# THE ROLES OF EMOTION REGULATION AND METACOGNITION IN PERFORMANCE-BASED EMPATHY

by

**Kelsey A. Bonfils**

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# THE PURDUE UNIVERSITY GRADUATE SCHOOL
# STATEMENT OF COMMITTEE APPROVAL

Dr. Michelle P. Salyers, Chair
Department of Psychology
Dr. Paul H. Lysaker
Department of Psychiatry, Indiana University School of Medicine
Dr. Kyle S. Minor
Department of Psychology
Dr. Tamika C. B. Zapolski
Department of Psychology

**Approved by:**

Dr. Nicholas J. Grahame
Head of the Graduate Program

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# ABSTRACT

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Major Professor: Michelle P. Salyers

Background: People with schizophrenia experience significant deficits in empathic skills, which are important for effective interpersonal relationships. Researchers have speculated about the roles of personal distress, emotion regulation, and metacognition in empathic interaction, but the impact of these constructs on empathy has yet to be empirically investigated. This study examines the relationships among these constructs in a sample of people with schizophrenia receiving community-based treatment (N = 58). It was hypothesized that better emotion regulation and metacognition, as well as reduced personal distress, would predict empathy. Further, emotion regulation was expected to mediate the relationship between personal distress and empathy, and metacognition was expected to moderate the relationship between personal distress and empathy. Method: Participants with schizophrenia or schizoaffective disorder completed self-report questionnaires of emotion regulation and personal distress, a performance-based measure of empathy, and an observer-rated interview to assess metacognition. Results: Metacognition, but not emotion regulation or personal distress, significantly predicted cognitive empathy performance, with a trend-level association for affective empathy performance. Mediation analyses revealed that emotion regulation mediates the relationship between personal distress and affective empathy performance, and moderation analyses revealed that metacognition moderates the same relationship.

Moderation results suggest the relationship between personal distress and affective empathy performance is significant for those with low metacognition, but that the relationship is the opposite of hypotheses – increased personal distress is associated with *better* performance. Conclusions: This study is the first of its kind to examine performance-based empathy with personal distress, emotion regulation, and metacognition. Results suggest interventions targeted to improve metacognition may be useful in enhancing empathic skills. Future work is needed to improve existing measures of empathy and personal distress, and to parse apart the intricacies of the relationships among personal distress, emotion regulation, and empathy.

# INTRODUCTION

Empathy is an area of increasing focus in schizophrenia research, with significant deficits indicated in cognitive empathy (Savla, Vella, Armstrong, Penn, & Twamley, 2013), affective empathy (Bonfils, Lysaker, Minor, & Salyers, 2016), and emotion perception (Kohler, Walker, Martin, Healey, & Moberg, 2010; Savla et al., 2013). Deficits in these areas can be problematic, as empathy is key to interpersonal relationships. As such, it is important to identify factors related to empathic performance in order to design or tailor existing interventions to assist people with schizophrenia in developing empathic skills. From the literature, three constructs have emerged as potentially important in determining empathic performance: personal distress, emotion regulation, and metacognition. The aim of this project was to determine the roles of these three constructs in empathic performance for people with schizophrenia.

## Empathy

Empathy is key to how we interact and form connections with others. The concept of empathy, or, broadly speaking, our ability to understand and share the feelings of others (Decety & Jackson, 2004), has long been of interest in schizophrenia. The concept dates back to Bleuler (1911) and Kraepelin (1919), who discussed the inability of people with schizophrenia to connect with others. Salovey and Mayer (1989) posited that people who demonstrate empathy, an integral aspect of emotional intelligence, would appear warm and genuine to others, facilitating creation of a large and supportive social network over time. This has been borne out in the literature, with recent research implicating empathy as a strong predictor of real-world social functioning (Bechi et al., 2017). Studies also suggest those high in empathy are more sensitive to emotional and socially

relevant information (Hofelich & Preston, 2012; Van den Brink et al., 2012), and those high in affective empathy in particular are more able to forgive others, an important relationship-maintaining behavior (McCullough et al., 1998; McCullough, Worthington Jr, & Rachal, 1997). Further, empathy is thought to play a key role in prosocial or altruistic behavior (Hoffman, 1981, 2000). One meta-analysis of studies in the general population found consistent, significant relationships between empathy and altruistic behavior across various measurement types (Eisenberg & Miller, 1987), and recent research has continued to find links between the two constructs (e.g., see O'Connell, Christakou, Haffey, & Chakrabarti, 2013). In addition to the clear importance of empathy for successful interactions and relationships, recent research shows that people can actually determine if others are high or low in empathy within just a few seconds of exposure to the person (Wu, Sheppard, & Mitchell, 2016), emphasizing the importance of empathy in the earliest stages of a relationship - meeting the other person.

Though it is clear that empathy plays a key role in our interpersonal interactions, the definition of empathy has been widely contested. Originally translated by Titchener (1909), the term empathy came from the German term "*Einfühlung,"* which can be literally translated as "feeling into" (pg. 18; Wispé, 1990). Though the literal translation seems simple, theorists have since dug deeper into the construct of empathy, producing numerous multifaceted definitions of the term. It is widely agreed that empathy consists of multiple processes (Decety & Jackson, 2004), but there has been debate as to what these processes are and how we should describe them. Some empathy scholars discuss very broad models, in which empathy encompasses all aspects of behavior designed to create meaningful interpersonal links (Gallese, 2003). Others describe empathy as a

subcomponent of a larger perception-action process, but the empathy component nevertheless still subsumes several additional processes, not all of which are geared to shared experiences with others (Preston & De Waal, 2002). Others present simpler models entailing three main components of empathy (De Vignemont & Singer, 2006; Decety & Jackson, 2004; Derntl & Regenbogen, 2014; Lee, Horan, & Green, 2015). Two of these components have reached a sort of consensus within the field: cognitive empathy and affective empathy. Cognitive empathy refers to the ability to take the perspective of the other person (allowing you to understand their thoughts and feelings), while affective empathy refers to an emotional reaction felt in response to the emotional experiences of another (which will frequently match the emotional state of the other; Decety & Jackson, 2004).

Although a general consensus has been reached regarding existence and importance of cognitive and affective components of empathy, terminology to refer to these components is still inconsistent within the field – particularly for cognitive empathy. A large body of literature has now examined the construct "theory of mind," which is often used synonymously with the term cognitive empathy (Green, Horan, & Lee, 2015; Rogers, Dziobek, Hassenstab, Wolf, & Convit, 2007). Theory of mind has been defined as the ability to know and understand the mental states of others (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) – aligning with definitions of cognitive empathy. However, measurement of theory of mind has largely focused on knowing the thoughts and intentions of others, with less focus on emotion (although the "Reading the Mind in the Eyes Test" (Baron-Cohen et al., 2001) is a notable exception). Though knowing the thoughts and intentions of others is undoubtedly important to empathy,

knowing their emotions is of equal (or perhaps greater) importance to empathic experience; further, emotional recognition and understanding is considered by some to be more automatic than the effortful psychological inference required to understand thoughts and intentions (Decety & Jackson, 2004). Thus, while the literature on theory of mind does inform aspects of cognitive empathy, this literature, in and of itself, may not provide a holistic picture of cognitive empathy.

In addition to theory of mind, other terms have also been used to refer to cognitive empathy (or aspects of it), such as mind-reading, social intelligence, and mentalizing (Baron-Cohen et al., 2001; Green et al., 2015). Given the parallel language of cognitive and affective empathy as subcomponents of a larger empathy construct, I use the term cognitive empathy to refer to the ability to take the perspective of the other person and infer thoughts and feelings, and the term affective empathy to refer to one's other-oriented emotional reaction felt in response to the emotional experiences of another.

While cognitive and affective empathy have been widely researched, a third component of empathy has yet to reach consensus in the research community. Some have posited that this third component of empathy is the ability to recognize emotions in the facial expressions, speech, or body language of others (Derntl & Regenbogen, 2014). Although emotion recognition is undoubtedly key to accurate knowledge about the other's thoughts and feelings, this may be a more basic process, necessary but not sufficient for empathic experience. Others have discussed the third component of empathy as a self-regulatory mechanism through which the person feeling empathy is able to define the boundaries of self and other, acknowledging that emotional reactions are in response to the experiences of others (De Vignemont & Singer, 2006; Decety &

Jackson, 2004; Wispé, 1986). This definition may go the furthest toward explaining the difference between empathy and non-empathic, self-oriented experiences of negative emotions when faced with others' distress (i.e., personal distress); however, the self-regulatory aspect of empathy remains purely theoretical, as measurement paradigms have not yet been developed to assess this potential aspect of empathy. In this vein, yet another group of researchers have defined a different component of empathy based on measurement, calling it "trait empathy," referring broadly to people's perceptions of their empathic tendencies; in other words, these researchers contend that self-reported measures of empathy assess perceived trait empathy, not actual cognitive or affective empathy (Lee et al., 2015).

Despite argument as to the best definition of the empathy construct, research has continued to accumulate. This includes schizophrenia studies, where empathy research most often encompasses cognitive and affective aspects. Though emotion recognition is routinely studied in schizophrenia, it is usually considered an independent component of social cognition, with a lesser focus on empathy (e.g., see Comparelli et al., 2013). Meta-analyses have summarized these findings, indicating deficits in cognitive aspects of empathy (Bora, Yucel, & Pantelis, 2009; Savla et al., 2013; Sprong, Schothorst, Vos, Hox, & Van Engeland, 2007), affective empathy (Bonfils et al., 2016), and emotion recognition (Kohler et al., 2010; Savla et al., 2013).

Though there are commonly measured empathic components in schizophrenia research, there are still problems with measurement techniques in the field. Performance-based assessments of theory of mind frequently measure some aspects of cognitive empathy, but most do not assess emotional perspective-taking. Further, there is a dearth

of performance-based measurement to assess affective empathy. The empathy literature has long relied on self-report instruments, both in the general population and in schizophrenia studies. However, performance-based paradigms have some distinct advantages over self-report instruments that assess respondents' perceptions, rather than actual performance or skills ("trait" empathy, according to Lee et al., 2015). Indeed, research has shown that people with schizophrenia tend to overestimate their empathic abilities on self-report measures as compared to reports from informants (Bora, Gökçen, & Veznedaroglu, 2008) or clinical observers (Lysaker, Hasson-Ohayon, Kravetz, Kent, & Roe, 2013). Thus, there is a need for performance-based measures of empathy that capture both cognitive and affective components.

Two performance-based paradigms have emerged that purport to measure cognitive and affective empathy. First, a comic strip task developed by Völlm and colleagues (2006) has recently undergone slight modification to include an affective component (Benedetti et al., 2009; Lee et al., 2010). While the goal to assess both is laudable, the task's assessment of affective empathy still relies heavily on the ability to cognitively infer emotional components of the comic strip story and characters, and the cognitive empathy task does not assess emotional perspective-taking. In contrast, the Derntl paradigm (Derntl et al., 2009) assesses emotional perspective-taking (cognitive empathy), affective responsiveness (used as a proxy for affective empathy in past literature), and emotion recognition. As the cognitive empathy task in this paradigm focuses exclusively on emotional perspective-taking, it is highly relevant to empathic interaction. The affective empathy task asks for respondents to indicate their own emotional responses to emotionally-laden sentences. Although the statements are self-

oriented, rather than oriented toward the other, the assessment of normative emotional responses relies less heavily on cognitive interpretation than the comic strip task described above. Thus, of the two options, the Derntl paradigm is more promising as an integrative, performance-based empathy assessment (see additional description of this task in the Methods section). The Derntl paradigm has been used three times in schizophrenia samples (Derntl, Finkelmeyer, et al., 2012; Derntl, Seidel, Schneider, & Habel, 2012; Smith et al., 2014), but additional work with this paradigm is needed to confirm its utility and extend performance-based empathy findings in schizophrenia.

