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SOCIAL COGNITION: EMPIRICAL CONTRIBUTION

THE DEVELOPMENTAL BUILDING BLOCKS OF PSYCHOPATHIC TRAITS: REVISITING THE ROLE OF THEORY OF MIND

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In the context of personality disorder development, theories of typical and atypical development both emphasize social cognition as an important building block for personality development. Prior claims of intact theory of mind (ToM) abilities in psychopathic individuals have relied upon a narrow conception of ToM as equivalent to "cognitive empathy." In this article, the authors make use of a broader conception of ToM comprising top-down and bottom-up processing, as well as the fractionation of ToM in terms of reduced or excessive ToM function, to examine relationships between ToM and psychopathic traits. A total of 342 adolescents (ages 12–17; *Mage* 15.39; *SD* = 1.45; 61.5% females) completed the Movie Assessment for Social Cognition (Dziobek, Fleck, Kalbe, et al., 2006) and the Child Eyes Test (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) in addition to three measures of psychopathic traits. Results demonstrated unique relations between the affective components of psychopathy (callous-unemotional traits [CU traits]) and impairment in both top-down and bottom-up ToM. In addition, excessive ToM related to affective components of psychopathy, while reduced or no ToM related to behavioral components of psychopathy. In mediational analyses, bottom-up ToM was shown to be necessary for top-town ToM in its relation with CU traits. Taken together, these results from the study lend support to revisiting the link between ToM and psychopathy.

This special issue of the *Journal of Personality Disorders* is organized around one of the core tenets of developmental psychopathology, namely, that typical development and atypical development are mutually informative. Developmental psychopathology is therefore not the study of pathological development per se, but the study of the basic mechanisms that cause developmental pathways to diverge toward pathological or typical outcomes (Cicchetti, 2006; Rutter & Sroufe, 2000). In the context of personality disorder development (the specific topic of this special issue), theories of typical (e.g., Bandura, 1999) and atypical development (Sharp & Fonagy, 2008b) both

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emphasize social cognition as an important building block for personality development. Social cognition refers to the mental processes involved in perceiving, attending to, remembering, thinking about, and making sense of the people in our social world (Moskowitz, 2005), or the ability to understand ourselves and others as individuals with beliefs, feelings, and personality (Mitchell, Macrae, & Banaji, 2004).

A social-cognitive construct that has received much attention in both developmental and psychopathology literature over the past 20 years is theory of mind (ToM). Originally coined by Premack and Woodruff (1978), ToM is defined as the natural human capacity to interpret the behavior of others within a mentalistic framework—that is, an individual's ability to ascribe desires, feelings, thoughts, and beliefs to others and to employ this ability to interpret, anticipate, and influence others' behavior (Sharp, Fonagy, & Allen, 2012). The typical developmental progression of ToM capacity is relatively well charted (Astington & Jenkins, 1995; Baron-Cohen, 2002, 2003) and while there is certainly a hard-wired component to ToM, data suggest considerable impact of the social environment on ToM development leading to identifiable individual differences (e.g., Carpendale & Lewis, 2004; see also Sharp & Fonagy, 2008a). Due to the interpersonal nature of personality pathology, ToM's role in a variety of personality disorders has been investigated (see, e.g., Brüne, Abdel-Hamid, Sonntag, Lehmkämper, & Langdon, 2009, and Sharp & Fonagy, 2008b, for reviews), including psychopathy, a disorder characterized by callous affect, interpersonal insensitivity, manipulation of others, violence, and crime (Cleckley, 1941; Hare, 1970).

Several authors have concluded that ToM does *not* play a role in the development of psychopathy, with one of the strongest positions articulated by Blair (2006), who stated that "there are no indications of Theory of Mind impairment in psychopathy" (p. 5). Support for this conclusion is based on several studies. Blair et al. (1996) used the Strange Stories task, an advanced test of ToM (Happé, 1994), in which participants are tested on their ability to understand nonliteral statements, including lies, white lies, jokes, pretending, misunderstanding, persuasion, appearance/reality, figures of speech, sarcasm, forgetting, double bluff, and contrary emotions (e.g., "Emma has a frog in her throat"), and found no ToM deficits in adults with psychopathy. Similarly, Richell et al. (2003) used an advanced ToM test (the "Reading the Mind in the Eyes Test" [RMET]; Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Baron-Cohen et al., 2001) and demonstrated null findings for adult psychopaths. In this task, participants are presented with only the eye region of the face and asked to pick which of four words best describes what the person in the photo is thinking or feeling. In further support of this null finding, Blair (2006) also pointed out that few data exist for ToM deficits in the broader spectrum of antisocial individuals. For instance, Happé and Frith (1996) assessed standard false-belief understanding in 6- to 12-year-old children, and although children were reported by their teachers to be impaired in their everyday use of social insight, they were as adept at passing false belief tasks as was expected for their age. Similar negative findings were reported by Buitelaar, Van der Wees, Swabb Barneveld, and Van der Gaag (1999) for conduct disordered children using a range of first-order

ToM tasks, including a picture sequencing measure (Baron-Cohen, Leslie, & Frith, 1986); appearance–reality task, mental–physical distinction task, and the concept of the brain task (Baron-Cohen, 1989); M&Ms false belief task (Perner, Frith, Leslie, & Leekam, 1989); and "Sally-Ann" false belief task with cuddle toys (Baron-Cohen, Leslie, & Frith, 1985), as well as second-order ToM tasks, all variations on the second-order belief attribution task developed by Perner and Wimmer (1985). Sutton, Smith, and Swettenham (1999) also demonstrated null findings for 7- to 10-year-old bullies using stories that required mental state understanding.

