How do individuals high in psychopathic traits represent
others' beliefs and actions?

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Abstract

Individuals high in psychopathic traits are known for manipulating others, while having at the same time a lack of empathy. An open question is whether the lack of empathy leads them to represent other persons' beliefs and actions *less* strongly or whether their manipulative character leads them to represent other persons' beliefs and actions *more* strongly.

Confirming past research, three experiments show a negative correlation between psychopathic traits and self-reported empathy. In addition, the results from an implicit Theory of Mind task (Experiment 1) demonstrate that the higher individuals score on psychopathic traits, the more they represent other persons' beliefs. Additionally, results from an imitation task (Experiment 1) as well as from a Joint Simon task (Experiment 2) demonstrate that high psychopathic traits are predictive for a stronger representation of other persons' actions.

However, a higher-powered study (Experiment 3) could not replicate the finding that psychopathic traits correlate with implicit Theory of Mind and Joint Simon effects.

Theoretical implications and limitations of the experiments are discussed.

Keywords: Psychopathy; empathy; joint action; imitation; Theory of Mind; Joint Simon

Being charming and giving (e.g., Hare, 1991; Harpur, Hakstian, & Hare, 1988), but having a profound lack of empathy (Mullins-Nelson, Salekin, & Leistico, 2006) and a callous disregard for the wellbeing of others (e.g., Blair, 1995; Hare, 1991) is known to be the profile of a psychopathic individual. Although psychopathy as a personality disorder itself is not yet part of the DSM IV or the ICD 10, in the last decade clinical and forensic research developed quite some interest for psychopathy (e.g., Blair, 2001). Interestingly, psychopathy has also been studied as a personality trait that is distributed normally in the general population (e.g., Levenson, Kiehl, & Fitzpatrick, 1995; Lilienfeld, 1994). Based on this research, it is generally agreed that psychopathy is constituted of two core components: emotional dysfunction and antisocial behavior (e.g., Frick, O'Brien, Wootton, & McBurnett, 1994; Harpur et al., 1988).

Psychopathy is typically defined by a set of emotional and interpersonal disturbances that are often associated with antisocial behavior (Hare, 1999). A profound lack of empathy, a callous disregard for the wellbeing of others and the manipulation of others are often considered the hallmarks of psychopathy (Babiak & Hare, 2006; Hare, 1999). Given these emotional and interpersonal deficits, it is not surprising that individuals with psychopathy commit more crimes (Hare & Jutai, 1983) and are more prone to recidivism (Ganzer & Sarason, 1973) than other clinical and forensic populations. Psychopathic criminals are also often more aggressive (Heilbrun, 1979) and violent than other offenders (Hare & McPherson, 1984). Beside criminality, the manipulative character of individuals with psychopathy becomes also apparent within organizations. In this context, being smooth, having adroit manipulative conversations, having the will to put others down, accomplishing lies, being ruthless and opportunistic or acting in calculated ways are just a few characteristics that individuals with psychopathy use to manipulate others (Boddy, 2006; Walker, 2005). Their success in manipulating others may be based on the fact that their strategies are very difficult to recognize allowing them to gain easily others' confidence (Mahaffey & Marcus, 2006).

One reason why individuals with psychopathy are so ruthless and manipulative might be their reduced empathic responding to others (Hare, 1991; Mullins-Nelson et al., 2006), because it seems that they have difficulties in feeling other persons' pain. In line with this notion, research found that individuals high on psychopathic traits have problems in processing emotions. For example, individuals with high psychopathic traits are impaired in the recognition of emotional faces (Ali & Chamorro-Premuzic, 2010; Montagne et al., 2005; Sharp & Vanwoerden, 2014; Snowden, Craig, & Gray, 2013), display less differentiated emotional responses to affective stimuli (Patrick, 1994), smaller skin conductance responses to fearful or distressing stimuli (Blair, Jones, Clark, & Smith, 1997; Hare, 1978; Ogloff & Wong, 1990), and difficulties in processing or producing emotional language (Day & Wong, 1996; Hare, Williamson, & Harpur, 1988).

In general, the above-reviewed literature indicates that psychopathy is equally characterized by manipulative tendencies and by a lack of empathy. Based on this discrepancy, the question arises to which degree individuals with high psychopathic traits actually represent other persons' beliefs and actions. On the one hand, one could assume that due to their lack of empathy individuals with high psychopathic traits should have a *reduced* tendency to represent others' beliefs and actions. On the other hand, one could assume that in order to manipulate others, individuals with high psychopathic traits represent others' beliefs and actions *more* strongly.

Representing other persons' beliefs and actions

Without the ability to represent others, society would hardly be imaginable. Social interactions, from collective hunting over playing soccer to criminal justice, critically depend on the ability to infer others' beliefs and actions. Such abilities have been suggested to be crucial preconditions for the evolution of the cooperative social structure in human societies (Herrmann, Call, Hernández-Lloreda, Hare, & Tomasello, 2007).

In terms of belief representations, research has shown that individuals simulate their own beliefs, but also the beliefs of others (for an overview, see Decety & Grèzes, 2006). Such representations can be shared both intrasubjectively (i.e., within oneself) and intersubjectively (i.e., between self and other). For example, a social-cognitive construct that has received much attention in the literature is Theory of Mind (ToM; Premack & Woodruff, 1978). ToM is defined as the natural human capacity to represent and interpret others' beliefs within a mentalistic framework—that is, an individual's ability to ascribe desires, feelings and thoughts to others and to employ this ability to interpret, anticipate, and influence others' behavior (Sharp, Fonagy, & Allen, 2012).

