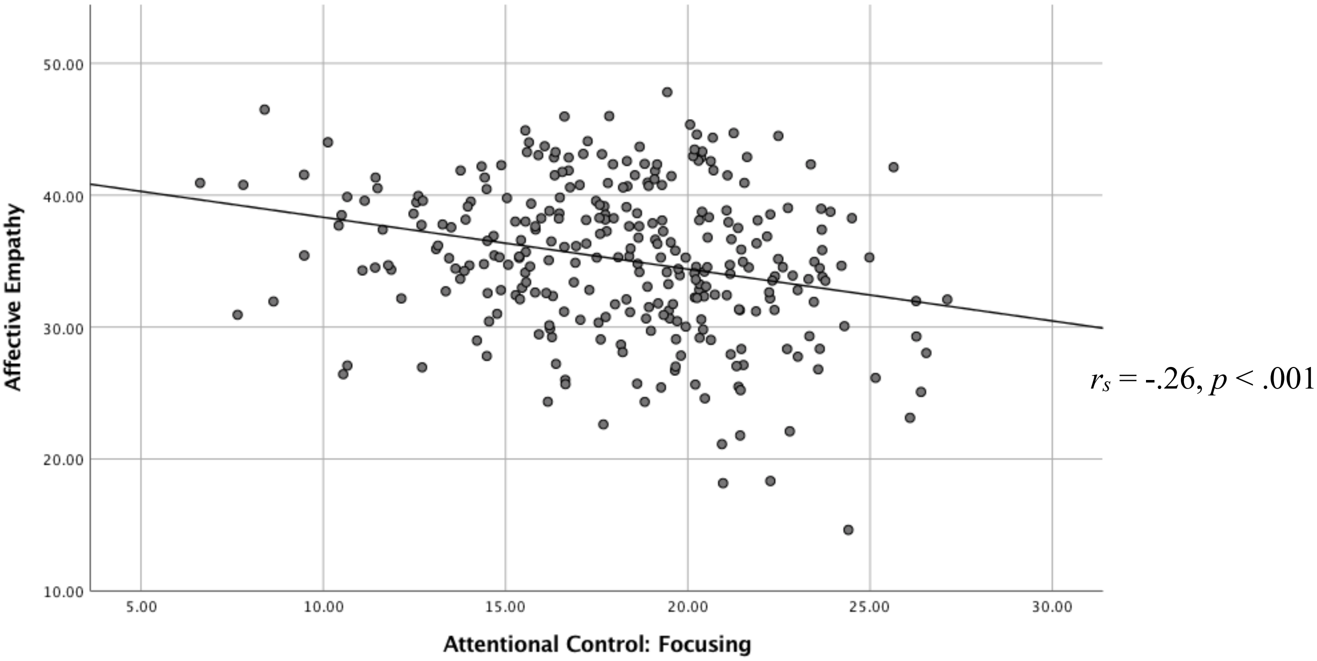

Figure 2. The negative relationship between Affective Empathy and Focusing (N = 299). R^2 Linear = .073. Note that the jitter function in SPSS was used to best represent the relationship while minimizing point overlap.

Next, we had observed interesting selectively in the relationship between the different attentional control and empathy scales. To confirm the selectivity of these relationships, two multiple regressions were performed. This allowed us to assess the unique contribution of each attentional control factor to explaining variance in the different aspects of empathy. Both multiple regressions had Focusing and Shifting as predictors, but the first had Cognitive Empathy as the criterion (see Table 2), while it was Affective Empathy for the second (see Table 3).

Table 2

The results of the multiple regression with Cognitive Empathy as the criterion and Focusing and Shifting as predictors.

Variable	Unstandardized Regression Weight (B)	Standard Error	Standardized Regression Weight (β)	*p*
Focusing	-.21	.13	-.10	.093
Shifting	.96	.18	.32	<.001

Note. The overall regression model was significant, $F(2, 296) = 14.04$, $p < .001$. Adjusted R-squared = .08. The residuals from this regression were not quite normally distributed. However, when a z-score exclusion criterion of |3.29| was applied to the Cognitive Empathy variable (Focusing and Shifting had no outliers according to this criterion), and the regression repeated (N = 298), the residuals were now normally distributed, and the results of the regression were unchanged (model $p < .001$, β for Focusing = -.10, $p = .106$, and the β for Shifting = .33, $p < .001$). The results of the main multiple regression were invariant to the inclusion of participant gender as a predictor (see supplementary material).

Table 3

The results of the multiple regression with Affective Empathy as the criterion and Focusing and Shifting as predictors.