## Variables Impacting Empathy

### Personal Distress & Emotion Regulation

Personal distress in response to others' distress, sometimes called emotional contagion (Preston & De Waal, 2002), has been implicated as an area of potential importance for empathic interaction in people with schizophrenia. Personal distress refers to the experience of self-oriented distress resulting from unpleasant emotions such as anxiety or fear when faced with negative experiences of others (Davis, 1983). While people with schizophrenia typically exhibit decreased empathy, the same samples reveal heightened personal distress when confronted with others' situations or emotions (Bonfils, Lysaker, Minor, & Salyers, 2017). Similarly, a meta-analysis of studies examining emotional experience in people with schizophrenia (Cohen & Minor, 2010) found that although schizophrenia participants reported similar levels of positive emotions to healthy controls, aversive emotional experience was heightened in response to neutral or even positive stimuli. As suggested by Horan et al. (2015) and Bonfils et al.

(2017), experiencing heightened negative emotions, leading to personal distress, may impede the ability of people with schizophrenia to empathically respond.

Although personal distress is not considered an actual component of empathy in most conceptualizations (e.g., see Jolliffe & Farrington, 2004; Vachon, Lynam, & Johnson, 2014), distress is clearly related to empathy. The most frequently used self-report measure of empathy, the Interpersonal Reactivity Index (IRI; Davis, 1983), includes a personal distress subscale, as does a more recently developed self-report measure of empathy, the Questionnaire of Cognitive and Affective Empathy (the emotional contagion subscale; Michaels et al., 2014; Reniers, Corcoran, Drake, Shryane, & Völlm, 2011). Furthermore, several prominent theorists have included personal distress in their conceptualizations of the empathic process. For example, personal distress has been described as affect sharing, similar to that seen in affective empathy, but without a distinction between the self and the other (thought by some to be the third component of empathy; see discussion of regulatory mechanisms above), resulting in self-oriented distress rather than an empathic reaction (De Vignemont & Singer, 2006; Decety & Jackson, 2006; Preston & De Waal, 2002). In this way, personal distress itself would not be a component of empathy, but could contribute to whether or not one engages in successful empathic interaction.

Despite the plethora of research showing heightened personal distress in people with schizophrenia, and suggestions from empathy theorists regarding the origin of personal distress within empathy models, the mechanism through which this occurs and its impact on empathy have yet to be empirically investigated. Some schizophrenia researchers have suggested that the heightened negative emotions experienced by people

with schizophrenia may result from a failure to downregulate negative emotions (Cohen & Minor, 2010; Horan, Green, Kring, & Nuechterlein, 2006; Horan et al., 2015), indicating an explanatory role for emotion regulation in empathic deficits in schizophrenia. Emotion regulation -- the processes involved in monitoring, evaluating, and altering emotions in order to achieve one's goals (Thompson, 1994) -- is often impaired in individuals with schizophrenia (O'Driscoll, Laing, & Mason, 2014). Deficits have been found for use of cognitive emotion regulation strategies (O'Driscoll et al., 2014) and directed attention (Strauss et al., 2015), and studies find increased presence of alexithymia (Van't Wout, Aleman, Bermond, & Kahn, 2007). In the context of Gross' (2015) extended process model of emotion regulation, people with schizophrenia may fail to adequately downregulate negative emotion at any stage of the model (i.e., situation, attention, appraisal, or response); as such, inadequate emotion regulation may result in overpowering negative emotions felt in an empathic context, interfering with the ability to appraise the thoughts, behaviors, and emotions of others (i.e., failure to appropriately use attentional deployment, cognitive change, or response modulation techniques; Gross, 2015). This idea of down-regulation failure aligns with one group of researchers who posit emotion regulation is actually the third component of empathy, alongside affective and cognitive empathy (Decety & Jackson, 2006). In addition to hindering empathic interaction, unpleasant self-oriented feelings could potentially drive people with schizophrenia to withdraw from interpersonal interactions because of discomfort. Yet, despite evidence indicating the potential importance of emotion regulation, speculations regarding the relationship between emotion regulation and empathy in people with schizophrenia have not been empirically examined.

**Metacognition**

In addition to emotion regulation, another key factor in regulating emotions and empathic response is metacognition – the ability to think about one's own thinking and the thinking of others. This can be at a discrete level of specific mental experiences, or at a more synthetic level where intentions, thoughts, and feelings are brought together into integrated representations of self and others (Lysaker, Vohs, et al., 2013; Semerari et al., 2003). Several studies indicate deficits in metacognition for people with schizophrenia (Hasson-Ohayon et al., 2015; Rabin et al., 2014; Vohs et al., 2014); this deficit seems to be unique to the disorder, as findings indicate people with schizophrenia have reduced metacognitive capacity not just as compared to healthy controls, but also as compared to people with other psychiatric conditions, including bipolar disorder (Tas, Brown, Aydemir, Brüne, & Lysaker, 2014), anxiety or depression (WeiMing, Yi, Lysaker, & Kai, 2015), post-traumatic stress disorder (Lysaker et al., 2015), and addictions (Lysaker, Leonhardt, Brüne, et al., 2014).

The term metacognition was originally used in the education literature (Flavell, 1979), but has evolved in its use to now encompass a spectrum of psychological functions. As used in schizophrenia research, the term metacognition typically refers to the ability to think about the thoughts and feelings of oneself and others and integrate this knowledge to make meaning of the world and one's connections within it (Lysaker & Hasson-Ohayon, 2014). Metacognition is commonly understood to have four domains: self-reflectivity - the ability to understand one's own thoughts and feelings; understanding of others' minds - the ability to understand others' thoughts and feelings; decentration - the ability to interpret the world and others' actions as independent from

oneself; and mastery - the ability to use skills in the first three domains to respond to psychological and social problems (Lysaker et al., 2005; Lysaker, Leonhardt, Pijnenborg, et al., 2014). The metacognition construct contains several elements associated with empathy – the ability to understand the thoughts and feelings of others, the ability to understand one's own thoughts and feelings (and that they are separate from others), and the ability to respond in an appropriate manner to others in a social setting are all integral to empathic interaction. Perhaps most importantly, metacognition may play a role in the interpretation of affect felt upon seeing another in distress, perhaps determining if the affect leads to personal distress or to empathic interaction with the other.

Despite the plausible connection between metacognition and empathy, there is a dearth of research investigating the intersection of these two constructs. I was able to locate only one study directly examining the empirical link between metacognition and empathy in schizophrenia. This study found positive correlations between the overall metacognition score and cognitive and affective empathy (but not personal distress; WeiMing et al., 2015). Outside of schizophrenia research, theoretical and empirical literature links metacognition with emotion regulation. For example, in the psychodynamic literature, "mentalized affectivity" refers to a type of emotion regulation in which awareness and experience of the emotion coincide, allowing attribution of appropriate emotional meaning to the experience, and bringing together the metacognitive and emotion regulation constructs (Fonagy, Gergely, & Jurist, 2004). Metacognition has also been linked to emotion regulation in affective neuroscience and cognitive literatures. For example, Wells' (2002) metacognitive theory focuses on the impact of thinking about one's own thinking on emotion regulatory strategies, and

negative metacognitive beliefs (based on Wells' theory) are significantly associated with emotion dysregulation (Mazloom, Yaghubi, & Mohammadkhani, 2016). Neuroscientific studies examining regulation of emotions, thoughts, and behaviors also point to the importance of accurate appraisal of others' mental states as well as the ability to reinterpret or reappraise the behavior of others (Ochsner, 2008; Olsson & Ochsner, 2008). Lastly, Gumley (2011) posited that decreased metacognitive capacities coupled with dysfunctional emotion regulation could play an important role in the symptomatology of mental disorders.

**The Current Study**

Taken together, evidence indicates the importance of metacognition in the ability to regulate emotions (and mitigate personal distress), which may in turn be key to effective empathic interactions, though no study to my knowledge has investigated these relationships. Thus, the aim of the proposed project was to determine the roles of emotion regulation, personal distress, and metacognition in predicting empathic performance in people with schizophrenia. Based on prior research, I hypothesized the following:

1) Stronger metacognition and emotion regulation skills, and lower personal distress would be associated with better empathic performance (both cognitive and affective).

2) Emotion regulation would mediate the relationship between personal distress and cognitive and affective empathy.

3) Metacognition would moderate the relationships between personal distress and cognitive and affective empathy, such that with higher metacognitive skills, the relationships between personal distress and cognitive and affective empathy are

nonsignificant, while at lower levels of metacognitive skill, personal distress would significantly predict poorer cognitive and affective empathic performance.

# METHOD

## Participants

Participants included 58 clients receiving mental health services with diagnoses of schizophrenia or schizoaffective disorder. This number ensured adequate statistical power for regression analyses, per a *G*Power* analysis (Faul, Erdfelder, Lang, & Buchner, 2007) indicating a minimum sample size of 55 guarantees 0.8 power to detect medium effects (in a regression with up to 7 predictors). Participants were required to be at least 18, fluent in English, able to provide informed consent, and receiving services at a participating community mental health center (Midtown Mental Health Center or Four County Counseling Center).

## Measures

Following informed consent, participants were administered a modified version of the Structured Clinical Interview for the Diagnostic and Statistical Manual-5 (SCID-5; First, Williams, Karg, & Spitzer, 2015), specifically assessing psychotic and mood symptoms, to confirm schizophrenia or schizoaffective disorder diagnoses. A demographic questionnaire was then administered.

**Empathy**. The computerized, performance-based Derntl paradigm (Derntl et al., 2009) adapted for the English language (Smith et al., 2014) was administered using the program *Presentation* ("Presentation Version 18.2 [Computer software]," 2016). The Derntl paradigm is a forced-choice, timed, computer-based assessment of empathy producing three subscale scores that reflect different empathic components. To assess emotion perception, respondents must select the emotion felt by a target image using the image's facial expression only (i.e., a face without context is presented) for 30 faces.

Images portray faces expressing one of five emotions (fear, anger, sadness, disgust, or happiness), or portray neutral expressions (Derntl et al., 2009). The facial image is presented with two answer choices (on either side of the face, corresponding with correct arrow key choices) for a maximum of 5 seconds. To assess cognitive empathy (referred to in this paradigm as emotional perspective-taking), respondents are shown 57 contextual images of two actors engaged in social interaction. One actor's face is masked, and respondents are required to select the appropriate facial emotion image that would portray the actor's emotion in the scene. Respondents are first shown the image for 4 seconds, followed by a response slide that presents 2 face choices, available for up to 4 seconds pending arrow key response. To assess affective empathy (referred to in this paradigm as affective responsiveness), respondents are asked to judge how they would feel in various emotional scenarios, presented as 150 brief sentences describing emotional and neutral situations. The written sentence is first displayed for 6 seconds, followed by a response slide with 2 emotion face choices, available for up to 4 seconds pending arrow key response. Correct choices for this task reflect the emotion most people would feel for the given scenario (i.e., the normative response; Smith et al., 2014). Across tasks in the Derntl paradigm, facial images come from a standardized stimulus set (Gur et al., 2002), and incorrect options are randomized across emotional conditions (Derntl et al., 2009; Smith et al., 2014).

**Personal Distress**. The Interpersonal Reactivity Index (IRI; Davis, 1983) was used to assess personal distress. The IRI contains 28 Likert-style self-report items rated from 0 (does not describe me well) to 4 (describes me very well). The IRI is designed to produce four subscale scores (each based on 7 items): personal distress, empathic

concern, perspective-taking, and fantasy (Davis, 1983). Primary interest in this study lies in the personal distress subscale. The IRI personal distress subscale was developed for use in the general population and displayed adequate convergent and divergent validity and good internal consistency in the original development study (Davis, 1983). The IRI has since been used extensively in schizophrenia samples (e.g., see Fujino et al., 2014; Horan, Pineda, Wynn, Iacoboni, & Green, 2014; Montag et al., 2012; Singh et al., 2015). It should be noted that internal consistency was low in the current sample ($\alpha$ = .56).

**Emotion Regulation**. Emotion regulation was assessed with the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). This self-report questionnaire was designed to comprehensively assess emotion regulatory abilities and has 36 Likert-style items, producing an overall score and six subscale scores: non-acceptance of emotional responses, difficulties engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. Items are rated from 1 (almost never) to 5 (almost always). Primary interest in this study lies in the overall emotion dysregulation score. The DERS overall score shows evidence of good internal consistency, test-retest reliability, and construct validity in general population samples (Gratz & Roemer, 2004) and in samples of people diagnosed with psychotic disorders (Owens, Haddock, & Berry, 2013). Internal consistency of the total score was strong in this sample ($\alpha$ = .93).