In line with these findings, recent investigations on the representation of other person's actions indicate that the perception of action performed by other individuals leads to an activation of one's own motor representation (e.g., Hamzei et al., 2003). For example, watching mouth, foot, or hand actions elicits activation in the premotor and superior parietal cortices, which are normally involved in the execution of these actions (Buccino et al., 2001). It is further assumed that humans' representations of others' actions may be emulated covertly or overtly in different ways in the central nervous system (for an overview, see Decety & Grèzes, 2006).

To test the degree to which individuals with high psychopathic traits represent other persons' beliefs and actions, past research has mainly studied the representation of others' beliefs, but not the representation of others' actions. That is, past research has mainly focused on explicit measures. The results suggest that psychopathic individuals are similarly good in inferring others' beliefs from simple stories (Blair et al., 1996; Dolan & Fullam, 2004; Jones, Happé, Gilbert, Burnett, & Viding, 2010) and from static pictures of the eye region (Dolan & Fullam, 2004; Richell et al., 2003) as control participants. Likewise, research on cognitive, but not emotional ToM (for a distinction see Low & Perner, 2012) found no differences between psychopathic and control individuals (Gray, Jenkins, Heberlein, & Wegner, 2011;

Shamay-Tsoory, Harari, Aharon-Peretz, & Levkovitz, 2010). However, it is important to note that such explicit measures are insensitive to more subtle deficits and susceptible to ceiling effects—in which participants perform at 100% or near 100% accuracy—in healthy as well as patient groups (for a review, see Dodell-Feder, Lincoln, Coulson, & Hooker, 2013). By taking this critique into account we aimed at testing the relationship between psychopathic traits and the representation of other persons' beliefs and actions by applying *implicit* measures.

Implicit measures of the representation of other persons' beliefs and actions

Probably, the most classic way of measuring the representation of other persons' beliefs is the assessment of ToM in false beliefs tasks (e.g., Wellman, Cross, & Watson, 2001). Almost two decades ago, Kovács, Téglás and Endress (2010; for a more critical view, see Kulke, von Duhn, Schneider, & Rakoczy, 2018) introduced an implicit version to measure ToM. In this task, participants were presented with different animated videos in which an agent (i.e. a blue smurf) was watching a ball rolling behind an occluder. The ball could then remain behind the occluder or roll out and leave the scene. At this point the agent left the scene and the video could continue in two different ways with the ball remaining in its current position (in or out of the scene) or changing its position (leaving the scene or coming back behind the occluder). In the last scene of the videos, the agent came back to the scene and the occluder fell down revealing the presence (50% of the cases) or the absence (50% of the cases) of the ball. At the end of the video participants had to press a button as fast as possible if the ball was behind the occluder. Kovács et al. found that participants were faster in detecting the ball not only when they had seen the ball rolling behind the occluder but also when only the agent believed the ball to be behind the occluder. This result has been taken as evidence that individuals automatically represent others' beliefs. Interestingly, recent research has shown that neural mechanisms for such implicit ToM overlaps with more explicit measures of ToM (Bardi, Desmet, Nijhof, Wiersema, & Brass, 2016).

The ability to represent other persons' actions is apparent in imitation and in joint action. Research on imitation has shown that individuals imitate a wide range of different behaviors, such as facial expressions (Dimberg, 1982), postures (LaFrance, 1982), gestures (Bernieri, 1988; Cracco, Genschow, Radkova, & Brass, 2018), or simple movements (Brass, Bekkering, Wohlschläger, & Prinz, 2000; Genschow & Florack, 2014; Genschow, Florack, & Wänke, 2013; Genschow & Schindler, 2016; Hofree, Urgan, Winkielman, & Saygin, 2015). According to ideomotor theory (e.g., Greenwald, 1970; Prinz, 1990, 1997), imitation is the result of shared perception-action codes that cause observed, but also anticipated actions (Genschow, Bardi, & Brass, 2018; Genschow & Brass, 2015; Genschow, Klomfar, d'Haene, & Brass, 2018) to be represented in the same format as executed actions. These shared representations provide a common ground for information on the self and others, suggesting an intrinsic overlap between self and other in the brain (e.g., Lamm, Bukowski, & Silani, 2016). Probably, the most common implicit task to measure automatic imitation is the imitation-inhibition task introduced by Brass et al. (2000). In this task, participants respond to two different numbers on the screen with two different finger movements while seeing either compatible finger movements or incompatible finger movements. The general finding is that participants make more errors when seeing incompatible compared to compatible finger movements and speed up their responses when seeing compatible compared to incompatible finger movements (for a meta-analysis, see Cracco, Bardi, et al., 2018). These findings suggest that individuals automatically represent other persons' actions leading to facilitated executions of compatible movements. An advantage of this task is that it is a more reliable task than traditional mimicry tasks used in social psychology (Genschow et al., 2017).