Based on studies discussed here, Blair (2006) instead opted for characterizing the interpersonal deficits associated with psychopathic traits in the context of impairment in "emotional empathy" as measured, for instance, by emotion recognition tasks of fear and sadness. While these studies are certainly convincing, it would be wrong to conclude that there are no indications of ToM impairment in psychopathy. These studies have relied on a definition and conceptualization of ToM, which we will term a "narrow" view of ToM. The narrow definition conceptualizes ToM simply as "cognitive empathy" as opposed to "emotional empathy" (e.g., Blair, 2006). Here, we put forward the idea that equating ToM with cognitive empathy reflects only one dimension in recent models of ToM function that acknowledge its fractionated nature. The narrow view of ToM therefore does not reflect several rich conceptualizations of ToM informed by recent findings in basic social neuroscience and clinical neuropsychology. Space does not permit a full discussion of these models, but we provide a brief discussion of prominent "broad" conceptualizations of ToM that take into account its multifaceted nature.

First, from a clinical neuropsychology perspective, in line with 20 years of child development literature and other prominent definitions of ToM (e.g., Abu-Akel, 2008; Crespi & Badcock, 2008a, 2008b; Lieberman, 2007; see also Apperly et al., 2010; Apperly, Samson, & Humphreys, 2009), Samson (2009) defines ToM as the capacity to understand (a) that people experience different types of mental states (e.g., emotions, desires, intentions, beliefs), (b) how these mental states arise (e.g., emotions cause certain desires), (c) how mental states are connected to behaviors, and (d) that others may not hold the same mental states (perspective) in the same environment. Clearly then, as articulated by Samson and others, ToM involves both low-level mindreading mechanisms termed bottom-up processes and top-down processes. Bottom-up processes (e.g., mirror neuron systems [see Rizzolatti & Craighero, 2004, for a review] and the empathy network [see Singer, Critchley, & Preuschoff, 2009, for a review]) allow for action mirroring, emotional contagion, facial emotion recognition, and attentional cuing. These processes are thought to come on line early in development, and function automatically and rather inflexibly. In contrast, top-down processing refers to more cognitively demanding ToM processing required for the computation of other people's intentions, beliefs, and desires. Here, mere facial emotion recognition or action mirroring would not be enough. Rather, bottom-up (lower level) processing is integrated with constructing a *representation* of someone else's mind, taking into account a dynamic, changing environment, as well

as knowledge about past events and knowledge about the person. Crucially, in forming such representations, self-perspective needs to be suspended; otherwise it can interfere with the formation of the representation of the other's mind. Also, top-down (higher level) ToM reasoning is probabilistic—that is, we do not *know for certain* what others think or feel—we merely hypothesize mental states given all the information at hand (Lieberman, 2007). For this kind of processing, basic neuroscience has suggested an important role for the prefrontal cortex (e.g., Shallice, 2001) and left temporoparietal junction (Apperly, Samson, Chiavarino, & Humphreys, 2004; Samson, Apperly, Chiavarino, & Humphreys, 2004). Not surprisingly, given its increased cognitive demands, top-down ToM develops later and is less automatic and more flexible than bottom-up ToM.

The distinction between bottom-up and top-down ToM function fits nicely with Lieberman's (2007) description of two distinct neural systems that cut across several major social-cognitive processes, namely, automatic versus controlled processing and internal (e.g., mind) versus external features (e.g., features of the face) processing. Regarding the former, automatic processing involves the amygdala, basal ganglia, ventromedial PFC, lateral temporal cortex, and dorsal anterior cingulate cortex, while controlled processing is associated with lateral PFC, medial PFC, lateral parietal cortex, medial parietal cortex, medial temporal lobe, and rostral anterior cingulate cortex (Satpute & Lieberman, 2006). For the second dimension (processing of internal vs. external features), Lieberman (2007) suggests that externally focused processes are associated with a lateral frontotemporoparietal network, whereas internally focused processes are associated with a medial frontoparietal network. Fonagy and Luyten (2009) expanded this fractionation of ToM further to incorporate four dimensions of ToM function: automatic/controlled, cognitive/affective, internal/external-based, and self/other focused (see also Sharp et al., 2013).