**Metacognition**. Metacognition was assessed using the Metacognition Assessment Scale-Abbreviated (MAS-A; Lysaker et al., 2005), an interview-based observer-rated scale. The MAS-A assesses metacognitive capacity through verbalization, producing a total score and four subscale scores: self-reflectivity, awareness of others' minds,

decentration, and mastery (Lysaker et al., 2010). Primary interest in this study lies in the total metacognitive capacity score. Past evidence indicates the MAS-A total score has good validity (Lysaker, Leonhardt, Pijnenborg, et al., 2014), internal consistency (Lysaker, Dimaggio, Buck, Carcione, & Nicolò, 2007), and inter-rater reliability (Lysaker et al., 2010) in individuals with schizophrenia-spectrum disorders. Internal consistency was acceptable in this sample ($\alpha$ = .70)

The Indiana Psychiatric Illness Interview (IPII; Lysaker, Clements, Plascak-Hallberg, Knipscheer, & Wright, 2002), a semi-structured interview designed to elicit illness narratives, was administered to produce ratings for the MAS-A. The IPII was designed to probe for information about how participants view their lives and mental disorders. The IPII generally lasts around 30 minutes, although the interview length may vary greatly based on the narrative provided. The IPII has been used in several studies of people with schizophrenia (e.g., see Hasson-Ohayon et al., 2015; Lysaker et al., 2011; Salyers, Matthias, Sidenbender, & Green, 2013; Vohs et al., 2014). The IPII was audio-recorded, saved to a secure server, transcribed, and de-identified prior to coding with the MAS-A.

**Symptoms**. Symptoms were assessed using the observer-rated Positive and Negative Syndrome Scale (PANSS; Kay, Fiszbein, & Opler, 1987). Five-factor scoring of the 30-item PANSS produces a total score plus five subscale scores: positive symptoms, negative symptoms, cognitive symptoms, hostility, and emotional discomfort (Bell, Lysaker, Beam-Goulet, Milstein, & Lindenmayer, 1994). The PANSS has been used extensively in schizophrenia research in the past (e.g., see Firmin, Luther, Lysaker, & Salyers, 2015; Luther, Lysaker, Firmin, Breier, & Vohs, 2015; Owens et al., 2013),

and shows evidence of acceptable validity, inter-rater reliability, and internal consistency (Bell et al., 1994; Kay et al., 1987). Internal consistency of the total and five subscale scores were adequate in this sample (alphas range between .68 and .85 – see Table 1).

## Procedure

**Recruitment**. Participants were recruited from two local community mental health centers (CMHCs) – Midtown Mental Health Center and Four County Counseling Center. Clinicians at each CMHC were asked to inform eligible clients that the study was available and provide informational brochures to potential participants. At Four County Counseling Center, this was the sole recruitment method. At Midtown, fliers with contact information, a brief study description (including eligibility requirements), and information about compensation were placed in approved positions directing interested clients to contact the author to learn more or participate in the study. Once a client contacted the author about participation, a brief phone screen was conducted and an interview time was scheduled. Reminder calls were provided.

**Interview**. Each assessment began with the informed consent process. Participants were asked to read the informed consent document; the interviewer then asked that the participant state back in their own words their understanding of what would happen during the course of the study to ensure adequate comprehension. Participants were allowed to ask any questions they had prior to signing the consent form and/or starting the interview. Immediately following the informed consent process, diagnostic confirmation was obtained via the SCID-5. If the participant did not meet inclusion criteria (no diagnosis of schizophrenia or schizoaffective disorder), the participant was given $5 and the interview concluded. This occurred for three potential

participants. If the participant met inclusion criteria, a demographic survey was administered, followed by the battery of assessments, ending with the IPII. Following the assessment, participants received $35. All interviews were conducted by a trained doctoral student or research assistant. Interviews were most often completed in 2-3 hours.

# ANALYSES

Prior to any analyses, data were entered into SPSS, checked, and cleaned. IPII interviews were transcribed and de-identified prior to MAS-A coding. Coding was conducted by trained research assistants and practicum students supervised by Dr. Paul Lysaker at the Richard L. Roudebush VAMC. All MAS-A coders underwent training to ensure adequate reliability in MAS-A ratings prior to coding transcripts for this study. MAS-A scores were entered into SPSS and checked once coding was completed.

Descriptive statistics were conducted first, followed by the Shapiro-Wilk test of normality. Tests of normality tend to be overly sensitive to sample size, including the Shapiro-Wilk test. However, this test is often preferred over other normality tests based on the results of simulation studies (e.g., see Yap & Sim, 2011), and thus was used here in conjunction with examination of skewness and kurtosis values. Bivariate correlations, t-tests, and analyses of variance (ANOVAs) were then conducted to assess for associations between scores on empathy tasks, symptoms, and demographic variables. Results of these analyses were used to select appropriate control variables.

To test the first hypothesis, bivariate correlations examined associations between scores on the empathy tasks and: 1) personal distress; 2) emotion regulation; and 3) metacognition, with the expectation that greater emotion regulation and metacognition and reduced personal distress would be associated with better empathic performance. Secondary hierarchical regressions were conducted to assess the predictive value of each variable when controlling for relevant demographic and symptom covariates.

Proposed mediating and moderating relationships were tested using Hayes' PROCESS macro (Hayes, 2013), which conducts ordinary least squares (OLS) regression

analyses. To assess whether emotion regulation (M) mediated the relationship between personal distress (X) and cognitive empathy (Y), I tested the indirect effect (*a***b*) of personal distress on cognitive empathy through emotion regulation. The PROCESS macro conducted the following two OLS regressions to test this model: 1) emotion regulation (M) was regressed onto personal distress (X) to produce *a*; and 2) cognitive empathy was regressed onto both emotion regulation (M) and personal distress (X) to produce *b* and *c'* (the direct effect). Emotion regulation was considered to mediate the relationship between personal distress and cognitive empathy if the indirect effect of personal distress on cognitive empathy through emotion regulation (*a***b*) was significant, using a bias-corrected 95% bootstrap confidence interval with 10,000 bootstrap samples (i.e., the confidence interval did not contain a value of zero). Of note, the presence of an association between X and Y is not required for there to be an indirect effect (Hayes, 2013); thus, mediation models were run even in the absence of such associations. This procedure was repeated to assess whether emotion regulation mediated the relationship between personal distress and affective empathy.

To assess whether metacognition (M) moderated the relationship between personal distress (X) and cognitive empathy (Y), the interaction term (XM) was added to the OLS regression model predicting cognitive empathy. If the interaction term was significant ($p < .05$) and significantly improved the regression model, metacognition was considered to moderate the relationship between personal distress and cognitive empathy. Of note, unstandardized, non-centered data were entered into the moderation model. While some statisticians recommend centering or standardizing data for analyses that use the product of X and M (e.g., see Aiken, West, & Reno, 1991; Cohen, Cohen, West, &

Aiken, 2003), Hayes (2013) argues that these procedures are not necessary and have little to no effect on the average data used for moderation analyses.

If significant moderation was detected, two techniques were employed to probe the interaction. First, the pick-a-point approach (Rogosa, 1980) was used to visualize any moderation detected. In this analysis, values of the moderator (metacognition) are chosen at which to graphically represent the relationship between X (personal distress) and Y (cognitive empathy); typically these values are plus and minus one standard deviation from the mean. Second, the Johnson-Neyman technique (Bauer & Curran, 2005) was used to identify the actual value of the moderator (metacognition) where the relationship between X and Y changed significance (Hayes, 2013). This procedure was repeated to assess whether metacognition moderated the relationship between personal distress and affective empathy. See conceptual models for both hypothesized interactions in Figures 1 and 2. All analyses were conducted in SPSS version 24.

# RESULTS

## Descriptive Statistics

See Table 2 for detailed descriptive statistics characterizing the demographic composition of the sample. More than half of the participants had schizophrenia and were female. Most participants were black, and nearly all were single or divorced. One third reported not having received their high school diploma or GED, but nearly 40% reported having attended some college. Most were unemployed and received Social Security benefits, but a quarter reported current, paid employment. Participants reported a wide variety of living arrangements, but most were living independently and had relatively stable housing. The sample age averaged 46.6 years, but there was wide variation, ranging from 25 to 65. The vast majority of participants completed the entire testing battery with good effort, but in two cases, data was removed for selected measures based on lack of apparent effort or ability (self-report scales removed for participant 104; Derntl tasks removed for participant 111).

See Table 1 for descriptive statistics of each scale used in analyses, along with symptoms. Emotion regulation, personal distress, metacognition, and cognitive and affective empathy performance all displayed characteristics consistent with normally distributed data, producing non-significant results for the Shapiro-Wilk test of normality and skew and kurtosis estimates less than an absolute value of one. In light of these results, the data presented here were considered appropriate for the planned parametric tests.

Data were also examined for outliers on the scales of interest (personal distress, emotion regulation, metacognition, and empathy tasks). One outlier was found for

personal distress (participant 152). This person was the only participant to report experiencing no personal distress (i.e., a score of 0), placing them nearly 3 standard deviations outside the mean. However, it is possible that this participant truly perceived that they do not experience personal distress, making a score of 0 valid for this participant. Thus, all analyses were run with and without this case. Any differences in results between analyses with and without participant 152 are discussed below.

**Tests for Possible Covariates**

All demographic and symptom variables were examined for associations with Derntl paradigm scores to determine which, if any, should be included as control variables in further analyses. Among demographic variables, the emotional perspective-taking task was only associated with age ($r$ = -.34, $p$ = .01). The affective responsiveness task did not exhibit an association with age, but did show mean differences for both race ($t(53)$ = -2.67, $p$ = .01) and marital status ($F(2, 54)$ = 3.20, $p$ = .049), such that white participants scored significantly higher than black participants, and those who were divorced or separated scored significantly higher than those who were single (never married). For both tasks, results suggested those with schizoaffective disorder performed significantly better than those with schizophrenia (Cognitive empathy: $t(55)$ = -2.29, $p$ = .026; Affective empathy: $t(55)$ = -2.65, $p$ = .011).

See Table 3 for results of correlation analyses examining associations between empathy tasks and symptoms. Both empathy tasks displayed moderate, negative correlations with cognitive symptoms, suggesting increased cognitive deficits are associated with decreased performance on these empathic tasks. Performance on the

cognitive empathy task was further negatively associated with negative symptoms, and performance on the affective empathy task was negatively associated with hostility.

**Associations among Relevant Variables**

Correlations were conducted to assess bivariate associations among study variables and address hypothesis one, that better emotion regulation and metacognition, and reduced personal distress, would be associated with improved performance on the empathy tasks. As can be seen in Table 3, empathy performance tasks correlated strongly with one another, but not so strongly that we might expect issues with multicollinearity (i.e., $r < .80$). Both tasks also displayed moderate, positive correlations with metacognition, suggesting increased empathic performance is associated with greater metacognitive capacity. At the bivariate level, neither empathy task was significantly correlated with either emotion regulation or personal distress, though personal distress was strongly correlated with emotion regulation. None of the above results changed when participant 152 was removed.

To further clarify the answer to hypothesis one, a series of regressions were conducted to assess predictive relationships while controlling for potentially confounding variables. Results for the cognitive empathy task can be seen in Table 4. As in bivariate correlation results, personal distress and emotion regulation did not significantly predict cognitive empathy performance, but metacognition did predict cognitive empathy performance, even with relevant symptom and demographic variables controlled (i.e., diagnosis, age, cognitive symptoms, and negative symptoms). For affective empathy performance (Table 5), neither personal distress nor emotion regulation were predictive. Metacognition was predictive when entered alone in the first step, but when control

variables were added (diagnosis, race, marital status, cognitive symptoms, and hostility), it was reduced to trend-level significance ($p$ = .093).

**Mediation Models**

Mediation models were conducted to test hypothesis two, that emotion regulation would mediate the relationship between personal distress and empathic task performance. Two models were tested for cognitive empathy performance – one with no control variables, and one controlling for diagnosis, age, cognitive symptoms, and negative symptoms (see Table 6). Interpretation of results did not differ between the two models. In both cases, an indirect effect was not apparent, as 95% confidence intervals both included a value of 0, inferring there is a possibility that the effect is 0.