Variable	Unstandardized Regression Weight (B)	Standard Error	Standardized Regression Weight (β)	*p*
Focusing	-.36	.09	-.25	<.001
Shifting	-.12	.13	-.06	.355

Note. The overall regression model was significant, $F(2, 296) = 12.05$, $p < .001$. Adjusted R-squared = .07. These results were invariant to the inclusion of participant gender as a predictor (see supplementary material).

Discussion

Empathy is a vitally important psychological process, which underlies adaptive human functioning and prosocial behavior. Cognitive and affective empathy reflect dissociable aspects of empathy (Corradi-Dell'Acqua et al., 2020; Cox et al., 2011; Eres et al., 2015; Kanske et al., 2015; Preckel et al., 2018; Reniers et al., 2011; Shamay-Tsoory et al., 2009; Tholen et al., 2020; Valk et al., 2017). Our results bolster this notion and extend it in an important way, by revealing differential relationships between these two aspects of empathy and different aspects of attentional control, such that greater attentional shifting ability was associated with enhanced cognitive empathy, while increased attentional focusing ability was associated with poorer affective empathy. This pattern of results is particularly powerful, because it is suggestive of a double-dissociation. This eliminates methodological explanations for observed associations, such as differential measurement reliability or sensitivity of measurement for one variable versus another (for a full discussion of the utility of such patterns, see Goodhew, 2020b). We discuss both key results in more detail in the following sections.

We reasoned that there may be a relationship between cognitive empathy and attentional control, given the demands placed on attention by being able to consider another's perspective that differs from one's own. Consistent with this, we observed a selective relationship between cognitive empathy and attentional switching, such that individuals who excel at flexibly switching between tasks had higher levels of cognitive empathy. It is interesting that this relationship was selective to the switching and not the focusing aspect of attentional control. Our original predictions linked cognitive empathy with attentional control, but did not distinguish between the two components of focusing and shifting. On the one hand, the observed relationship is consistent with the notion that cognitive empathy entails *switching* from one's own to another's perspective. However, on the other hand, a case could also be made for *focusing* on another's perspective and filtering out one's own being integral to cognitive empathy, but there was no support for that notion here.

This relationship between cognitive empathy and attentional control is consistent with the broader literature. It has been noted that the temporoparietal junction (TPJ) is an area implicated in both cognitive empathy and shifts of attention (Corbetta et al., 2008; Mitchell, 2008; Schuwerk et al., 2016). While this overlap does not necessarily imply equivalence, it is consistent with the notion that both shifts of attention and cognitive empathy draw on common mechanisms, and indeed it has been suggested that this could be because both processes entail switching between internally versus externally focused viewpoints (Corbetta et al., 2008). Our findings of a relationship between self-reported cognitive empathy and attentional shifting in everyday life is consistent with this line of reasoning from the neuroscientific evidence.

In a similar vein, attentional control can be conceptualized as an (or at least related to) executive function, and concurrent deficits in both executive function and cognitive empathy are often observed in clinical groups, including persons with attention-deficit hyperactivity disorder (ADHD), Autism Spectrum Disorder, and Alzheimer's disease (Kouklari et al., 2018; Pineda-Alhucema et al., 2018; Ramanan et al., 2017). This suggests that executive function and cognitive empathy may rely on shared mechanisms. Substance-using mothers show reduced activation in brain regions associated with cognitive control and those associated with reward in response to signals of infant distress (Landi et al., 2011), which could also be considered indicative of concurrent impairment in attentional control and empathy. Further, individuals with acquired brain pathology also experience concurrent deficits in executive function and cognitive empathy, and the specific aspects of executive function that are most likely to be impaired along with cognitive empathy includes attentional *shifting* (Aboulafia-

Brakha, Christe, Martory, & Annoni, 2011). The present results make a novel contribution to this literature in that they show that this coupling between cognitive empathy and attentional control, shifting in particular, is present in a sample that was not selected on the basis of clinical or neuropsychological status.

Turning now to affective empathy, we reasoned that there may be a negative relationship between affective empathy and attentional control and possibly focusing in particular, given that psychopathy has been found to relate to higher levels of selective attention (Hiatt et al., 2004; Krusemark et al., 2016; Newman et al., 2010; Wolf et al., 2012), and affective but not cognitive empathy is typically impaired in such populations (e.g., Lamm et al., 2016; Winter et al., 2017). Importantly, we found evidence consistent with a negative relationship between focusing (but not switching) and affective empathy in a non-clinical sample. This means such relationships are not limited to those with psychopathy. It is possible that there are differences in the mechanisms of clinical-level psychopathy versus relatively lower levels of empathy in a general sample. However, facial expressions are the primary means through which human emotions are communicated (Smith, Cottrell, Gosselin, & Schyns, 2005; Thompson, Uusberg, Gross, & Chakrabarti, 2019). Strong filtering out of facial expression information (which may not be consistent with a current goal focus), could be at least in part responsible for reduced affective empathy in both non-psychopathic individuals scoring high in focusing and in psychopaths.