Of course, it is unlikely that ToM function (and associated experimental paradigms) exclusively recruit the extremes of any of the dimensions outlined above. The brain is simply too complex for such neat and easy solutions. However, even more unlikely is the notion that ToM function can adequately be captured by the extreme of only one dimension (cognitive empathy) as reflected in prior work on the ToM-psychopathy link. In this article, we seek to revisit the issue of ToM impairment associated with psychopathic traits using a broad conceptualization of ToM. Doing so moves the psychopathy literature beyond the use of tasks tapping into singular aspects of ToM. To this end, we present data using the Movie Assessment for Social Cognition (MASC; Dziobek, Fleck, Kalbe, et al., 2006). Not only is this task a measure of top-down ToM, hitherto unexplored in psychopathy, but it also goes beyond other advanced measures of ToM (Baron-Cohen et al., 2001; Happé, 1994; Sharp, Croudace, & Goodyer, 2007), which tend to measure only singular aspects of ToM, by more closely resembling the demands of everyday-life ToM (Dziobek, Fleck, Kalbe, et al., 2006). As such, the MASC was developed as a naturalistic, video-based instrument for the assessment of ToM that allows for the usual dichotomous (right/wrong) response format, which is reflected in its total score. In addition, a qualitative

error analysis is conducted where wrong choices (distracters) correspond to one of three error categories: (a) "less ToM" (undermentalizing) involving insufficient mental state reasoning, resulting in incorrect, "reduced" mental state attribution, in which case a research participant may refer to mental states but in an impoverished way; (b) "no ToM" (no mentalizing) involving a complete lack of ToM—in this case, a research participant may fail to use any mental state term in explaining behavior; and (c) "excessive ToM" (hypermentalizing) reflecting overinterpretative, unjustified mental state reasoning (Montag et al., 2009).

Whereas the MASC is heavily dependent on contextual cues, requiring the participant to infer mental states from complex and dynamic indicators that include but also go beyond the external features of the face, the Child's Eye Task (CET; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) calls on an individual's capacity to read the mental states of others from external cues, a decontextualized display of just the eye region of the face. The CET was developed from the RMET discussed earlier. It therefore taps what Lieberman (2007) refers to as externally focused social cognition, and is viewed as a task that taps lower level (bottom-up) ToM function due to its reduced complexity and reliance on more automatic processing. Thus, while the CET only requires inferences of the content of another person's mental state (based on the perception of the eye region of a face), the MASC requires participants to reason causally about the movie characters' likely behavior and feelings based on those movie characters' mental states. In adding the CET to the battery, we were interested in whether negative findings using the CET (Richell et al., 2003; Sutton et al., 1999) could be replicated in the present sample. We were also interested in whether lower level ToM function (as measured by the CET) was necessary for higher level ToM processing (as measured by the MASC). We therefore set out to test a mediational model in which MASC performance mediated the relationship between CET performance and psychopathic traits.

In exploring these relationships, we also acknowledged the multicomponent nature of psychopathy. Research with children and adolescents has identified three dimensions of psychopathy (Andershed, Kerr, Sattin, & Levander, 2002; Cooke & Michie, 2001; Frick, 2009): (a) affective (shallow emotions, absence of guilt, callousness and lack of empathy, lack of responsibility for one's own actions), (b) interpersonal (superficial charm, grandiosity, manipulation and pathological lying), and (c) behavioral/lifestyle (impulsivity, irresponsibility, a need for stimulation, a parasitic lifestyle and a lack of realistic long-term goals). It is generally accepted that the first of these (callous-unemotional traits [CU traits]) uniquely distinguishes psychopathy from other antisocial behavior. CU traits are also believed to be the component of psychopathy that lies at the heart of the interpersonal impairment characteristic of psychopaths and most predictive of poor outcomes. We therefore hypothesized that ToM impairment would be uniquely associated with CU traits. Against the background of recent discussions of the limitations of self-report psychopathy measures (Kotler & McMahon, 2005; Sharp & Kine, 2008), we assessed psychopathy using multiple measures, including the Antisocial Process Screen Device (APSD; Frick, O'Brien,

Wootton, & McBurnett, 1994), which is the most often used measure of psychopathic traits in children and adolescents; the Inventory of Callous-Unemotional Traits (ICU; Essau, Sasagawa, & Frick, 2006), which was developed to address some of the validity issues found in studies using the APSD; and finally the Youth Psychopathic Traits Inventory (YPI; Van Baardewijk et al., 2008), often thought of as the best self-report measure of psychopathic traits because it tricks research participants into revealing undesirable characteristics of the self.

Taken together, by fractionating ToM function both conceptually and experimentally and applying it to subcomponents of a personality disorder, this study demonstrates how typical development and atypical development are mutually informative. Positive results would suggest ToM to be a basic mechanism that causes developmental pathways to diverge, with outcomes that may include high levels of psychopathic traits.

METHODS

PARTICIPANTS

Adolescents were recruited from a 16-bed inpatient psychiatric unit that usually serves individuals with severe behavioral and emotional disorders who have not responded to previous interventions. The inclusion criterion was sufficient proficiency in English to consent to research and complete the necessary assessments, and exclusion criteria were a diagnosis of schizophrenia or another psychotic disorder, an autism spectrum diagnosis, or an IQ of less than 70. Of 420 adolescents who were approached for consent, 26 declined participation, 23 revoked consent, and 17 were excluded on the basis of the aforementioned criteria. Additionally, 12 participants were excluded because of missing data. Therefore, the final sample consisted of 342 adolescents (ages 12–17; *Mage* 15.39; *SD* = 1.45), including 213 (61.5%) females and 134 (38.5%) males, and had the following ethnic breakdown: 82.3% White (*n* = 251), 6.6% Hispanic (*n* = 20), 3.6% Asian (*n* = 11), 2.6% Black (*n* = 8), and 4.9% Mixed (*n* = 15).