Results for affective empathy performance can be seen in Table 7. Two models were also tested for this task – one with no control variables, and one controlling for diagnosis, race, marital status, cognitive symptoms, and hostility. For the first model, results were similar to those seen for the cognitive empathy task – i.e., no indirect effect was evident, as the bootstrapped confidence interval contained a possible value of 0. However, when control variables were added to the model, an indirect effect of emotion regulation on affective empathy became apparent. In this model, participants who reported increased personal distress also reported reduced ability to regulate emotion ($a$ = 0.52, $p$ < .001), which in turn led to increased scores on the affective empathy task ($b$ = 5.51, $p$ = .075). Personal distress indirectly influences affective empathy performance through the mechanism of emotion regulation (point estimate of indirect effect = 2.86, 95% CI [0.31, 6.95]). After accounting for this indirect effect, personal distress had no direct effect on affective empathy performance ($c'$ = -2.05, $p$ = .443). Of note, the

direction of the effect of emotion regulation on affective empathy performance (the *b* path) is opposite of that hypothesized – suggesting that reduced ability to regulate emotion is associated with *better* performance in this data. All mediation results were the same when conducted without participant 152, the outlier for personal distress.

**Moderation Models**

See Table 8 for moderation results for cognitive empathy performance. Two models were conducted, both with and without control variables of diagnosis, age, cognitive symptoms, and negative symptoms. Though the moderation model without control variables was significant, no single predictor reached significance, including the interaction term. When control variables were added, metacognition, age, and cognitive symptoms reached significance as predictors, but the interaction term remained non-significant, suggesting that metacognition does not moderate the relationship between personal distress and cognitive empathy performance in this data.

See Table 9 for moderation results for affective empathy performance. As for cognitive empathy performance, models were conducted both with and without control variables (diagnosis, race, marital status, cognitive symptoms, and hostility). Similar to cognitive empathy performance, in the model without control variables, the overall model was significant, but no single predictor reached significance. However, when control variables were added to the model, metacognition, personal distress, race, marital status, cognitive symptoms, and hostility were all significant predictors. Importantly, the interaction term also reached significance ($p = .027$), suggesting the relationship between personal distress and affective empathy performance is moderated by metacognition. The pick-a-point approach provides a useful graphic with which to understand this

relationship (visualized in Figure 3). Results of the Johnson-Neyman procedure revealed that the critical value of metacognition is 9.84. For those with scores of 9.84 or higher, personal distress does not affect one's affective empathy performance. But, for those with metacognition scores lower than 9.84, increased personal distress was associated with better affective empathy performance. This finding is contrary to the hypothesized direction of this effect. In this sample, 87% of participants had metacognition scores above 9.84.

# DISCUSSION

This study is the first to my knowledge to investigate the roles of three primary predictors in performance-based empathy – personal distress, emotion regulation, and metacognition. Results indicate that, at the bivariate level, metacognition is significantly, positively associated with performance on both cognitive and affective empathy tasks; personal distress and emotion regulation did not display significant correlations. These results held up for cognitive empathy in multivariate analyses, suggesting metacognition is an important predictor of cognitive empathic performance. For affective empathy, metacognition was reduced to a trend-level predictor when control variables were added, perhaps suggesting a more important role for demographic or symptom variables. Mediation analyses revealed a mediating role of emotion regulation in the relationship between personal distress and affective empathy performance, but not cognitive empathy performance. Lastly, moderation analyses found metacognition moderates the relationship between personal distress and affective empathy performance, but not cognitive empathy performance. Contrary to hypotheses, this moderating relationship suggests that increased personal distress *improves* affective empathy performance for those with low metacognition.

## How do Personal Distress, Emotion Regulation, and Metacognition Impact Empathy?

Though the literature suggests each of these constructs – personal distress, emotion regulation, and metacognition – may be important to empathic performance, this data indicates metacognition may be the most important of these factors in determining empathic performance. Metacognition was positively associated with both cognitive and

affective empathy performance in correlational analyses, to the order of a medium effect size, suggesting that those with better metacognition may be more able to accurately respond during an empathy task. While the construct definitions certainly suggest a likely connection between metacognition and empathy (Lysaker et al., 2005; Lysaker, Leonhardt, Pijnenborg, et al., 2014), only one study had thus far examined the link between these two constructs (WeiMing et al., 2015). That study used a self-report empathy measure, so results can be interpreted to support a link between metacognitive abilities and perceived empathic tendencies (termed "trait" empathy by others in the field; Lee et al., 2015) rather than performance. The current study extends those findings by linking metacognition with performance-based cognitive and affective empathy, suggesting that observer-rated metacognitive abilities may have an impact on real-world empathic interactions. This is an important extension, as research shows that people with schizophrenia may tend to overestimate their own empathic tendencies on self-report measures (Bora et al., 2008; Lysaker, Hasson-Ohayon, et al., 2013), and studies examining the relationships between self-report and performance-based measures tend to find low or nonexistent associations (Derntl et al., 2009; Derntl, Seidel, et al., 2012; Lee, Zaki, Harvey, Ochsner, & Green, 2011; Regenbogen et al., 2015).

While both cognitive and affective empathy performance were associated with metacognition at the bivariate level, this association may be more robust for cognitive empathy performance when confounding variables are controlled. In a multivariate regression analysis controlling for diagnosis, age, and cognitive and negative symptoms, metacognition was still highly significant as a predictor of cognitive empathy performance. For affective empathy performance, when controlling for diagnosis, race,

marital status, cognitive symptoms, and hostility, metacognition was only predictive at the trend level ($p$ = .093). This is likely not an effect of reduced power to detect effects, as G*_Power_ (Faul et al., 2007) indicates a sample of 55 is adequate to detect medium effects in a multiple regression analysis with such specifications.

Revisiting the definition of metacognition, it may make sense that metacognition is a more robust predictor for cognitive empathy performance than for affective empathy performance. Metacognition is essentially the ability to think about and integrate one's own mental experiences and those of others (Lysaker, Vohs, et al., 2013; Semerari et al., 2003), including both thoughts and emotions. Cognitive empathy is a construct closely akin to this definition, focused on knowing and understanding the thoughts and emotions of others (Decety & Jackson, 2004). However, affective empathy is less about knowing the other's feelings and more about experiencing your own reciprocal emotion. While metacognitive abilities would certainly be important in interpreting the other's emotion and in understanding the context of one's felt emotion, the actual experience of emotion itself is not part of the metacognition construct. Thus, the more robust relationship between metacognition and cognitive empathy performance aligns well with the literature and the field's understanding of these two constructs.

Taken together, these findings suggest metacognition may play a central role in predicting empathic performance. Thus, interventions designed to enhance metacognitive capacities may also benefit empathic performance. One intervention of particular promise, Metacognitive Reflection and Insight Therapy (MERIT; Van Donkersgoed et al., 2014), was developed to align with the metacognitive components measured by the MAS-A (self-reflectivity, awareness of the other, decentration, and mastery), allowing

the intervention to be tailored to the metacognitive level of the client. Indeed, MERIT was designed specifically for people with schizophrenia, suggesting MERIT may be particularly appropriate to address the empathic deficits seen in this group while also enhancing metacognition. Improving empathic performance through such an intervention has potential to positively influence social functioning and the quality of interpersonal relationships, both of which are related to empathy (Bechi et al., 2017; Hofelich & Preston, 2012; Van den Brink et al., 2012). Future work should continue to explore the relationships between metacognition and both cognitive and affective empathy and how they may be impacted by particular interventions.

Surprisingly, neither personal distress nor emotion regulation were associated with either empathy task at the bivariate or multivariate level (though emotion regulation reached trend level [$p = .096$] in the affective empathy model when controlling for diagnosis, race, marital status, cognitive symptoms, and hostility). These findings were contrary to hypotheses. Even though literature shows evidence of deficits in emotion regulation (O'Driscoll et al., 2014; Strauss et al., 2015) and heightened personal distress in those with schizophrenia (Bonfils et al., 2017), these constructs did not have an appreciable impact on cognitive or affective empathy performance.

There are several possible explanations as to why these relationships did not appear in this data. First, of course, it is possible that these two variables truly do not have any impact on how an individual empathically performs. However, it seems more likely that measurement or other confounding variables prevented detection of an existing relationship. Measures of both emotion regulation and personal distress were self-reports, implying participants' perception of their experiences with these constructs were being

measured, rather than their actual observer- or performance-based abilities or experiences. It is possible that participants' perceptions vary from their real-world abilities, as is the case with empathy (Bonfils et al., 2016; Bora et al., 2008; Lysaker, Hasson-Ohayon, et al., 2013).

Even if a participant's perception of their emotion regulation and personal distress were accurate, it is possible that the Derntl paradigm tasks did not activate either an experience of personal distress or a need to regulate emotions, thus negating any effect of those variables on performance in this context. In the real world, empathic interactions would naturally be vastly more complex than those presented in the Derntl paradigm. Many elements go into each social interaction that impact our emotional responses – for example, one's past relationship with the person for whom empathy is felt; the valence and seriousness of the scenario (e.g., life-threatening illness vs. celebrating a new baby vs. dropping your groceries on the sidewalk); ability to engage with the person; and pre-existing events or emotions prior to the social interaction, among many other possibilities. It may be that these other elements, not simulated in the Derntl paradigm, are what triggers an experience of personal distress and/or the need to regulate one's emotions, which can then interfere with empathy.

Anecdotally, while completing the Derntl paradigm tasks during this study, a sizeable number of participants expressed emotion in response to the prompts. However, this almost always took the form of laughter, frequently in response to prompts meant to evoke disgust. Participants rarely seemed to share the emotions of the prompts for other categories (happiness, sadness, anger, or fear). In fact, due to the somewhat lengthy and tedious nature of these tasks, some participants expressed boredom or inquired as to when

the task would be finished. While this evidence is anecdotal and not systematic, it does suggest that the task is not particularly emotionally provocative. Indeed, it seems likely that participants were required to tap their cognitive or metacognitive skills (as evidenced by associations with those constructs) more so than they experienced emotion in response to the tasks. Thus, it is unlikely that participants experienced personal distress or needed to regulate emotions, perhaps obfuscating any effect those experiences would have had on real empathic interaction. Future research may want to investigate other ways to assess these interactions, such as using performance-based emotion regulation tasks or employing some sort of mood induction to invoke a mild form of personal distress prior to participation in empathy tasks.

**Does Emotion Regulation Mediate the Relationship between Personal Distress and Empathic Performance?**

Though no correlations were found between personal distress and cognitive or affective empathy performance, Hayes (2013) points out that bivariate associations between the predictor and the outcome are not required for the presence of indirect effects. Thus, mediation models were still examined to address hypothesis two, that emotion regulation mediates the relationships between personal distress and cognitive and affective empathy performance. Against expectations, there was no evidence of mediation for cognitive empathy performance. However, in light of the discussion above about the lack of emotional provocation in the Derntl tasks, and the necessarily cognitive focus on knowing the thoughts and emotions of others in a cognitive empathy task, this finding fits well within the context of these results.

While no mediation was evident for cognitive empathy performance, affective empathy performance showed evidence of an indirect effect of personal distress when controlling for diagnosis, race, marital status, cognitive symptoms, and hostility. This model suggests that personal distress indirectly affects affective empathy performance through the mechanism of emotion regulation. In practice, based on this result, we would expect that when someone with schizophrenia was presented with a situation wherein they might empathically interact, he or she might first feel personal distress, activating a need for emotion regulation skills, which then may exert influence on the empathic response, resulting in an indirect effect of the personal distress on empathy. Of note, in this model, the effect of emotion regulation on affective empathy performance (the *b* path) was positive. Considering the direction of scoring for the emotion regulation scale, the DERS, this suggests that reduced emotion regulatory abilities predict *better* affective empathy performance. The *b* path in this model only reached trending significance ($p$ = .075) (as did emotion regulation in the multivariate prediction model discussed above, where the direction of the effect was the same), so we must be careful not to over-interpret such a result. However, it is important to note that while mediation results suggest that emotion regulation does act as one mechanism through which personal distress impacts affective empathy performance, that mechanism may not operate as expected.