Similar to automatic imitation, joint action has been suggested to require the sharing of representations with others, anticipation of their behaviors, and coordination of one's own actions with those of others (Sebanz, Bekkering, & Knoblich, 2006). Many demonstrations of such co-representations have used special variations of the Simon task (Simon, 1990; Simon,

Hinrichs, & Craft, 1970). The standard Simon effect occurs if left and right key presses are made to non-spatial form attributes, such as red or green squares that are presented on the left or right side of a computer screen. Although stimulus location is completely irrelevant in such tasks, spatial stimulus response (S-R) compatibility consistently produces better performance than incompatibility (De Jong, Liang, & Lauber, 1994; Lu & Proctor, 1995; Simon & Rudell, 1967). Importantly, the Simon effect is usually not observed when an individual participant performs a simple go/nogo response (Ansorge & Wühr, 2004), suggesting that only responses that are spatially coded can be automatically activated by spatially corresponding stimuli. Interestingly, Sebanz, Knoblich and Prinz (2003) found the reappearance of the Simon effect in a go/nogo task when another individual performed the complementary go/nogo task. In this experiment, Sebanz et al. implemented three tasks. In the individual go/nogo task, participants performed the Simon task, in which participants reacted to one of two stimuli with just one arm. In the Joint Simon task two participants sat alongside each other and performed together the complementary go/nogo Simon task while each participant reacted with one arm towards one of two stimuli. In the standard Simon task, participants reacted with both hands to both stimulus attributes. The authors found a Simon effect in the standard Simon task, but not in the Individual go/nogo task. However, the Simon effect reappeared in the Joint Simon task indicating that both actors formed shared representations, such that the action alternative of the other person was also present (see also Sellaro, Treccani, Rubichi, & Cubelli, 2013).

Overview of research

To test the relationship between psychopathy and the ability to represent other persons' beliefs and actions we conducted three experiments, in which we applied implicit reaction time based measures. To assess individuals' representation of other persons' beliefs we applied an adapted version of Kovács et al.'s (2010) implicit ToM task in Experiment 1. To test whether psychopathy is also related to the representation of other persons' *actions*, we additionally applied the imitation-inhibition task (Brass et al., 2000). To obtain a more

specific measure of individuals' representation of other persons' actions in the context of joint action and to control the effects for cognitive control, in Experiment 2, we applied the Joint Simon task (Sebanz et al., 2003). Finally, in Experiment 3, we aimed at replicating the findings obtained in Experiment 1 and 2 within a higher-powered experiment and by assessing psychopathic traits with additional scales. To test whether psychopathy is related to empathy, we assessed in all experiments the Interpersonal Reactivity Index (IRI; Davis, 1980). We made openly accessible all our data and the stimulus material at the Open Science Framework (OSF) under the following link: <https://osf.io/954ah/>.

Experiment 1

Method

Participants. In exchange for 10 €, 40 Participants (32 female, 8 male) with an age ranging from 18 to 46 ($M = 24.20$; $SD = 5.07$) took part in the experiment. All participants were tested individually in individual cubicles and gave written informed consent.

Procedure. Firstly, participants completed an adapted version of the implicit ToM task introduced by Kovács et al., (2010), which lasted around 30 minutes. This task is implicit, because it makes no reference to other persons' beliefs, and requires no behavioral predictions of what agents will do on the basis of their beliefs. Concretely, participants watched 84 animated videos of Buzz Lightyear, a fictional toy space ranger hero in the *Toy Story* franchise. The first 4 videos served as practice block and the remaining 80 videos as test block. In all the videos, the agent (Buzz Lightyear) first enters a room and places a ball on a table. The ball then rolls behind an occluder. Afterwards, the videos randomly continue in four different ways depending on the experimental conditions. Each condition was presented once in the practice block and 20 times in the test block. The critical manipulation involves the participants' and the agent's belief of whether the ball is behind the occluder or not. That is, the ball either stays behind the occluder or rolls away. Then, the agent leaves the room and participants have to press the space bar as fast as possible. While the agent is gone,

participants either observe a change of the ball's position or not. A change can be observed in two ways. First, in the condition, in which the ball stayed behind the occluder, the ball leaves. Second, in the condition, in which the ball rolled away, the ball returns. Crucially, the agent has no "belief" of these changes as he has left the room. Shortly after the agent reenters the room, the occluder falls down. Based on a random selection, the ball is now visible or not. Similar to a go/nogo task, participants have to press as fast as possible the space bar as soon as the agent leaves the room and again if the ball is present. It is important to note that the agent's beliefs are never mentioned to participants. To prepare the data for the analysis, only trials in which participants actually reacted toward the ball were considered. To exclude very fast and very slow reaction times, latencies below the first percentile ($N = 16$) and beyond the 99th percentile ($N = 15$) of all latencies were discarded.

Secondly, participants completed the imitation-inhibition task (Brass et al., 2000). In this task participants had to lift either their index or middle finger in response to a number displayed on a computer screen (e.g., 1 = *index finger*, 2 = *middle finger*) while simultaneously viewing a hand producing either a congruent or incongruent finger movement, or no movement (baseline). In congruent trials, the observed hand executed an identical finger movement as the participants, whereas in incongruent trials the observed movement was different from the instructed one. The imitation-inhibition task contained a practice block (24 trials) and an experimental block (150 trials). The experimental block consisted of 50 incongruent trials, 50 congruent trials and 50 baseline trials. In each trial, participants first placed their right forefinger and right middle finger on a light box that could measure press releases. Each video sequence began with a 500 ms lasting frame that mirrored the participants' hand position. Two frames lasting 34 ms then showed the number and the finger movement (congruent and incongruent trials) or the number on the not-moving hand (baseline trials). The video sequences in the congruent and incongruent trials finished with the finger being lifted up (500 ms).