MEASURES

Top-Down ToM Function. Top-down ToM function was assessed through the MASC (Dziobek, Fleck, Kalbe, et al., 2006), a computerized test for the assessment of implicit theory of mind or mentalizing abilities that approximates the demands of everyday life (Smeets, Dziobek, & Wolf, 2009). Examples of test stimuli are included in the online supplemental material provided in Sharp et al. (2011). Subjects were asked to watch a 15-minute film about four characters getting together for a dinner party. Themes of each segment covered friendship and dating issues. During administration of the task, the film is stopped at 45 points during the plot and questions referring to the characters' mental states (feelings, thoughts, and intentions) are asked (e.g., "What is Betty feeling?", "What is Cliff thinking?"). Participants are provided with four responses options: (a) an excessive ToM

(hypermentalizing) response, (b) a less ToM (undermentalizing) response, (c) a no ToM (no mentalizing) response, and (d) an accurate ToM (mentalizing) response. To derive a summary score of each of the subscales, points were simply added, so that, for instance, a subject who chose mostly hypermentalizing response options would have a high hypermentalizing score. The MASC is a reliable instrument that has proven sensitive in detecting subtle mindreading difficulties in adults of normal IQ (Dziobek, Fleck, Kalbe, et al., 2006) and in young adults (Smeets et al., 2009), as well as in patients with bipolar disorder (Montag et al., 2009) and autism (Dziobek, Fleck, Rogers, Wolf, & Convit, 2006). Therefore, compared to more traditional ToM tasks, the MASC is more sensitive in detecting mindreading difficulties than tasks that would show ceiling effects in older children and adults.

Lower Level ToM Function (Emotion Recognition). The CET (Baron-Cohen et al., 2001) was adapted from the adult Reading the Mind in the Eyes Test developed by Baron-Cohen et al. (1997). The test comprises 28 photographs of the eye region of the face. The participants were asked to pick which of four words best describes what the person in the photo is thinking or feeling. Three of the four words are foil mental state terms, while the fourth is deemed "correct." The position of the four words is randomized for each item.

Psychopathic Traits. Psychopathic traits were assessed with three measures. First, the Antisocial Process Screening Device *(*APSD; Frick et al., 1994) is a 20-item self-report measure designed to assess traits associated with the construct of psychopathy similar to those assessed by the Psychopathy Checklist-Revised (PCL-R; Hare, 1991). Each item on the APSD is scored 0 = *not at all true*, 1 = *sometimes true*, or 2 = *definitely true*. Previous studies have reported that the APSD appears to best fit a three-factor structure, composed of the dimensions Narcissism, Callous/Unemotional, and Impulsivity (Vitacco, Rogers, & Neumann, 2003). Internal consistency previously reported for the self-report version of the APSD in a community sample was adequate for Total Score (.78–.81) but less so for factor scores, which ranged from .50 to .68 (Munoz & Frick, 2007). For the current sample, internal consistencies were poor, at .64, .53, and .56, respectively.

Second, the Inventory of Callous-Unemotional Traits (ICU; Essau et al., 2006) is a 24-item self-report questionnaire designed to assess callous-unemotional traits, measuring three dimensions of behavior: callousness, uncaring, and unemotional. Items were scored on a four-point Likert scale (0 = *not at all true*, 1 = *somewhat true*, 2 = *very true*, 3 = *definitely true*). Previous studies have shown the ICU to be reliable in a large sample of adolescents; internal consistency ranged from .70 to .81 for the full-scale and callous and uncaring subscales and was .64 and .53 for the unemotional subscale (Essau et al., 2006; Kimonis et al., 2008). In the current sample, the ICU full-scale, callous, uncaring, and unemotional subscales had internal consistencies of .82, .66, .80, and .81, respectively. Importantly, as a whole, all subscales are designed to assess CU traits.

Finally, the Youth Psychopathic Traits Inventory (YPI; Andershed et al., 2002) and its child version, the Youth Psychopathic Trait Inventory–Child Version (YPI-CV; Van Baardewijk et al., 2008) were used in the current study to index psychopathic traits. The YPI is a 50-item self-report measure of the personality traits associated with psychopathy. It is composed of 10 five-item subscales measuring different psychopathic traits. The YPI has three higher order factors: (a) an interpersonal factor, composed of the subscales dishonest charm, grandiosity, lying, and manipulation; (b) an affective factor, composed of the subscales callousness, unemotionality, and remorselessness; and (c) a lifestyle factor, composed of the subscales impulsiveness, thrill-seeking, and irresponsibility. Respondents were asked to rate the degree to which the individual statements or items apply, using a four-point Likert-type scale (1 = *Does not apply at all*, 2 = *Does not apply well*, 3 = *Applies fairly well*, and 4 = *Applies very well*). Good concurrent, external, and predictive validity data for the YPI have been reported (Van Baardewijk et al., 2008). In the current sample, the internal consistency was .92 for the total score, .92 for the interpersonal subscale, .81 for the affective subscale, and .84 for the lifestyle subscale.