When interpreting these mediation results, it is important to consider the clinical implications of cognitive and affective empathy deficits, and that emotion regulation may be a mediator for one of these, but not the other. No research to my knowledge has yet been able to investigate how the different measured empathic components influence

actual empathic interaction in a schizophrenia sample. Future work is needed to parse apart the relative importance of cognitive and affective empathy for real-world social interactions.

**Does Metacognition Moderate the Relationship between Personal Distress and Empathic Performance?**

Similar to the mediation models, moderation models revealed that metacognition does not have a moderating role in the relationship between personal distress and cognitive empathy performance. While metacognition seems to be an important variable in predicting cognitive empathy performance and most certainly merits investigation in future studies, it did not interact with personal distress to predict cognitive empathy performance in this data, suggesting the relationship between personal distress and cognitive empathy performance was relatively similar at all levels of metacognitive ability.

Results for affective empathy performance tell a different story. In a model controlling for other correlates (diagnosis, race, marital status, cognitive symptoms, and hostility), metacognition moderated the relationship between personal distress and affective empathy performance such that for those with low metacognition (less than a score of 9.84), increased experience of personal distress predicted *better* performance on the affective empathy task, and for those with higher metacognition (above a score of 9.84), the relationship was non-significant. While the presence of moderation is consistent with hypotheses, the direction of the effect is not. It was expected that increased personal distress would hamper performance on empathy tasks, and likely actual empathic interaction as well. However, this data tells the opposite story – that

those who report experiencing greater personal distress were more able to accurately identify the normative response in the affective empathy task than those with lower reported personal distress, at least for those who are low in metacognition.

While this relationship is unexpected, it is only present for a small proportion of the sample -- only 13% of participants had a metacognition score below the threshold of 9.84 where this relationship becomes significant. Scores on the MAS-A range from 0 to 28 and are comprised of the scores from four subscales (self-reflectivity, awareness of the other, decentration, and mastery). A score of 10 on the MAS-A could result from a variety of possible subscale scores but would generally suggest the participant is able to identify their own basic cognitive operations as well as those of others, but that the person has little or no ability to integrate that knowledge into a cohesive sense of self or understanding of how one interacts with the world and other people in it (Lysaker et al., 2005; Lysaker, Leonhardt, Pijnenborg, et al., 2014). It is possible that once one moves toward being able to integrate internal experiences and develops a stronger sense of self, he or she becomes less reactive to internal experiences of distress, thus reducing any relationship between personal distress and affective empathy. Indeed, people with greater metacognition may be more able to ascertain the origin of a given emotion (the self vs. the other). In this way, metacognition may actually function as a self-regulatory mechanism, such as that referenced by some empathy scholars (De Vignemont & Singer, 2006; Decety & Jackson, 2004; Wispé, 1986).

Going further, it may be that at higher levels of metacognition, perception of personal distress changes, with the person becoming aware that internal, self-oriented distress is unpleasant and perhaps inappropriate in empathic interactions, leading to

potential interference with affective empathy. This story would seem to align somewhat with the data – as can be seen in Figure 3, the direction of the relationship between personal distress and affective empathy performance seems to change at higher levels of metacognition. In this data, the Johnson-Neyman technique identified only one region of significance (below a score of 9.84), but this could be the result of a restriction of range or a relatively small sample size. In testing for the critical value identified by the Johnson-Neyman technique, the PROCESS output identified trending significance for two values of metacognition, indicating a negative relationship between personal distress and affective empathy (M = 18.78; $p$ = .094; M = 19.50, $p$ = .081). As 19.50 was the highest metacognition score achieved by a participant in this sample, this data cannot tell us the relationship between personal distress and affective empathy performance for those with higher scores (MAS-A scores reach a maximum of 28). Considering the trend seen at higher values here, it seems reasonable to guess that the relationship would be significant and negative at even higher scores. This would suggest that personal distress interferes more with affective empathy for those with higher metacognition scores than for those with moderate scores, and that those with low scores actually receive some sort of enhancement to their affective empathy performance from experiencing personal distress.

This leads to a discussion of the unexpected direction of such an effect – how could personal distress possibly convey a positive effect on performance? This question may, indeed, be integrally related to the finding above that reduced emotion regulation was trending toward an association with better performance on the affective empathy task. For both of these findings, the implications are that greater experience of negative

emotions and less ability to control them result in better affective empathy performance. This goes against the relationship posited by numerous scholars – that increased experience of negative emotion and inability to downregulate that emotion would *interfere* with empathic interaction (Cohen & Minor, 2010; Horan et al., 2006; Horan et al., 2015).

One possible explanation for such unexpected findings could lie in the nature of the Derntl paradigm's affective responsiveness task. As mentioned above, this task requires participants to respond to a sentence describing an emotional situation with how *they* would feel. It does not require participants to report the emotion they would feel were an emotional situation to happen to someone else. Thus, as the name suggests, the task may more accurately assess a construct such as emotional responsiveness, or emotionality. Those who experience more personal distress or have less success in regulating their emotions may naturally also experience more emotion, generally. This may convey some benefit in identifying normative emotional responses in the Derntl paradigm's affective responsiveness task (though this relationship exists only at low levels of metacognition). Assuming that the task is truly a measure only of responsiveness, this would imply that those with moderate or higher levels of metacognition are able to rely more on their metacognitive abilities to accurately identify normative emotional responses, negating a need to rely on one's own emotional experiences to do well on the task. For those with the highest levels of metacognition, it is possible that the experience of personal distress impedes the use of metacognitive abilities, leading to decreased accuracy; alternatively, there could be some other factor characteristic of people with increased personal distress and the highest levels of

metacognition that increases the difficulty of the affective responsiveness task. For example, it could be that knowledge and understanding of one's own painful emotions makes it more uncomfortable to acknowledge these emotions in the context of such a task.

While such an explanation makes sense in the context of these results, it also indicates that the Derntl paradigm affective responsiveness task may not assess true affective empathy, though it has been used to assess this construct in published studies (Derntl, Finkelmeyer, et al., 2012; Derntl, Seidel, et al., 2012; Smith et al., 2014). If this is the case, future research is needed in two main areas. First, additional development of performance-based affective empathy tasks is needed; and second, the hypotheses proposed herein should be examined with more robust measures. As discussed in the introduction, only two performance-based affective empathy tasks currently exist. Aside from the Derntl paradigm, a comic strip task has been modified to include an affective component (Benedetti et al., 2009; Lee et al., 2010), but this task relies quite heavily on cognitive interpretation of the comic strip and does not ask directly for the participants' emotional experiences upon seeing the cartoon actor in an emotionally provocative situation. The Derntl paradigm was chosen for the current study because it relies less heavily on cognitive interpretation and asks directly for participants' emotions, but the target of the prompts is the self, not the other, potentially negating its ability to assess empathy at all. An additional area of research concerns suppression of the mu rhythm, sometimes examined in electroencephalograph (EEG) studies of schizophrenia. The mu rhythm is thought to be a marker for the mirror neuron system, which some have suggested is the neurological mechanism underlying empathy (Decety, 2010a; Iacoboni,

2009). However, this literature is early in its development, and current studies are inconsistent in their findings in terms of both suppression of the mu rhythm in schizophrenia and associations between said suppression and self-report measures of empathy (e.g., see Brown, Gonzalez-Liencres, Tas, & Brune, 2016; Horan et al., 2014; McCormick et al., 2012). Further, one review found little evidence that we should assume the mirror neuron system is a critical component of emotion recognition processes, let alone empathy or sympathy (Decety, 2010b). Taken together, research on suppression of the mu rhythm needs additional work before it can be of value in ascertaining determinants of empathic deficits.

Considering the state of the field, a sizable amount of research is needed to develop a robust measurement technique assessing affective empathy. One particular area of interest may lie in the direction of interactional tasks. Indeed, some research has begun to look at measuring theory of mind during interactions between participants with schizophrenia and study confederates (Achim, Parent, & Fossard, 2017). The field would certainly benefit from developing tasks along these lines to assess affective empathy, perhaps even asking about in-the-moment emotional experiences during or immediately after interaction with others.

Returning to the unexpected direction of the results indicating that personal distress may enhance affective empathy performance for those low in metacognition – if we forge ahead with the assumption that the affective responsiveness task does, indeed, assess affective empathy performance, a second possible explanation for these findings could be that more intense internal experiences of emotion may foster greater empathic emotion felt for the other. Experiencing more frequent or intense negative, self-oriented

emotion may allow a person to develop greater understanding of what others might feel in emotionally provocative situations, and thus, allow that person to share the other's emotion in an empathic manner more easily. This may be especially true for those with low metacognition who are otherwise less able to use cognitive resources to enhance their experience of empathic emotion. If this is the case, there are clinical implications of this finding. People with schizophrenia who have low metacognition may benefit from interventions designed to help them access and understand their own emotional experiences; such an intervention could have a trickle-down effect to help clients better identify and understand the emotions of others.

**A Word on Control Variables**

While no specific hypotheses were put forth regarding the relationships between demographic or symptom variables and empathy tasks, some interesting findings did emerge. First, both diagnosis and cognitive symptoms were significantly associated with both types of empathy tasks. Some literature suggests those with schizophrenia experience greater deficits in social cognition than those with schizoaffective disorder (e.g., see Chen, Cataldo, Norton, & Ongur, 2012; Fiszdon, Richardson, Greig, & Bell, 2007), so it may not be surprising that those with schizoaffective disorder performed better on both cognitive and affective empathy tasks. However, diagnosis was often not significant when entered in as a control variable in more complex models. Cognitive symptoms, on the other hand, remained significant or trending in every analysis, suggesting the relationship between cognitive deficits and performance on these tasks is strong and robust even when accounting for several other relevant variables. This is notable, as cognitive symptoms are common in schizophrenia. Past studies have not

acknowledged that the tasks may be cognitively taxing for some (Derntl et al., 2009; Derntl, Seidel, et al., 2012; Smith et al., 2014), but the results here suggest that cognitive deficits should be carefully considered when designing and using performance-based tasks of social cognition and empathy, specifically. Future work should investigate the impact of cognitive symptoms on other empathy measures, and studies of empathy or other social cognitive constructs should consider the role of cognitive symptoms in their results.

Some other intriguing associations emerged, as well. For cognitive empathy performance, age and negative symptoms were both associated at the bivariate level, but age remained highly significant across analyses (while negative symptoms were not significant at any level other than bivariate). Of interest, results suggested that those who were older performed more poorly on the cognitive empathy task, but this did not hold true for the affective empathy task. As both tasks pulled for some cognitive skills and were performed on a computer, it is unlikely that either of these factors can explain the age finding. While this could not be systematically investigated in this analysis, it is possible that the age finding actually reflects worsening social cognitive abilities over time, or over the course of the illness. Some literature suggests that duration of illness is negatively associated with empathic abilities (Bonfils et al., 2017), so it is a plausible explanation that age might reflect a manifestation of that association in this data. Thus, this finding could potentially contribute to the evidence base supporting duration of illness as a variable of importance in social cognition in schizophrenia.

Affective empathy performance was affected by different demographic and symptom variables, including race, marital status, and hostility (as measured by the

PANSS). For race, white participants scored significantly higher on the affective empathy task than black participants – on average scoring more than 10 points higher! The impact of one's own race on empathic performance has not been investigated very deeply, but one study in the social psychology literature found there are no differences between white and black children on emotion recognition (Hindt, Davis, Schubert, Poehlmann-Tynan, & Shlafer, 2016). The literature in adults is also quite sparse, though one study indicates white and Asian-American medical students rate themselves as equally empathic (Berg, Majdan, Berg, Veloski, & Hojat, 2011). It is quite possible that the effect found in this study is a result of the prompts used in the task, which uses pictures of exclusively white actors. The Derntl paradigm was originally developed in Germany, where there is considerably less racial diversity than in the United States. It was also developed using a standardized set of facial stimuli. Standardization has its benefits, and development of the task would have been considerably more difficult if the authors had to create their own pictorial stimuli. However, the racial differences found and the fact that all stimuli are from a single race call into question the cultural generalizability of the task. This idea is supported by a body of literature indicating that people are generally better able to recognize the emotions of those in the same cultural group or race/ethnicity (for a meta-analysis of these findings, see Elfenbein & Ambady, 2002). In a similar vein, research suggests that people are more likely to feel empathy toward members of their in-group (Eisenberg, Eggum, & Di Giunta, 2010), a finding that has been supported by both lab-based experimental paradigms (Stürmer, Snyder, Kropp, & Siem, 2006; Stürmer, Snyder, & Omoto, 2005) and neuropsychological tasks (Chiao & Mathur, 2010). Taken together,

these findings suggest black participants may start with a disadvantage in the Derntl paradigm tasks, based on the all-white prompts.