Thirdly, we assessed participants' psychopathic traits with the 26-item long Dutch version of *Levenson's Self-Report of Psychopathy* (LSRP; Levenson et al., 1995). For each item participants indicated whether they agree or disagree on a 4-point scale (1 = *strongly disagree*, 2 = *disagree somewhat*, 3 = *agree somewhat*, 4 = *strongly agree*). The scale underlies a two-factor structure: The Primary Psychopathy factor (LSRP-I), assessing the callous/manipulative lifestyle associated with psychopathy, and the Secondary Psychopathy factor (LSRP-II) assessing behavioral problems associated with psychopathy. Cronbach's alpha was $\alpha = .81$ for LSRP-I, $\alpha = .77$ for LSRP-II, and $\alpha = .82$ for the total score.

Fourthly, participants completed the Dutch version (De Corte et al., 2007) of the Interpersonal Reactivity Index (IRI; Davis, 1980) to assess empathy. In this scale, 28 items are scored on a 5-point rating scale ranging from 0 (does not describe me well) to 5 (describe me very well). The scale is divided into four dimensions, each containing 7 items: Perspective Taking (Cronbach's $\alpha = .84$), Fantasy (Cronbach's $\alpha = .85$), Empathic Concern (Cronbach's $\alpha = .71$), and Personal Distress (Cronbach's $\alpha = .81$).

Finally, participants indicated basic demographic characteristics, were proofed for suspicion, debriefed and dismissed.

Results

None of the participants correctly guessed the hypotheses or was able to indicate the goal of the ToM task. To analyze our data, we first tested whether our results are consistent with previous findings of the implicit TOM task and the imitation-inhibition task.

ToM task. The results of the ToM task are depicted in Figure 1. In order to analyze the ToM task, we first compared the baseline condition (P-A-) with the other conditions. The baseline condition should be the slowest condition, because only in the baseline condition neither the agent nor the participant believed the ball behind the occluder. As in previous studies, this condition differed significantly from the conditions where participants believed that the ball is behind the occluder (P+A- and P+A+), $t(39) > 3.14$, $p < 0.003$, $dz > .49$.

Interestingly, participants also responded faster in the condition where they, but not the agent, believed that the ball is behind the occluder (P+A-) compared to the condition, where only the agent believed that the ball is behind the occluder (P-A+), $t(39) = 2.43$, $p = .02$, $dz = .38$.

The critical comparison for ToM involves the baseline condition (P-A-) and the condition where only the agent believed that the ball is behind the occluder (P-A+). If participants would not represent the agent's belief, they should be equally slow in this condition compared to the baseline condition. However, replicating previous findings, they were faster than in the baseline condition when only the agent believed that the ball is behind the occluder, $t(39) = 2.15$, $p = 0.04$, $dz = .34$.

Imitation-inhibition task. To analyze the imitation-inhibition task we first tested differences in the error rates (i.e. moving the incorrect finger). The means are depicted in Figure 2. The analysis indicates that participants made more errors in incongruent trials than in congruent trials, $t(39) = 6.73$, $p < .001$, $dz = 1.07$, and in baseline trials $t(39) = 6.31$, $p < .001$, $dz = .97$. No significant effect emerged between the congruent condition and the baseline condition, $t(39) = .51$, $p = .61$.

The analysis of the reaction times (see Figure 3 for means) indicates that participants lifted their fingers faster in congruent trials than in baseline trials, $t(39) = 8.65$, $p < .001$, $dz = 1.35$ and in incongruent trials, $t(39) = 8.32$, $p < .001$, $dz = 1.31$. Likewise, participants responded slower in incongruent trials than in baseline trials, $t(39) = 4.06$, $p < .001$, $dz = .91$.

Psychopathy. To prepare the data for analyses, we first calculated the ToM score by dividing the condition, in which only the agent believed that the ball was behind the occluder (P-A+) from the baseline condition in which the participants and the agent did not believe that the ball was behind the occluder (P-A-). High values indicate strong representations of others' beliefs. Second, we calculated congruency effects for the imitation-inhibition task. For the error rates we subtracted congruent trials from incongruent trials and for latencies we

subtracted incongruent trials from congruent trials. High values indicate strong representations of others' actions.

Table 1 gives a general overview over the results. In line with past research (e.g., Mullins-Nelson et al., 2006), psychopathy correlated negatively with crucial subfactors of empathy. That is, it correlated negatively with perspective-taking and empathic concern. More important for our hypothesis, however, are the positive correlations between psychopathy and the ToM score and between psychopathy and the error rate of the imitation-inhibition task. This indicates that the higher individuals score on psychopathic traits, the more they represent others' beliefs and actions. Interestingly, neither the ToM score nor the imitation-inhibition scores correlated with any empathic subfactors. This indicates that the ToM task as well as the imitation-inhibition task indeed measures something beyond empathy. To analyze our data in more detail, we conducted separate regression analyses.