The Youth Self-Report. The Youth Self-Report (YSR; Achenbach, 1991) is a measure of psychopathology completed by adolescents. The measure contains 112 problem items, each scored on a 3-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, or 2 = *very or often true*). The measure yields a number of scales, some empirically derived (the Syndrome Scales) and some theoretically based (the *DSM*-Oriented Scales). The Total Problems scale yields a *T*-score of general psychiatric functioning and therefore provides an important index of overall psychiatric severity. Given the inpatient nature of our sample, it was important to include overall psychiatric severity as a potential confounding variable in analyses.

RESULTS

DESCRIPTIVE STATISTICS

Means and standard deviations of the main study variables are reported in Table 1. Comparison of the means suggests that psychopathy in the current sample was comparable to other adolescent clinical samples. For instance, the mean for the CU subscale of the APSD was 3.76 (*SD* = 2.1), which is comparable to the clinical control sample reported by Woodworth and Waschbusch (2008) (*M* = 3.59, *SD* = 1.77). Similar findings were reported for the ICU total score in Jones, Happé, Gilbert, Burnett, and Viding (2010) (*M* = 25.88, *SD* = 4.57) compared to the current sample (*M* = 24.35, *SD* = 9.12). Comparisons to forensic and community samples are displayed in Table 1 and further demonstrate that the current sample evidenced levels of psychopathic traits similar to those of forensic samples (with one exception—see Pardini, Lochman, & Frick, 2003 vs. Essau et al., 2006 and the current sample).

TABLE 1. Descriptive Statistics and Comparison With Published Samples

	Current Sample				Forensic Samples				Forensic Samples			
	Min	Max	*M*	*SD*	Min	Max	*M*	*SD*	Min	Max	*M*	*SD*
Age (n = 448)	12	17	15.39	1.45	—	—	~15	—	—	—	~15	—
YSR Total Problems (*n* = 354)	1	90	64.35	11.04	—	—	—	—	—	—	—	—
Eyes Test (*n* = 337)	6	27	19.98	2.86	—	—	—	—	—	—	—	—
MASC-Less ToM (*n* = 342)	0	18	3.28	2.35	—	—	—	—	—	—	—	—
MASC-No ToM *(n* = 342)	0	8	1.83	1.68	—	—	—	—	—	—	—	—
MASC-Exc ToM (*n* = 342)	1	26	7.94	3.77	—	—	—	—	—	—	—	—
MASC-Total Correct (*n* = 342)	10	42	31.95	5.2	—	—	—	—	—	—	—	—
YPI Total Score (n = 300)	1	3	2.12	.44	—	—	2.52[b]	0.4	—	—	1.51f	.35
YPI Lifestyle (n = 300)	1	4	2.51	.55	—	—	—	—	—	—	1.83[f]	.50
YPI Affective (*n* = 300)	1	3	1.93	.49	—	—	—	—	—	—	1.42[f]	.35
YPI Interpersonal (*n* = 300)	1	4	1.97	.58	—	—	—	—	—	—	1.34[f]	.37
ICU Total (*n* = 345)	3	48	24.35	9.12	—	—	23.96[c]	9.41	—	—	26.54[e]	7.4
ICU Unemotional (*n* = 345)	0	15	7.78	3.61	—	—	7.5[c]	3.03	—	—	7.4[e]	2.7
ICU Uncaring (*n* = 345)	0	24	9.45	4.69	—	—	8.68[c]	5.16	—	—	9.2[e]	3.8
ICU Callousness (*n* = 345)	0	32	7.12	4.18	—	—	5.29[c]	4.82	—	—	8.0[e]	4.4
APSD Narcissism (*n* = 346)	0	13	4.43	2.61	—	—	—	—	—	—	—	—
APSD Impulsivity (*n* = 346)	0	10	5.63	1.9	—	—	1.11[a]	.33	—	—	—	—
APSD CU (*n* = 346)	0	11	3.76	2.1	—	—	.93[a]	.36	0	8	2.89[d]	1.73

Note. [a]Pardini et al., 2003; [b]Fairchild et al., 2009; [c]Kimonis et al., 2008; [d]Hipwell et al., 2012; [e]Essau et al., 2006; [f]van Baardewijk et al., 2008. YSR = Youth Self Report, MASC-Less ToM = Movie Assessment for Social Cognition Less Theory of Mind subscale, MASC-No ToM = MASC No Theory of Mind subscale, MASC-Exc ToM = MASC Excessive Theory of Mind subscale, ICU = Inventory of Callous-Unemotional Traits, APSD = Antisocial Process Screening Device, APSD CU = APSD Callous-Unemotional subscale.

THE RELATIONSHIP BETWEEN GLOBAL THEORY OF MIND AND PSYCHOPATHIC TRAITS

Table 2 summarizes the bivariate correlations between ToM variables and psychopathy variables. Focusing just on the total score of the MASC (first row) and the total score of the CET (fifth row), the CU subscales of the APSD and the callous subscale of the ICU correlated negatively with both MASC total score and CET, while no behavior/impulsive subscales correlated with ToM variables. However, some exceptions to a complete or unique pattern of CU-ToM impairment were observed. First, the APSD narcissism subscale also correlated negatively with the MASC total score. A final exception to a complete pattern of CU-ToM impairment correlations was that no relationship was observed between the YPI affective subscale and the CET.