The relationship between race and empathic performance in schizophrenia is further complicated by the fact that the majority of studies investigating empathy have not reported race as a demographic characteristic; indeed, two recent meta-analyses examining empathy and related constructs in schizophrenia reported that fewer than 20% of included studies reported the racial distribution of their sample (Bonfils et al., 2016; Bonfils et al., 2017). It is logical to assume, then, that most researchers are not investigating the impact of race on their results in empathy studies in schizophrenia. Considering that more people diagnosed with schizophrenia in the United States are black than are white (Corrigan, Mueser, Bond, Drake, & Solomon, 2009), it is of the utmost importance that future measure development take cultural generalizability into account, and that researchers using existing tasks examine race as a potential control variable.

Marital status and hostility were both also associated with performance on the affective empathy task. Analyses for marital status indicated that those who were divorced or separated (35% of this sample) performed significantly better on the affective empathy task than those who were single (59% of this sample). They did not differ from those who were currently partnered, though this group was very small (5%). Thus, it is likely that this difference is reflecting lifetime interpersonal functioning – those with a history of significant, intimate relationships likely have greater empathic skills than those without such a history. For hostility, it may be that increased presence of negative emotions made it more difficult to correctly identify emotions throughout the affective empathy task. Alternatively, people with increased hostility may genuinely not endorse

the normative emotional response to the prompts in the task – meaning they may have answered accurately for their own emotional experience, but that experience does not align with that of the normative sample. Lastly, if a participant approached the interview with increased hostility, they may have been reluctant to put forth their best effort on the task. In light of these results and those for cognitive empathy, all studies of empathy should carefully examine demographic and symptom variables for potential covariates, especially considering that results for this study differed significantly upon inclusion of control variables in each model.

**Limitations**

While this study had several strengths, including the use of a clinical sample, performance-based empathy measurement, and robust mediation and moderation analytical techniques, there were also some limitations. In addition to the measurement issues discussed above regarding the Derntl paradigm, there were some problems with the personal distress scale. While this is the traditional measure in the field used for this construct, and, in fact, the only available measure to my knowledge, it has some considerable weaknesses. First, the internal consistency was low in this sample (.56), suggesting not all items are measuring the same construct. Removal of any of the seven items on the scale did not result in an appreciably improved alpha, so all items were retained, but low internal consistency can result in needlessly conservative statistical analyses and increased risk of type II error (Warner, 2008). Of note, though this measure has been used extensively in schizophrenia research, internal consistency estimates are rarely reported. Future work is needed to either improve this scale or develop a new one. However, it may also be that personal distress is not measured well through self-report.

As mentioned above, some sort of mood induction or an observer-rated task may be more appropriate for this construct.

A self-report measure was also used to assess emotion regulation. For this study, that choice was made out of fiscal necessity and to keep interviews to a reasonable length. However, there are a number of available ways to measure emotion regulation, including performance-based and neuroimaging techniques (e.g., see Horan, Hajcak, Wynn, & Green, 2013; Strauss et al., 2013; Strauss et al., 2015; van der Meer, van't Wout, & Aleman, 2009). Further, emotion regulation as a construct has been variably defined. While Thompson's (1994) definition is widely used, it is not the only definition, and some researchers prefer to assess use of particular adaptive emotion regulation strategies, such as emotional management or attentional deployment (O'Driscoll et al., 2014). Use of a different measure in this study, either different in methodology or construct definition, may have changed results. Future work should investigate how emotion regulation measures correlate with one another, and how various emotion regulation measurement strategies impact empathy and other social cognitive constructs.

Some limitations common to many schizophrenia studies apply here, as well. This data is cross-sectional and cannot test potential longitudinal relationships. For example, this data cannot tell us if low metacognition predicts later deficits in empathy, or if the experience of personal distress might reduce over time. The sample is also somewhat small. This can limit statistical power; indeed, a sample of 84 participants would have been required for .8 power to detect medium effects in correlation analyses, and some demographic analyses were underpowered. However, the sample size here was adequate for analyses to answer main hypotheses using regression, mediation, and moderation. The

sample may also not be representative of all with schizophrenia-spectrum disorders. One notable example of this is that the sample was majority female, an unusual distribution in schizophrenia studies. Further, nearly all participants came from the same urban community mental health center. Results may differ for those in other service settings. Lastly, a fairly large number of analyses were run here, resulting in some level of alpha inflation. Alpha correction was not employed because of the relatively small sample and the early nature of this research. All results should be replicated in larger, more representative samples.

**Conclusion**

This study is the first of its kind to examine performance-based empathy with personal distress, emotion regulation, and metacognition. Taken together, results begin to answer some questions about the relationships amongst these variables, indicating that metacognition may be the most robust predictor of empathic performance. Further, results indicate that increased personal distress and reduced emotion regulation may actually convey some benefit in terms of affective empathy performance, while highlighting the need for additional work developing strong affective empathy measures. Clinically, results suggest interventions targeted to improve metacognition may be useful in enhancing empathic skills. Results point to the need for future research in a number of areas, including an examination of the cultural appropriateness of our measures for various demographic groups, development of a robust, performance-based or observer-rated measure of personal distress, and ongoing investigation of the relationship between emotion regulation and empathic interaction.

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# TABLES

Table 1 – Descriptive statistics and scale reliabilities

| Variable | N | Mean | Standard Deviation | Alpha |
|---|---|---|---|---|
| Cognitive Empathy Performance (Derntl-EPT) | 57 | 40.6 | 7.3 | n/a |
| Affective Empathy Performance (Derntl-AR) | 57 | 111.1 | 14.6 | n/a |
| Personal Distress (IRI) | 57 | 2.1 | 0.7 | .56 |
| Metacognition (MAS-A) | 58 | 12.5 | 3.4 | .70 |
| Emotion Regulation (DERS) | 57 | 2.8 | 0.8 | .93 |
| PANSS-Total | 58 | 67.1 | 14.9 | .85 |
| PANSS-Positive | 58 | 15.5 | 4.8 | .70 |
| PANSS-Negative | 58 | 16.9 | 5.2 | .75 |
| PANSS-Cognitive | 58 | 14.2 | 4.3 | .68 |
| PANSS-Emotional discomfort | 58 | 11.6 | 4.5 | .76 |
| PANSS-Hostility | 58 | 7.1 | 2.7 | .76 |

Note. Derntl-EPT = Emotional Perspective-Taking, range of 0-57; Derntl-AR = Affective Responsiveness, range of 0-150; IRI = Interpersonal Reactivity Index; scale of 0-4. MAS-A = Metacognitive Assessment Scale, Abbreviated, range of 0-28; DERS = Difficulties in Emotion Regulation Scale, scale of 1-5. PANSS = Positive and Negative Syndrome Scale; total score has a range of 30-210. PANSS-Positive has a range of 6-42. PANSS-Negative has a range of 8-56. PANSS-Cognitive has a range of 7-49. PANSS-Emotional discomfort has a range of 4-28. PANSS-Hostility has a range of 4-28.

Table 2 – Demographic characteristics (N=58)

| Variable | n | Percentage |
|---|---|---|
| Diagnosis | | |
| Schizophrenia | 36 | 62.1% |
| Schizoaffective disorder | 22 | 37.9% |
| Gender | | |
| Male | 23 | 39.7% |
| Female | 35 | 60.3% |
| Race | | |
| Black | 40 | 69.0% |
| White | 16 | 27.6% |
| Mixed Race | 1 | 1.7% |
| Not reported | 1 | 1.7% |
| Hispanic | 2 | 3.4% |
| Marital Status | | |
| Single, never married | 34 | 58.6% |
| Married or living with partner | 3 | 5.2% |
| Separated or divorced | 20 | 34.5% |
| Widowed | 1 | 1.7% |
| Education | | |
| Less than HS | 20 | 34.5% |
| HS diploma or GED | 13 | 22.4% |
| Some college | 22 | 37.9% |
| Bachelor's level degree | 3 | 5.2% |
| Employment | | |
| Paid employment | 14 | 24.1% |
| Casual work | 1 | 1.7% |
| Unemployed, but wants to work | 11 | 19.0% |
| Other (SSI/SSDI) | 32 | 55.2% |
| Housing | | |
| Homeless | 2 | 3.4% |
| Staying with friends/family temporarily | 2 | 3.4% |
| Congregate living | 8 | 13.8% |
| Semi-independent living | 3 | 5.2% |
| Living with family | 4 | 6.9% |
| Own apartment or house with spouse/partner/friends | 17 | 29.3% |
| Own apartment or house, alone | 22 | 37.9% |
| | M | SD |
| Months in current residence | 36.89 | 51.70 |
| Number of places lived in the past year | 1.84 | 1.15 |
| Age | 46.60 | 9.75 |

Table 3 - Correlations

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Cognitive Empathy Performance (Derntl-EPT) | 1 | | | | | | | | | | |
| 2. Affective Empathy Performance (Derntl-AR) | .60** | 1 | | | | | | | | | |
| 3. Metacognition (MAS-A) | .46** | .41** | 1 | | | | | | | | |
| 4. Personal Distress (IRI) | -.07 | .09 | -.13 | 1 | | | | | | | |
| 5. Emotion Regulation (DERS) | -.17 | -.07 | -.06 | .54** | 1 | | | | | | |
| 6. PANSS-Total | -.17 | -.22 | -.14 | .26 | .58** | 1 | | | | | |
| 7. PANSS-Positive | .11 | -.05 | .09 | .21 | .48** | .76** | 1 | | | | |
| 8. PANSS-Negative | -.26* | -.18 | -.23 | .15 | .27* | .68** | .20 | 1 | | | |
| 9. PANSS-Cognitive | -.40** | -.45** | -.19 | .03 | .14 | .57** | .21 | .41** | 1 | | |
| 10. PANSS-Emotional Discomfort | .11 | .16 | .00 | .32* | .58** | .74** | .65** | .35** | .04 | 1 | |
| 11. PANSS-Hostility | -.11 | -.30* | -.09 | .20 | .59** | .62** | .59** | .13 | .18 | .52** | 1 |

** Correlation is significant at the .01 level (2-tailed). * Correlation is significant at the .05 level (2-tailed). EPT = Emotional Perspective-Taking; AR = Affective Responsiveness; MAS-A = Metacognitive Assessment Scale, Abbreviated; IRI = Interpersonal Reactivity Index; DERS = Difficulties in Emotion Regulation Scale. Higher scores for the Derntl paradigm tasks and MAS-A total score indicate better performance or higher metacognitive capacity, respectively. Higher scores on the IRI Personal Distress scale and the DERS total score indicate greater experience of personal distress and reduced emotion regulation, respectively. Removing Pt. 152 (the outlier for PD) did not substantively change any of the correlation results.