To test the influence of psychopathy on ToM, we ran separate regression analyses for every psychopathy score to predict the ToM index. The results show that the LSRP total score [$\beta = .39, t(39) = 2.64, p = .01$; Figure 4], LSRP-1 [$\beta = .29, t(39) = 1.87, p = .07$] as well as LSRP-2 [$\beta = .33, t(39) = 2.20, p = .03$] tended to predict an increase in ToM.

To test the influence of psychopathy on the imitation-inhibition task, we first analyzed the congruency effect of the error rates by running multiple regression analyses. The results show that an increase in the error rates was significantly predicted by the LSRP total score [$\beta = .38, t(39) = 2.56, p = .02$; Figure 5], by LSRP-1 [$\beta = .33, t(39) = 2.14, p = .04$] and marginally significant predicted by LSRP-2 [$\beta = .27, t(39) = 1.72, p = .09$]. We then analyzed the congruency effect of the latencies. The regression analyses detected no significant relationship between the latencies and psychopathy, $\beta < .14, t(39) = .88, p > .38$.

Discussion

In Experiment 1 we found first evidence for a relationship between psychopathic traits and the ability to represent others' beliefs and actions. The higher individuals scored on psychopathic traits, the stronger they represented other persons' beliefs as indexed by their performance in an implicit Theory of Mind task (Kovács et al., 2010). Similarly, the higher participants scored in the psychopathy questionnaire, the more strongly they represented others' actions as demonstrated by the error rates in the imitation-inhibition task (Brass et al., 2000). Importantly, the findings cannot be explained by empathy, because empathy did neither correlate with the ToM nor with the imitation-inhibition task, but negatively with psychopathy. Therefore, these results are the first support that individuals with high psychopathic traits are able to represent others' beliefs and actions despite a lack in empathy.

While the results of the ToM task nicely demonstrate the positive relationship between psychopathy and the ability to represent other persons' beliefs, the results of the imitation-inhibition task leave open some questions. First, as we find correlations with psychopathy on the error rates, but not on the latencies of the imitation-inhibition task, it is not clear to which degree individuals with high psychopathic traits actually represent other persons' actions. Second, as the imitation-inhibition task can be considered as an artificial situation, in which participants respond to pictures of another person's fingers, it is not clear whether participants represent others' actions when interacting with a real person. Second, as the imitation-inhibition task is based on an interference between two motor representation, it is an open question if individuals with high psychopathic traits do actually represent others' actions more strongly or if they simply have difficulties in cognitive control. In order to answer these questions, we conducted a second experiment, in which we applied a standard Simon task and the Joint Simon task. Both Simon tasks require cognitive control, but only in the Joint Simon task individuals have to represent the actions of another (real) person. Therefore, if individuals with high psychopathic traits indeed represent others' actions more strongly than

individuals with low psychopathic traits, one should expect a higher Simon effect in the Joint Simon task, but not in the standard Simon task. To test this assumption we conducted Experiment 2.

Experiment 2

Method

Participants. In exchange for course credit, 37 students (23 female, 6 male, 5 not reported) with an age ranging from 17 to 27 ($M = 19.48$; $SD = 2.01$) took part in the experiment. Three participants were discarded from the analyses because their partner for the Joint Simon task was absent. All participants gave written informed consent before starting with the experiment.

Procedure. Firstly, participants started with the Simon tasks. In the standard Simon task, participants operated both response keys pressing the left key in response to a red square and the right key in response to a green square. In the Joint Simon task, two participants responded together toward the squares. Half of the participants responded with their left hands toward red squares on the left key. The other half of the participants responded with their right hands toward green squares on the right key. The squares remained on the screen until 134 ms had passed. The inter-trial interval was 1357 ms. Participants were instructed to react as fast as possible to the squares. In each Simon task, participants completed four experimental blocks of 60 trials, separated by short breaks. Before each task, participants performed a practice block of 32 trials. The order of the Standard Simon task and the Joint Simon task was counterbalanced across pairs of participants. The duration of each task was around 10 minutes. To prepare the data for the analyses, response latencies below 200 ms and above 800 ms were discarded.

Secondly, participants filled out a Dutch translation of the *Levenson's Self-Report of Psychopathy* (LSRP; Levenson et al., 1995). Cronbach's alpha was $\alpha = .82$ for LSRP-1, $\alpha = .52$ for LSRP-2 and $\alpha = .78$ for the total score.

Thirdly, we assessed participants' empathy with the Dutch version (De Corte et al., 2007) of the Interpersonal Reactivity Index (IRI; Davis, 1980). Cronbach's alpha was $\alpha = .76$ for Perspective Taking, $\alpha = .89$ for Fantasy, $\alpha = .63$ for Empathic Concern and $\alpha = .85$ for Personal Distress.

Finally, participants indicated basic demographic characteristics, were debriefed and dismissed.

Results

Firstly, we analyzed the standard Simon task by running separate ANOVAs for latencies and error rates. The main effect of compatibility was significant when analyzing the latencies, $F(1, 33) = 10.56, p = .003, \eta_p^2 = .24$, as well as when analyzing the error rates $F(1, 33) = 27.46, p < .001, \eta_p^2 = .45$. This indicates an overall Simon effect with faster responses and fewer errors in S-R compatible trials ($M_{\text{latencies}} = 330.48 \text{ ms}, SD = 44.69; M_{\text{error rates}} = 0.84, SD = 0.83$) than in incompatible trials ($M_{\text{latencies}} = 343.54 \text{ ms}, SD = 41.14; M_{\text{error rates}} = 1.99, SD = 1.42$).