TABLE 2. Correlations Between Main Study Variables

	Total ToM	Exc ToM	No ToM	Less ToM	CET	APSD CU	APSD Imp	APSD Narc	ICU Callous	ICU Unc	ICU Unem	YPI Int	YPI Aff	YPI Lifest	Age	Sex	YSR Total
TotalToM	—	−.78**	−.55**	−.56**	.34**	−.20**	.06	−.21**	−.22**	−.08	.04	−.02	−.14*	.01	.32**	−.14**	−.06
ExcToM	—	—	.14*	.03	−.22**	.20**	.05	.26**	.22**	.08	.03	.13*	.14*	.08	−.26**	.14**	−.20**
NoToM	—	—	—	.28**	−.16**	.11*	−.13*	.05	.14*	.04	−.09	.005	.10	−.01	−12*	.05	−.03
LessToM	—	—	—	—	−.30**	.04	−.11*	.01	.05	.02	−.06	−.17**	.01	−.12	−.20**	.06	−.16**
CET	—	—	—	—	—	−.23**	−.003	−.14*	−.17**	−.11*	.01	.02	−.07	.07	.04	−.20**	−.02
APSD_CU	—	—	—	—	—	—	.28**	.32**	.53**	52**	.26**	.29**	.50**	.31**	−.07	.16**	.24**
APSD_Imp	—	—	—	—	—	—	—	.47**	.36**	.42**	.14*	.46**	.25**	.66**	.06	.03	.41**
APSD-Narc	—	—	—	—	—	—	—	—	.41**	.39**	.14*	.62**	.39**	.43**	−.03	.02	.41**
ICU_Callous	—	—	—	—	—	—	—	—	—	.45**	.24**	.40**	.54**	.33**	−.08	.09	.37**
ICU_Unc	—	—	—	—	—	—	—	—	—	—	.17**	.36**	.44**	.40**	.03	.12*	.24**
ICU_Unem	—	—	—	—	—	—	—	—	—	—	—	.17**	.38**	.03	.05	.001	.23**
YPI_Int	—	—	—	—	—	—	—	—	—	—	—	—	.46**	.61**	.04	.08	.31**
YPI_Aff	—	—	—	—	—	—	—	—	—	—	—	—	—	.21**	.05	.20**	.16**
YPI_Lifest	—	—	—	—	—	—	—	—	—	—	—	—	—	—	−.002	.02	.38**
Age	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.05	−.04
Sex	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	−.06

Note. TotalToM = Movie Assessment for Social Cognition (MASC) total score, ExcToM = MASC Excessive Theory of Mind subscale, NoToM = MASC No Theory of Mind subscale, LessToM = MASC Less Theory of Mind subscale, CET = Child Eyes Test total score, APSD_CU = Antisocial Process Screening Device Callous-Unemotional subscale, APSD_Imp = APSD Impulsivity subscale, APSD-Narc = APSD Narcissism subscale, ICU_Callous = Inventory of Callous-Unemotional Traits Callous subscale, ICU_Unc = ICU Uncaring subscale, ICU_Unem = ICU Unemotional subscale, YPI_Int = Youth Psychopathic Traits Inventory Interpersonal subscale, YPI_Aff = YPI Affective subscale, YPI_Lifest = YPI Lifestyle subscale.

To determine whether APSD CU uniquely associated with ToM, we ran two separate regression analyses with the three APSD subscales (CU, impulsivity, narcissism) as independent variables and MASC total score and CET total score as dependent variables, respectively. With MASC total score as dependent variable, all APSD subscale scores retained significance: CU ($\beta = -.15$; $p = .004$), impulsivity ($\beta = .21$; $p < .001$), narcissism ($\beta = -.24$; $p < .001$). With CET as dependent variable, similar results were found: CU ($\beta = -.22$; $p < .001$), impulsivity ($\beta = .12$; $p < .04$), narcissism ($\beta = -.13$; $p < .02$).

To determine whether the YPI affective subscale uniquely associated with ToM, we ran similar analyses as described for the APSD, with YPI subscales as independent variables. With MASC total score as dependent variable, only the YPI affective subscale retained significance ($\beta = -.21$; $p = .003$). The lifestyle ($\beta = .02$; $p = .76$) and interpersonal ($\beta = .12$; $p = .18$) subscales did not retain significance.

THE RELATIONSHIP BETWEEN TOP-DOWN THEORY OF MIND COMPONENTS AND PSYCHOPATHIC TRAITS CONTROLLING FOR PSYCHIATRIC SEVERITY, AGE, AND GENDER

When unpacking different components of top-down ToM processing by scrutinizing correlations between psychopathy dimensions and excessive ToM, no ToM, or less ToM, a general pattern of associations between CU traits and excessive ToM emerges, while no Tom and less ToM appear to be associated with several aspects of psychopathy. Specifically, less ToM was negatively correlated with APSD Impulsivity as well as YPI Interpersonal Problems. No ToM was positively correlated with APSD CU and ICU Callous and was negatively correlated with APSD Impulsivity.