Table 4 – Regression Results, Cognitive Empathy Performance

| | *B* | *SEB* | *β* | *t* | *p* | $R^2$ | Adjusted $R^2$ |
|---|---|---|---|---|---|---|---|
| **Model 1 – Personal Distress** | | | | | | | |
| Step 1 ($F(1, 54) = 0.29$, $p = .594$) | | | | | | .01 | -.01 |
| Constant | 42.35 | 2.91 | | 14.54 | .000 | | |
| Personal Distress | -0.71 | 1.32 | -0.07 | -0.54 | .594 | | |
| Step 2 ($F(5, 55) = 4.05$, $p = .004$) | | | | | | .29 | .22 |
| Constant | 61.53 | 5.93 | | 10.38 | .000 | | |
| Personal Distress | -0.96 | 1.21 | -0.10 | -0.79 | .431 | | |
| Age | -0.24 | 0.09 | -0.32 | -2.67 | .010 | | |
| Diagnosis (Schizoaffective) | 2.94 | 1.83 | 0.20 | 1.61 | .114 | | |
| Cognitive symptoms | -0.50 | 0.25 | -0.27 | -2.03 | .048 | | |
| Negative symptoms | -0.11 | 0.18 | -0.08 | -0.61 | .545 | | |
| **Model 2 – Emotion Regulation** | | | | | | | |
| Step 1 ($F(1, 54) = 1.65$, $p = .204$) | | | | | | .03 | .01 |
| Constant | 45.55 | 3.76 | | 12.13 | .000 | | |
| Emotion Regulation | -1.67 | 1.30 | -0.17 | -1.29 | .204 | | |
| Step 2 ($F(5, 50) = 4.26$, $p = .003$) | | | | | | .30 | .23 |
| Constant | 62.99 | 6.13 | | 10.28 | .000 | | |
| Emotion Regulation | -1.46 | 1.25 | -0.15 | -1.17 | .247 | | |
| Age | -0.25 | 0.09 | -0.34 | -2.83 | .007 | | |
| Diagnosis (Schizoaffective) | 2.99 | 1.80 | 0.21 | 1.67 | .102 | | |
| Cognitive symptoms | -0.44 | 0.25 | -0.24 | -1.76 | .084 | | |
| Negative symptoms | -0.09 | 0.18 | -0.07 | -0.48 | .631 | | |
| **Model 3 – Metacognition** | | | | | | | |
| Step 1 ($F(1, 55) = 14.70$, $p < .001$) | | | | | | .21 | .20 |
| Constant | 28.25 | 3.34 | | 8.45 | .000 | | |
| Metacognition | 0.99 | 0.26 | 0.46 | 3.83 | .000 | | |
| Step 2 ($F(5, 51) = 7.74$, $p < .001$) | | | | | | .43 | .38 |
| Constant | 48.95 | 6.30 | | 7.77 | .000 | | |
| Metacognition | 0.78 | 0.24 | 0.36 | 3.29 | .002 | | |
| Age | -0.22 | 0.08 | -0.29 | -2.74 | .008 | | |
| Diagnosis (Schizoaffective) | 1.80 | 1.64 | 0.12 | 1.09 | .279 | | |
| Cognitive symptoms | -0.57 | 0.22 | -0.31 | -2.62 | .011 | | |
| Negative symptoms | -0.03 | 0.17 | -0.02 | -0.17 | .866 | | |

Note. Higher scores for the cognitive empathy tasks and metacognition indicate better performance or higher metacognitive capacity, respectively. Higher scores on personal distress and emotion regulation indicate greater experience of personal distress and reduced emotion regulation, respectively. Removing Pt. 152 (the outlier for personal distress) did not substantively change any of the regression results.

Table 5 – Regression Results, Affective Empathy Performance

| | *B* | *SEB* | *β* | *t* | *p* | $R^2$ | Adjusted $R^2$ |
|---|---|---|---|---|---|---|---|
| **Model 1 – Personal Distress** | | | | | | | |
| Step 1 ($F(1, 52) = 0.26$, $p = .615$) | | | | | | .01 | -.01 |
| Constant | 108.32 | 5.92 | | 18.29 | .000 | | |
| Personal Distress | 1.36 | 2.69 | 0.07 | 0.51 | .615 | | |
| Step 2 ($F(7, 46) = 6.76$, $p < .001$) | | | | | | .51 | .43 |
| Constant | 129.09 | 7.17 | | 18.00 | .000 | | |
| Personal Distress | 0.80 | 2.19 | 0.04 | 0.37 | .716 | | |
| Diagnosis (Schizoaffective) | 5.88 | 3.27 | 0.20 | 1.80 | .079 | | |
| Race (White) | 8.52 | 3.53 | 0.27 | 2.42 | .020 | | |
| Marital (currently partnered) | 13.48 | 6.98 | 0.22 | 1.93 | .060 | | |
| Marital (separated/divorced) | 9.16 | 3.24 | 0.31 | 2.83 | .007 | | |
| Cognitive symptoms | -0.89 | 0.42 | -0.24 | -2.11 | .040 | | |
| Hostility | -2.21 | 0.62 | -.041 | -3.54 | .001 | | |
| **Model 2 – Emotion Regulation** | | | | | | | |
| Step 1 ($F(1, 52) = 0.22$, $p = .642$) | | | | | | .00 | -.02 |
| Constant | 114.64 | 7.73 | | 14.83 | .000 | | |
| Emotion Regulation | -1.25 | 2.67 | -0.07 | -0.47 | .642 | | |
| Step 2 ($F(7, 46) = 4.56$, $p < .001$) | | | | | | .54 | .46 |
| Constant | 124.78 | 7.04 | | 17.72 | .000 | | |
| Emotion Regulation | 4.12 | 2.43 | 0.21 | 1.70 | .096 | | |
| Diagnosis (Schizoaffective) | 5.29 | 3.19 | 0.18 | 1.66 | .104 | | |
| Race (White) | 8.58 | 3.38 | 0.27 | 2.54 | .015 | | |
| Marital (currently partnered) | 13.66 | 6.68 | 0.22 | 2.05 | .047 | | |
| Marital (separated/divorced) | 9.19 | 3.14 | 0.31 | 2.93 | .005 | | |
| Cognitive symptoms | -0.98 | 0.41 | -0.26 | -2.37 | .022 | | |
| Hostility | -2.78 | -0.70 | -0.52 | -3.99 | .000 | | |
| **Model 3 – Metacognition** | | | | | | | |
| Step 1 ($F(1, 53) = 9.33$, $p = .004$) | | | | | | .15 | .13 |
| Constant | 90.24 | 6.97 | | 12.94 | .000 | | |
| Metacognition | 1.65 | 0.54 | 0.39 | 3.05 | .004 | | |
| Step 2 ($F(7, 47) = 8.00$, $p < .001$) | | | | | | .54 | .48 |
| Constant | 120.19 | 8.76 | | 13.72 | .000 | | |
| Metacognition | 0.79 | 0.46 | 0.18 | 1.72 | .093 | | |
| Diagnosis (Schizoaffective) | 5.16 | 3.18 | 0.17 | 1.62 | .112 | | |
| Race (White) | 8.47 | 3.37 | 0.26 | 2.51 | .015 | | |
| Marital (currently partnered) | 10.21 | 6.87 | 0.16 | 1.49 | .144 | | |
| Marital (separated/divorced) | 8.05 | 3.21 | 0.27 | 2.51 | .016 | | |
| Cognitive symptoms | -0.98 | 0.38 | -0.27 | -2.57 | .013 | | |
| Hostility | -1.82 | 0.59 | -0.34 | -3.07 | .004 | | |

Note. Higher scores for the cognitive empathy tasks and metacognition indicate better performance or higher metacognitive capacity, respectively. Higher scores on personal distress and emotion regulation indicate greater experience of personal distress and reduced emotion regulation, respectively. Removing Pt. 152 (the outlier for personal distress) did not substantively change any of the regression results.

Table 6 - Mediation Results, Cognitive Empathy Performance

| **Basic Mediation Model** | | | | |
|---|---|---|---|---|
| | Coefficient | SE | *t* | *p* |
| Outcome: Emotion Regulation (*a* path) | | | | |
| Constant | 1.59 | 0.25 | 6.47 | <.001 |
| Personal Distress | 0.58 | 0.11 | 5.17 | <.001 |
| Outcome: Cognitive Empathy (*b* and *c'* paths) | | | | |
| Constant | 45.36 | 3.87 | 11.73 | <.001 |
| Emotion Regulation | -1.89 | 1.60 | -1.18 | .243 |
| Personal Distress | 0.38 | 1.60 | 0.24 | .812 |
| Indirect Effect | Bootstrap Estimates | | 95% Confidence interval | |
| | Effect | SE | Lower | Upper |
| Effect of Personal Distress on Cognitive Empathy through Emotion Regulation | -1.09 | 1.02 | -3.31 | 0.81 |

| **Mediation Model with Control Variables** | | | | |
|---|---|---|---|---|
| | Coefficient | SE | *t* | *p* |
| Outcome: Emotion Regulation (*a* path) | | | | |
| Constant | 1.16 | 0.55 | 2.12 | .039 |
| Personal Distress | 0.55 | 0.11 | 4.89 | <.001 |
| Diagnosis (Schizoaffective) | 0.08 | 0.17 | 0.46 | .644 |
| Age | -0.01 | 0.01 | -1.09 | .281 |
| Cognitive Symptoms | 0.04 | 0.02 | 1.80 | .078 |
| Negative Symptoms | 0.02 | 0.02 | 1.08 | .284 |
| Outcome: Cognitive Empathy (*b* and *c'* paths) | | | | |
| Constant | 63.07 | 6.21 | 10.16 | <.001 |
| Emotion Regulation | -1.32 | 1.53 | -0.86 | .392 |
| Personal Distress | -0.24 | 1.47 | -0.16 | .873 |
| Diagnosis (Schizoaffective) | 3.04 | 1.84 | 1.66 | .104 |
| Age | -0.25 | 0.09 | -2.77 | .008 |
| Cognitive Symptoms | -0.45 | 0.26 | -1.75 | .087 |
| Negative Symptoms | -0.09 | 0.18 | -0.47 | .640 |
| Indirect Effect | Bootstrap Estimates | | 95% Confidence interval | |
| | Effect | SE | Lower | Upper |
| Effect of Personal Distress on Cognitive Empathy through Emotion Regulation | -0.72 | 0.95 | -2.72 | 1.12 |

Note. Higher scores for the cognitive empathy tasks and metacognition indicate better performance or higher metacognitive capacity, respectively. Higher scores on personal distress and emotion regulation indicate greater experience of personal distress and reduced emotion regulation, respectively. Removing Pt. 152 (the outlier for personal distress) did not substantively change any of the mediation results.

Table 7 - Mediation Results, Affective Empathy Performance

| **Basic Mediation Model** | | | | |
|---|---|---|---|---|
| | Coefficient | SE | *t* | *p* |
| Outcome: Emotion Regulation (*a* path) | | | | |
| Constant | 1.59 | 0.25 | 6.47 | <.001 |
| Personal Distress | 0.58 | 0.11 | 5.17 | <.001 |
| Outcome: Affective Empathy (*b* and *c'* paths) | | | | |
| Constant | 113.54 | 7.88 | 14.41 | <.001 |
| Emotion Regulation | -3.80 | 3.27 | -1.16 | .250 |
| Personal Distress | 4.05 | 3.27 | 1.24 | .221 |
| Indirect Effect | Bootstrap Estimates | | 95% Confidence interval | |
| | Effect | SE | Lower | Upper |
| Effect of Personal Distress on Affective Empathy through Emotion Regulation | -2.19 | 2.11 | -7.05 | 1.55 |

| **Mediation Model with Control Variables** | | | | |
|---|---|---|---|---|
| | Coefficient | SE | *t* | *p* |
| Outcome: Emotion Regulation (*a* path) | | | | |
| Constant | 0.58 | 0.34 | 1.71 | .094 |
| Personal Distress | 0.52 | 0.10 | 4.98 | <.001 |
| Diagnosis (Schizoaffective) | 0.08 | 0.16 | 0.54 | .592 |
| Race (White) | -0.10 | 0.17 | -0.58 | .563 |
| Marital (Currently partnered) | 0.15 | 0.33 | 0.44 | .661 |
| Marital (Divorced/separated) | -0.42 | 0.15 | -0.27 | .787 |
| Cognitive Symptoms | 0.02 | 0.02 | 0.96 | .342 |
| Hostility | 0.12 | 0.03 | 4.11 | <.001 |
| Outcome: Affective Empathy (*b* and *c'* paths) | | | | |
| Constant | 125.88 | 7.21 | 17.45 | <.001 |
| Emotion Regulation | 5.51 | 3.02 | 1.82 | .075 |
| Personal Distress | -2.05 | 2.65 | -0.77 | .443 |
| Diagnosis (Schizoaffective) | 5.41 | 3.20 | 1.69 | .100 |
| Race (White) | 9.06 | 3.45 | 2.62 | .012 |
| Marital (Currently partnered) | 12.67 | 6.83 | 1.86 | .070 |
| Marital (Divorced/separated) | 9.39 | 3.16 | 2.97 | .005 |
| Cognitive Symptoms | -1.00 | 0.42 | -2.40 | .021 |
| Hostility | -2.88 | 0.71 | -4.05 | <.001 |
| Indirect Effect | Bootstrap Estimates | | 95% Confidence interval | |
| | Effect | SE | Lower | Upper |
| Effect of Personal Distress on Affective Empathy through Emotion Regulation | 2.86 | 1.61 | **0.31** | **6.95** |

Note. Higher scores for the cognitive empathy tasks and metacognition indicate better performance or higher metacognitive capacity, respectively. Higher scores on personal distress and emotion regulation indicate greater experience of personal distress and reduced emotion regulation, respectively. Removing Pt. 152 (the outlier for personal distress) did not substantively change any of the mediation results.