Secondly, we analyzed the Joint Simon task. The main effect of compatibility was significant when analyzing the latencies, $F(1, 33) = 22.90, p < .001, \eta_p^2 = .41$, but not when analyzing the error rates $F(1, 33) = 1.73, p = .20$. This indicates an overall Joint Simon effect with faster responses in S-R compatible trials ($M = 263.28 \text{ ms}, SD = 24.40$) than in incompatible trials ($M = 276.81 \text{ ms}, SD = 28.32$).

Thirdly, we analyzed the influence of psychopathy. Table 2 gives an overview over the results. In line with Experiment 1, psychopathy correlated negatively with the crucial empathic subfactors perspective-taking and empathic concern. More importantly, however, we found a positive correlation between psychopathy and the Joint Simon effect indicating that the more psychopathic individuals are, the higher their Joint Simon effect is. The correlation between psychopathy and the Standard Simon effect was not significant. Similar

to Experiment 1, the representation of others' actions—here measured with the Joint Simon task—did not correlate with empathy.

To test the effect of psychopathy on the Simon tasks in more detail, we computed multiple regression analyses with the LSRP total score, LSRP-1 and LSRP-2 as predictors and the Standard Simon effect, the Joint Simon effect and the interaction between the Simon effects as dependent variables. LSRP total score, LSRP-1 and LSRP-2 did not predict the Standard Simon effect, $\beta < .11$, $t(33) < .62$, $p > .54$. However, more important for our hypothesis, the Joint Simon effect was significantly predicted by the LSRP total score [$\beta = .38$, $t(33) = 2.32$, $p = .03$], LSRP-2 [$\beta = .36$, $t(33) = 2.17$, $p = .04$], and marginal significantly predicted by LSRP-1 [$\beta = .32$, $t(33) = 1.90$, $p = .07$]. Also, the interaction between the Standard Simon effect and the Joint Simon effect was significantly predicted by the LSRP total score (see Figure 6), LSRP-1 and LSRP-2 [$\beta > .33$, $t(33) > 2.00$, $p < .05$], indicating that psychopathy only predicts the social part of the Simon effect.

Discussion

In line with past research (e.g., Mullins-Nelson et al., 2006) and Experiment 1, we found the crucial components of empathy (i.e., perspective taking and empathic concern) being negatively correlated with psychopathy. More central for our hypothesis, however, psychopathy predicted participants' performance in the Joint Simon task. It is important to note that this effect is not due to better cognitive control, or related abilities (e.g., intelligence), because we do not find any correlation between psychopathy and the standard Simon effect. Therefore, the results of Experiment 2 suggest, in line with the findings of Experiment 1, that the higher individuals score on psychopathic traits, the more they represent other persons' actions.

However, there are a few limitations of Experiment 2, but also Experiment 1. First, in Experiment we do not find a significant Joint Simon effect on the error rates and thus could not calculate the impact of psychopathy on this measure. However, it is important to note that,

originally, Joint Simon effects are analyzed on the latencies only (Sebanz et al., 2003). Second, in our previous studies, we tested the predictions with a rather small number of participants. Third, in all our previous experiments, we measured psychopathic traits with just one scale. To overcome these shortcomings, we conducted Experiment 3, which was a direct replication of Experiment 1 and Experiment 2 with two exceptions: We assessed a larger number of participants, we included additional psychopathy scales into the design, and we assessed the ToM task, the standard Simon task, and the Joint Simon task, but not the imitation-inhibition task.

Experiment 3

Method

Participants. In exchange for course credit, 89 students from Ghent University (73 female, 16 male) with an age ranging from 18 to 26 ($M = 18.85$; $SD = 1.41$) took part in the experiment. Due to a computer error, we discarded three participants. All participants gave written informed consent before starting with the experiment. The total duration of the experiment was approximately one hour.

Procedure. In Experiment 3 we assessed ToM, a standard Simon task and a Joint Simon Task. These tasks were the exact same tasks as used in our previous experiments. The order of the tasks was counterbalanced across participants. After running through these tasks, participants filled out different scales to measure psychopathic traits and empathy.

Similarity to our previous studies we assessed Levenson's Self-Report of Psychopathy (LSRP; Levenson et al., 1995). Cronbach's alpha was $\alpha = .83$ for LSRP-I, $\alpha = .65$ for LSRP-II, and $\alpha = .83$ for the total score.

In line with Experiment 1 and 2, participants also completed the Dutch version (De Corte et al., 2007) of the Interpersonal Reactivity Index (IRI; Davis, 1980) to assess empathy with the subfactors: Perspective Taking (Cronbach's $\alpha = .72$), Fantasy (Cronbach's $\alpha = .86$), Empathic Concern (Cronbach's $\alpha = .82$), and Personal Distress (Cronbach's $\alpha = .74$).