That CU may relate to excessive ToM was a surprise because disorders associated with high affect (e.g., reactive aggression, anxiety, depression) are usually associated with excessive ToM (Crespi & Badcock, 2008b; Sharp et al., 2011). Consistent with the notion that excessive ToM may relate to general psychiatric severity, results shown in Table 2 indicate that excessive ToM also correlated with the YSR Total Problems score at .19 ($p < .001$). To explore whether general psychiatric status or severity of psychopathology (as indexed by the YSR Total Problems score) in this inpatient sample was driving the relationship between excessive ToM and CU, we next ran a linear regression using the CU variable that showed the strongest correlation with excessive ToM (ICU callous subscale) as an outcome variable. We included excessive ToM, YSR Total Problems score as an index of overall psychiatric severity, gender, and age as independent variables. Excessive ToM retained significance ($\beta = .12$; $p = .01$) along with YSR total problems ($\beta = .33$; $p < .001$) and gender ($\beta = .10$; $p = .04$). Regressions using other CU indices (APSD CU and YPI Affective) produced similar results, underscoring the finding that CU traits are associated with excessive ToM.

THE RELATIONSHIP BETWEEN BOTTOM-UP THEORY OF MIND AND PSYCHOPATHIC TRAITS, CONTROLLING FOR AGE AND GENDER

Next, we explored the confounding effects of gender for the CET-CU relationship given the known gender differences for CET performance. For consistency, we chose the ICU callous subscale as outcome variable, also because the ICU was specifically developed for assessing CU traits. CET performance, YSR Total Problems score, gender, and age were entered as independent variables. CET retained significance ($\beta = -.14$; $p = .006$) along with YSR Total Problems ($\beta = .35$; $p < .001$), but not gender ($\beta = .09$; $p = .06$). The same analyses were conducted for APSD CU and similar results were found. Regression analyses were not conducted for the YPI affective subscale as dependent variable because the CET and the YPI affective subscale did not correlate at the bivariate level of analyses (see Table 2).

MASC PERFORMANCE MEDIATES THE RELATIONSHIP BETWEEN CET PERFORMANCE AND PSYCHOPATHIC TRAITS

We used the total MASC score and the CU variable that showed the strongest correlation with overall MASC (ICU callous subscale) to examine the Samson (2009) model of ToM as it relates to CU: That is, lower level ToM (CET) leads to top-down ToM problems (MASC total score), thereby affecting levels of CU traits (ICU callous). The Preacher and Hayes (2008) test of the indirect effect was used to test this hypothesis because limits of the Sobel test have been noted. Before testing for mediation, formal detection-tolerance and the variance inflation factor (VIF) were used to assess multicollinearity. Because multicollinearity was not a problem, with tolerance greater than .2 and a VIF less than 4 for all variables, centering the predictor variables was not necessary (Aiken & West, 1991; Hombeck, 2002). When running the Preacher and Hayes macro, a bootstrap test of the indirect effects of impairment on the CET through the proposed mediator (MASC performance) is performed. This test confirmed that CET performance may lead to reduced MASC performance, which in turn may increase level of CU traits, with the mean of the indirect effect across all bootstrap samples estimated at –.03 and a resulting confidence interval that did not include 0 (CI = –.1737 to –.0328), which does not include the 0 value (Preacher & Hayes, 2008).

DISCUSSION

Our overall aim in the current article was to revisit the role of ToM in psychopathic traits using a broad conceptualization of ToM. Our secondary aim was to use the examination of the ToM-psychopathy link to demonstrate that the study of clinical populations may inform our understanding of basic processes in typical development. Regarding the overall aim, we argued that prior research examining the psychopathy-ToM link has adhered to a narrow definition of ToM that ignores its fractionated nature. The broad definition of ToM now guides most conceptualizations of ToM in the social

neuroscience, developmental, and clinical neuropsychology literature, and we put forward the notion that adhering to the narrow definition of ToM will not resolve the long-standing mixed findings for the ToM-psychopathy link. In addition, that ToM is not a unitary function makes it ideal for studying dissociable social-cognitive processes in atypical development that may inform our understanding of basic processes—the focus of this special issue.

In examining the relationship between global ToM impairment (total MASC score and CET) and psychopathic traits, we found that both top-down (total MASC score) and bottom-up (CET) ToM related uniquely to CU traits on the YPI, but not on the APSD self-report measure. The APSD self-report version has been criticized for not being a valid measure of psychopathic traits due to low internal consistency and some problems in its concurrent validity (Lee, Vincent, Hart, & Corrado, 2003; Munoz & Frick, 2007; Sharp & Kine, 2008). Indeed, internal consistency in the current sample was unacceptable (see Measures section). With the YPI and ICU CU subscales robustly associated with both top-down and bottom-up ToM, we conclude that CU uniquely associates with ToM despite the nondifferentiated findings for the APSD.

In examining components of top-down ToM (excessive ToM, reduced ToM, no ToM) and psychopathic traits, we found that when the broad definition of ToM is used, a pattern emerges for top-down ToM function, such that excessive ToM and reduced ToM differentially associate with unique aspects of psychopathy. Specifically, the affective-interpersonal component of psychopathy appears to relate to excessive ToM, whereas reduced ToM relates to both affective and more behaviorally based psychopathy traits. Moreover, the association between excessive ToM and CU traits was not a function of overall psychiatric severity because the predictive significance of ToM held in multivariate analyses. Excessive ToM (Dziobek, Fleck, Kalbe, et al., 2006), can be defined as a top-down social-cognitive process that involves making unjustified assumptions about other people's mental states that go so far beyond observable data that the average observer will struggle to see how they are justified (Sharp et al., 2013). As such, excessive ToM involves overattribution of mental states to others and their likely misinterpretation, similar perhaps to what is captured in studies of hostile attribution biases in social-information processing studies of antisocial behavior (e.g., Dodge, 1993).