Table 8 - Moderation Results, Cognitive Empathy Performance

| Variable | Coefficient | SE | *t* | *p* |
|---|---|---|---|---|
| Cognitive Empathy, no control variables: $R^2 = .17$, $F = 3.67$, $p = .018$ | | | | |
| Constant | 24.74 | 11.78 | 2.10 | .041 |
| Metacognition | 1.30 | 0.88 | 1.48 | .146 |
| Personal Distress | 2.15 | 5.10 | 0.42 | .675 |
| Interaction Term | -0.19 | 0.39 | -0.48 | .633 |
| Cognitive Empathy, control variables added: $R^2 = .42$, $F = 4.94$, $p < .001$ | | | | |
| Constant | 37.20 | 11.34 | 3.28 | .002 |
| Metacognition | 1.85 | 0.83 | 2.24 | .030 |
| Personal Distress | 5.98 | 4.78 | 1.25 | .217 |
| Interaction Term | -0.50 | 0.36 | -1.40 | .169 |
| Diagnosis (Schizoaffective) | 1.61 | 1.74 | 0.93 | .359 |
| Age | -0.23 | 0.08 | -2.74 | .009 |
| Cognitive Symptoms | -0.67 | 0.24 | -2.78 | .008 |
| Negative Symptoms | 0.00 | 0.17 | -0.01 | .996 |

Note. Higher scores for the cognitive empathy tasks and metacognition indicate better performance or higher metacognitive capacity, respectively. Higher scores on personal distress and emotion regulation indicate greater experience of personal distress and reduced emotion regulation, respectively. Removing Pt. 152 (the outlier for personal distress) did not substantively change any of the moderation results.

Table 9 - Moderation Results, Affective Empathy Performance

| Variable | Coefficient | SE | *t* | *p* |
|---|---|---|---|---|
| Affective Empathy, no control variables: $R^2$ = .17, $F$ = 3.59, $p$ = .020 | | | | |
| Constant | 65.18 | 24.07 | 2.71 | .009 |
| Metacognition | 3.16 | 1.80 | 1.75 | .086 |
| Personal Distress | 11.07 | 10.42 | 1.06 | .293 |
| Interaction Term | -0.65 | 0.79 | -0.82 | .417 |
| Affective Empathy, control variables added: $R^2$ = .58, $F$ = 6.82, $p$ < .001 | | | | |
| Constant | 81.12 | 18.74 | 4.33 | <.001 |
| Metacognition | 3.99 | 1.48 | 2.70 | .010 |
| Personal Distress | 20.27 | 8.55 | 2.37 | .022 |
| Interaction Term | -1.48 | 0.65 | -2.29 | **.027** |
| Diagnosis (Schizoaffective) | 3.62 | 3.18 | 1.14 | .262 |
| Race (White) | 7.87 | 3.33 | 2.36 | .023 |
| Marital (Currently partnered) | 10.12 | 6.76 | 1.50 | .142 |
| Marital (Divorced/separated) | 7.68 | 3.15 | 2.44 | .019 |
| Cognitive Symptoms | -1.26 | 0.42 | -3.00 | .005 |
| Hostility | -1.89 | 0.61 | -3.08 | .004 |

Note. Higher scores for the cognitive empathy tasks and metacognition indicate better performance or higher metacognitive capacity, respectively. Higher scores on personal distress and emotion regulation indicate greater experience of personal distress and reduced emotion regulation, respectively. Removing Pt. 152 (the outlier for personal distress) did not substantively change any of the moderation results.

# FIGURES

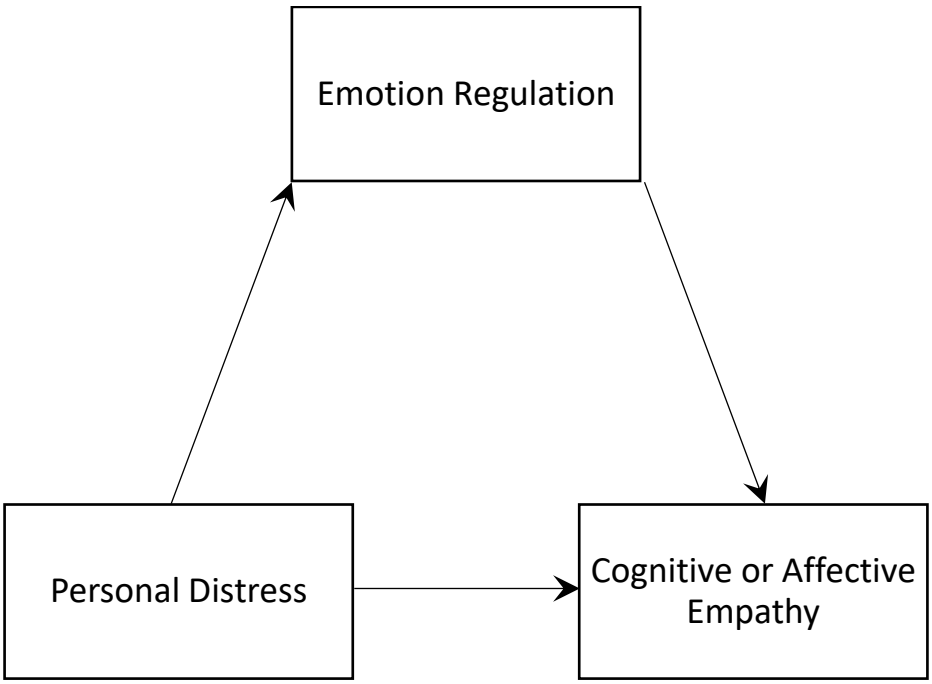


Figure 1. Conceptual model of hypothesized mediation of the relationship between personal distress and empathy by emotion regulation.

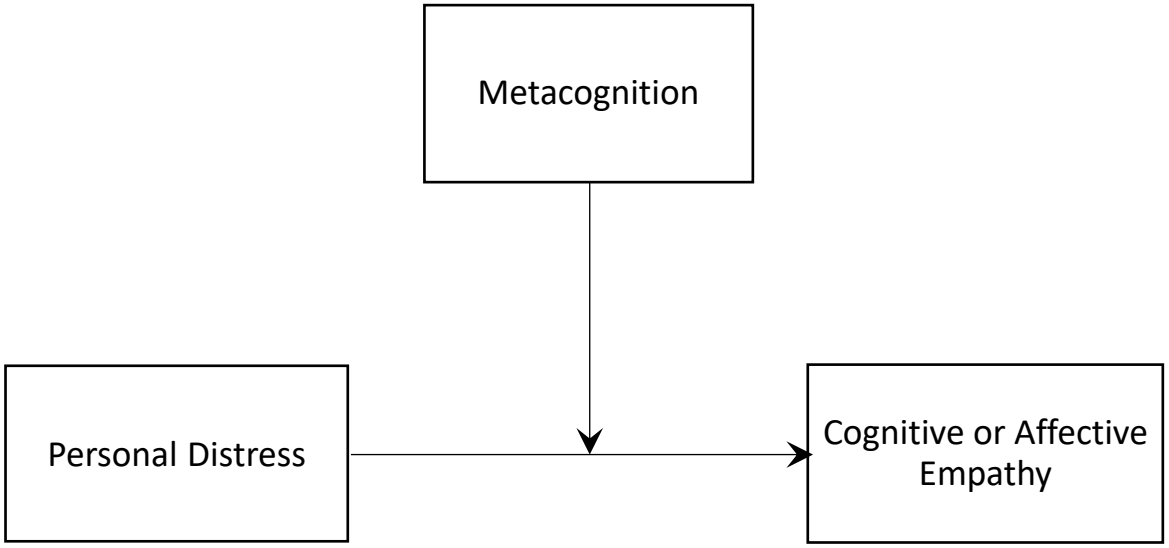


Figure 2. Conceptual model of hypothesized moderation of the relationship between personal distress and empathy by metacognition.

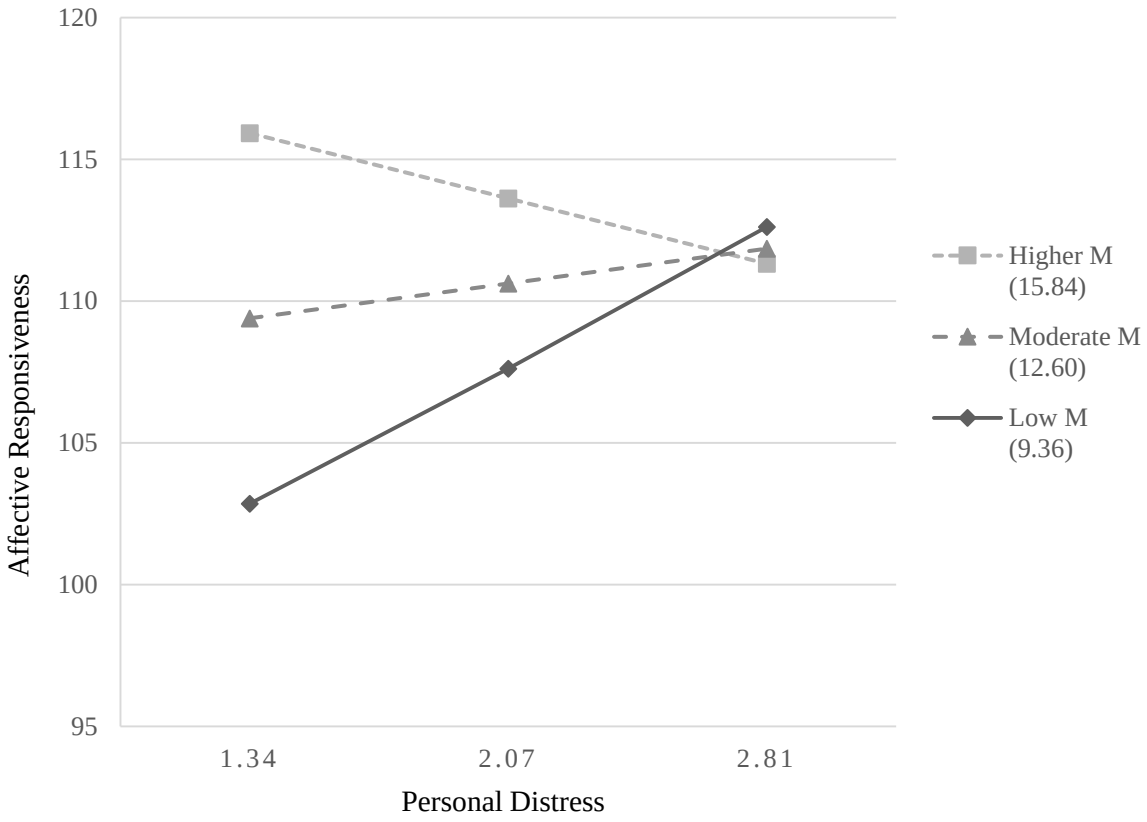


Figure 3. Visualization of relationship between personal distress and affective empathy, moderated by metacognition total scores. M=Metacognitive Assessment Scale-Abbreviated (MAS-A) total score. Visualization created using the pick-a-point approach, with lines plotted at the mean of personal distress as well as +/- one standard deviation. For plotting, all control variables are held at their mean from this data.