Both attentional control and empathy also have links to emotion regulation. Emotion regulation refers the process whereby deliberate strategies are used to amplify or mute particular emotions, and attentional control, including processes such as shifting the focus of attention toward or away from stimuli, is directly implicated in emotion regulation (Ochsner, Silvers, & Buhle, 2012). In healthy participants, self-reported attentional control (as measured by the Attentional Scale) predicts greater spontaneous emotion regulation following exposure to aversive pictures (Morillas-Romero, Tortella-Feliu, Balle, & Bornas, 2015). Moreover, anxiety and depression can be thought of as encapsulating emotion-regulation difficulties (Ochsner & Gross, 2005), and therefore the evidence we reviewed earlier linking poorer attentional control to anxiety and depression is consistent with this nexus between attentional control and emotion regulation (Judah et al., 2014; Ólafsson et al., 2011; Reinholdt-Dunne et al., 2013; Taylor et al., 2016). Behavioral and neuroimaging evidence also supports the role of impaired attentional control in anxiety and depression (Loeffler et al., 2019). Altogether, this indicates that greater attentional control is associated with improved emotion regulation.

More recently, it has been considered how emotion regulation may relate to empathy. One proposal is that understanding another's perspective (i.e., cognitive empathy) may be a route via which emotion regulation can be achieved. That is, an increased understanding of another's perspective and therefore their actions, may temper negative emotions to transgressions (Thompson et al., 2019). Given this, it is possible that the positive relationship between attentional shifting and cognitive empathy observed in the present study is the initial step in a model in which the relationship between attentional control and emotion regulation is mediated via cognitive empathy. Alternatively, it has also been proposed that emotion regulation may play a role in prosocial behavior, such that the goal of reducing one's own distress at seeing another person in distress may motivate helping the distressed person (Zaki & Ochsner, 2012). From this perspective it is possible that the relationship between attentional control and empathy may be mediated by emotion regulation, such that mitigating one's own emotional distress enables receptiveness to others' perspective, or perhaps their distress, thereby potentially implicating affective empathy. Future research will be important to ascertain the nature of the interrelationships between the different facets of attentional control (i.e., focusing and shifting), the two different components of empathy (i.e., cognitive and affective empathy) and emotion regulation.

The present study has some limitations. First, it relied on self-report measures of attentional control and empathy. We believe this choice was justified, given the evidence that these are valid measures of these constructs, including demonstrated links with relevant behavioral and neuroscientific outcomes. Further, individual-differences approaches such as those adopted here require adequate measurement reliability, because the maximum observable association between two variables is fundamentally constrained by the reliability of those two variables (Goodhew & Edwards, 2019; Hedge, Powell, & Sumner, 2018; Parsons, Kruijt, & Fox, 2019). Unfortunately, consideration of psychometrics such as measurement reliability and validity is not as routine or consistent when experimental measures are used to answer individual-difference questions, despite it being equally important (Goodhew, 2020b; Goodhew & Edwards, 2019). Indeed, when it is, some experimental measures (e.g., flanker for attentional control) can have quite poor reliability (Hedge et al., 2018; but see Goodhew, 2020c). Therefore, while we believe that an exciting avenue forward is to extend this work into objective laboratory-based measures of both empathy (e.g., willingness to help) and attentional control (e.g., ability to ignore distracting input or switch tasks), in doing so, it will be important to establish the psychometric reliability and validity of such measures. Second, the current study is correlational in nature, and thus causal inferences cannot be drawn. It will be useful in future research to test causal directions, such as whether training to enhance attentional switching ability enhances cognitive empathy. Third, all participants completed all of the questionnaires in the same order, consistent with recommendations to not introduce running order as a source of between-participant variability in individual-difference designs (Dale & Arnell, 2013; Goodhew, 2020a; Goodhew & Edwards, 2019). This means that it is theoretically possible that the order of questionnaire completion is important in the observed associations. While we do not think that this is likely, future research could seek to replicate the results with measuring empathy prior to attentional control.

In conclusion, here we found that individuals with higher levels of attentional switching capacity had higher levels of cognitive empathy, whereas individuals with higher levels of attentional focusing ability had reduced affective empathy. This highlights the selective nature of interrelationships between attentional control and empathy, and cautions against treating either as a monolithic construct.

Open Practices Statement

The study predictions were determined prior to data collection, although they were not formally pre-registered. Raw data are available via OSF: https://osf.io/3egh9/

Competing Interests Statement

The authors have no competing interests to declare.

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