The picture for more lower level ToM function (as measured by the CET) was different, in that reduced ToM was uniquely associated with CU. From an information processing approach this would make sense. CU traits are associated with lower level ToM impairment (e.g., emotion recognition as demonstrated here), which leads to errors in top-down ToM function manifesting as excessive ToM (see also model of hypermentalizing in Sharp, in press). Why lower level ToM deficits (such as emotion understanding) may manifest as excessive ToM in higher level ToM processing is open for debate. One suggestion by Langdon and Brock (2008) whose research on schizophrenic patients has also shown both reduced ToM and excessive ToM, is that schizophrenic patients engage in excessive ToM when task demands increase and ToM stimuli allow for the inappropriate attribution of

self-knowledge to other people. In schizophrenic patients, lower level ToM impairment leads to the egocentric projection of one's own suspicions and biases into innocent others and ambiguous situations (excessive ToM). Given the known narcissistic characteristics associated with psychopathy, a similar process may be at play for psychopathy. This notion is further supported by the positive mediational role demonstrated here for MASC performance in the relationship between CET performance and CU traits. This finding suggests that top-down ToM function may partly rely on lower level ToM function (emotion understanding).

This interpretation of our findings stands in contrast to the interpretation of those who view psychopathy as mainly an affective disorder. The paradox of psychopathy lies in the co-occurrence of the capacity for ToM (as demonstrated by studies reviewed in the Introduction) together with the existence of deficits in interpersonal relationships. This paradox has led authors such as Blair and others to conclude that the interpersonal deficits associated with psychopathy lie in the affective domain (psychopathic individuals understand others' pain, but cannot feel it). Here, we suggest using the broad definition of ToM that impairments in socio-affective *and* cognitive processing are integrated to produce ToM impairment at different stages of a social information processing sequence, and at different stages of development. For instance, the negative findings for CET performance in psychopathy are mostly in samples of adults, with child samples demonstrating significant associations (Sharp, 2008). Perhaps there is more affect in psychopathy after all—a sentiment suggested by recent findings of high rates of both reactive and proactive aggression associated with psychopathy (Blair, 2010; Glenn & Raine, 2009; Reidy, Zeichner, & Martinez, 2008). This may be most true at earlier stages of development when cortical regions are not yet compensating for early reduced (but not absent) amygdala functioning, which later becomes more apparent in adult psychopathy (Richell et al., 2003).

These conclusions are tentative due to several limitations. First of all, in this study we have equated lower order, bottom-up ToM with emotion recognition as measured by the CET (or RMET). Currently, there is significant debate in the literature about what the RMET and CET measure, and it is true that some studies using the RMET have distinguished more complex social emotions from basic emotions (Adolphs, Baron-Cohen, & Tranel, 2002). Our approach in the current study to equate the CET with more basic emotion recognition, however, fits with a neuropsychological conception of what the brain does when it interprets one eye region (CET: cognitive and affective, but basic processing) versus a whole sequence of events as depicted in a movie (cognitive and affective, but complex reasoning).

Another limitation specific to the study design is the use of a clinical sample. Although a clinical sample should produce adequate variability in psychopathic traits, it is characterized by significant heterogeneity and severity of psychiatric problems. Therefore, any relationships we found between ToM function and psychopathy may be a function of psychiatric caseness or severity and not specific to CU traits. We tried to address this limitation by controlling for general psychiatric severity using the YSR total score, and by comparing our sample to other forensic and clinical samples, but the hy-

potheses put forward in this article need to be tested in a forensic sample of adolescents with psychopathy as well as in a sample of adolescents drawn from the community. Moreover, while relationships with dimensional psychopathic traits are useful, hypotheses should also be tested in a group design in which psychopathy is assessed through interview-based assessments (like the PCL-YV) in addition to self-report. Finally, we employed mediational analyses to investigate whether bottom-up ToM processing was necessary for top-down processing, but due to the correlational nature of the data, causal processes cannot be assumed.

Notwithstanding these limitations, we have challenged the notion that no evidence exists for a ToM-psychopathy link, both conceptually and empirically. We also have demonstrated that ToM, due to its fractionated nature, and its clearly charted developmental trajectory, is ideally suited for adhering to the core tenet of developmental psychopathology which is the focus of this special issue. By demonstrating dissociable ToM processing for different components of psychopathy, we have shed light on the normal function of these ToM processes. Disturbance in affect is going to be associated with hypermentalizing, while disturbance in more behavioral domains will be associated with undermentalizing. We can therefore imagine in typical development that those high on an emotion dysregulation continuum, including reactive aggression, are more likely to engage in excessive ToM, while those high on social skills deficits are more likely to undermentalize. Although we were not able to parse out the effects of reactive and proactive aggression in relation to psychopathic traits in the current study, these are questions for future research at the intersection between typical and atypical development.

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