In addition, we measured psychopathic traits with the Dutch version (Gordts, Uzieblo, Neumann, Van den Bussche, & Rossi, 2017) of the Self-Report Psychopathy Scale (SRP-III; Paulhus, Hemphill, & Hare, 2015). The SRP-III measures psychopathic traits within four different subscales: Interpersonal Manipulation (IPM; Cronbach's $\alpha = .86$), Callous Affect (CA; Cronbach's $\alpha = .74$), Erratic Life Style (ELS; Cronbach's $\alpha = .81$), and Criminal Tendencies (CT; Cronbach's $\alpha = .92$)

Moreover, we assessed the Triarchic Psychopathy Measure (TriPM; Patrick, Fowles, & Krueger, 2009). Within this scale, psychopathy is measured according to three distinct phenotypic constructs: disinhibition (Cronbach's $\alpha = .77$), which reflects tendencies toward impulsiveness, irresponsibility, oppositionality, and anger/hostility; boldness (Cronbach's $\alpha = .81$)—defined as the nexus of high dominance, low anxiousness, and venturesomeness; and meanness (Cronbach's $\alpha = .70$)—reflecting tendencies toward callousness, cruelty, predatory aggression, and excitement seeking.

Finally, we assessed the Psychopathic Personality Inventory–Revised (PPI-R; Lilienfeld, Widows, & Staff, 2005), which contains 154 items and is divided into eight subscales: Machiavellian Egocentricity (ME; Cronbach's $\alpha = .83$), Rebellious Nonconformity (RN; Cronbach's $\alpha = .81$), Blame Externalization (BE; Cronbach's $\alpha = .84$), Carefree Nonplanfulness (CN; Cronbach's $\alpha = .80$), Social Influence (SOI; Cronbach's $\alpha = .90$), Fearlessness (F; Cronbach's $\alpha = .84$), Stress Immunity (STI; Cronbach's $\alpha = .86$), Coldheartedness (C; Cronbach's $\alpha = .84$), Virtuous Responding (VR; Cronbach's $\alpha = .68$), and Deviant Responding (DR; Cronbach's $\alpha = .61$). In line with previous research, we computed a total score (PPI-R-Total; Cronbach's $\alpha = .91$) by summing up all subscales, a Fearless Dominance Factor (PPI_I; Cronbach's $\alpha = .88$) by summing up the subscales SOI, F, and STI, as well as a Self-Centered Impulsivity Factor (PPI_II = Cronbach's $\alpha = .89$) by summing up the subscales ME, RN, BE, and CN.

Results

ToM Task. The results of the ToM task are depicted in Figure 7. In line with Experiment 1, we first compared the baseline condition (P-A-) with the other conditions. As in previous studies and similarly as in Experiment 1, this condition differed significantly from the conditions in which participants believed that the ball is behind the occluder (P+A- and P+A+), $t(87) > 3.37, p < 0.002, dz > .49$.

Similarly to Experiment 1, participants also responded faster in the condition where they, but not the agent, believed that the ball is behind the occluder (P+A-) compared to the condition, where only the agent believed that the ball is behind the occluder (P-A+), $t(87) = 2.94, p = .02, dz = .31$.

In line with Experiment 1, also the critical comparison for ToM between the baseline condition (P-A-) and the condition where only the agent believed that the ball is behind the occluder (P-A+) was significant. That is, participants were faster in the baseline condition than in the condition where only the agent believed that the ball is behind the occluder, $t(87) = 5.47, p < .001, dz = .58$.

Standard Simon. We analyzed the standard Simon task by running separate ANOVAs for latencies and error rates. The main effect of compatibility was significant when analyzing the latencies, $F(1, 89) = 47.55, p = .001, \eta_p^2 = .35$, as well as when analyzing the error rates $F(1, 89) = 24.54, p < .001, \eta_p^2 = .22$. This indicates an overall Simon effect with faster responses and fewer errors in S-R compatible trials ($M_{\text{latencies}} = 336.49 \text{ ms}, SD = 45.25$; $M_{\text{error rates}} = 1.05, SD = 1.66$) than in incompatible trials ($M_{\text{latencies}} = 356.42 \text{ ms}, SD = 44.54$; $M_{\text{error rates}} = 1.87, SD = 1.94$).

Joint Simon. When analyzing the Joint Simon task, we found a significant main effect of compatibility when analyzing the latencies, $F(1, 89) = 32.44, p < .001, \eta_p^2 = .27$, as well as when analyzing the error rates $F(1, 89) = 4.07, p = .05, \eta_p^2 = .04$. This indicates an overall Joint Simon effect with faster responses and fewer errors in S-R compatible trials ($M_{\text{latencies}} =$

277.62 ms, $SD = 32.54$; $M_{\text{error rates}} = 0.51$, $SD = 2.24$) than in incompatible trials ($M_{\text{latencies}} = 291.40$ ms, $SD = 33.77$; $M_{\text{error rates}} = 0.88$, $SD = 2.73$).

Relation with psychopathic traits. Finally, we analyzed the relationship between psychopathic traits and ToM, the Simon effect as well as the Joint Simon effect. Table 3 gives an overview over the results. ToM did not correlate with any of the (Joint) Simon effects, $r < .08$; $p > .50$. However, in line with past research (e.g., Mullins-Nelson et al., 2006), Experiment 1 and Experiment 2, we found the crucial components of empathy (i.e., perspective taking and empathic concern) being negatively correlated with different psychopathy scales.

However, in contrast to our previous experiments, neither ToM, nor the Joint Simon effect correlated with psychopathic traits measured with Levenson's Self-Report of Psychopathy (LSRP; Levenson et al., 1995), $r < .17$; $p > .11$. Moreover, ToM and the Joint Simon effect measured with the latencies did not correlate with any of the other assessed psychopathy scales either, $r < .21$; $p > .05$. The Joint Simon effect measured with the error rates correlated only with PPI-R DR (Deviant Responding), $r = .30$, $p = .005$, and with PPI-R VR (Virtuous Responding), $r = .34$, $p < .001$. Finally, ToM significantly correlated with empathic concern, $r = .29$, $p = .006$.

Discussion

The results of Experiment 3 cannot replicate the results obtained in Experiment 1 and Experiment 2. That is, neither ToM nor the Joint Simon effect correlated with psychopathic traits measured with Levenson's Self-Report of Psychopathy. Moreover, we could not find a consistent pattern between ToM, Joint Simon effects, and psychopathic traits assessed with other psychopathy measures. As we assessed a larger sample in Experiment 3 as compared to our previous experiments and since we could not replicate our previous findings, Experiment 3 challenges our previous findings.

General Discussion

Past research indicates that individuals high in psychopathic traits can be manipulative despite a lack of empathy (Babiak & Hare, 2006; Hare, 1999). Based on this discrepancy it seems unclear to what degree individuals with psychopathy represent other persons' beliefs and actions. On the one side, one could assume that based on their lack in empathy, individuals high in psychopathic traits represent beliefs and actions of others less strongly. On the other side, it might be that in order to be able to manipulate others, they represent the beliefs and actions of others very strongly. While applying rather explicit measures to test how individuals with psychopathy represent other persons' beliefs, previous research found no relationship between psychopathy and the representation of others' beliefs (e.g., Gray et al., 2011; Shamay-Tsoory et al., 2010). In the current paper we went, thus, one step further and applied, in three experiments, three different implicit measures to investigate the representation of others' beliefs and actions in individuals with high psychopathic traits.

In all experiments we found in line with past research a lack in empathy for individuals with high psychopathic traits (e.g., Mullins-Nelson et al., 2006). In contrast, the results on the representation of others' actions and beliefs are rather conflicting. In Experiment 1 we applied an implicit ToM task (Kovács et al., 2010) and the imitation-inhibition task (Brass et al., 2000). The results indicate that the higher individuals score on psychopathic traits, the more ToM they have and the more susceptible they are to other persons' movements. In Experiment 2, we assessed the Joint Simon task and found psychopathy to predict the Joint Simon effect. In sum, both experiments suggest that the more psychopathic individuals are, the more they are able to represent others' beliefs and actions. However, a major shortcoming of these experiments is that they are underpowered. Thus, in Experiment 3, we aimed at replicating our previous findings on the ToM and the Joint Simon task within a larger sample and with additional psychopathy measures. However, the results did not replicate our previous findings. That is, neither ToM nor Joint Simon indices

correlated significantly with Levenson's self-report measure of psychopathy (LSRP; Levenson et al., 1995). In addition, neither ToM nor Joint Simon indices correlated with most other measures of psychopathy.

Taken together our results are rather intermixed in respect to the question of how individuals high in psychopathic traits represent others' beliefs and actions within implicit tasks. As the higher-powered Experiment 3 does not find a relationship between psychopathic traits, we would like to argue that if a relationship exists, the relationship would be rather weak. This interpretation is in line with previous research that found no relationship between psychopathy and the representation of others' beliefs by using explicit tasks (e.g., Gray et al., 2011; Shamay-Tsoory et al., 2010). Despite this implication, future research may aim at testing the relationship between psychopathic traits and the representation of others' actions and beliefs within larger samples to detect even small effects.

Despite the already mentioned shortcomings, there is a further limitation of the current work that should be acknowledged. In terms of potential clinical relevance, we must stress that our experiments focused on samples of individuals who were assessed by using subclinical psychopathy measures. Although past research has shown that such self-report measures highly correlate with diagnostic tools (e.g., Lilienfeld & Andrews, 1996), it would be overstretching our data to suggest that our results would generalize to clinically diagnosed psychopathic individuals. To fully understand how psychopathic individuals represent other persons' beliefs and actions within implicit tasks, future research should consider using such a diagnosed psychopathic sample. In line with this limitation, we have to acknowledge that our conclusions are based on correlational data only.

Yet an interesting finding is that neither empathic concern nor perspective-taking correlated with ToM, imitation-inhibition, or Joint Simon effects. This is in contrast to previous research suggesting that empathy (Müller, Leeuwen, Baaren, Bekkering, & Dijksterhuis, 2013; Sonnby-Borgström, Jönsson, & Svensson, 2003; Sonnby-Borgström,

2002) and perspective-taking (Chartrand & Bargh, 1999; Cracco, De Coster, Andres, & Brass, 2015; Horton, 2014; Lakin & Chartrand, 2003) are related to automatic imitation and mimicry. However, our research is in line with a more recent and higher powered study demonstrating that empathic concern and perspective-taking measured with the IRI (Davis, 1980), is neither correlated with the imitation-inhibition task, nor with standard mimicry paradigms (Genschow et al., 2017). Further support for the idea that empathic concern and perspective-taking is not correlated to imitation comes from a recent meta-analysis on the imitation-inhibition task (Cracco, Bardi, et al., 2018).

In sum, by applying implicit reaction time based measures, we have found rather intermixed results for the idea that psychopathy is positively related to the representation of other individuals' beliefs and actions. These results are in line with previous research that did not find a relationship between psychopathy and the representation of others' beliefs in explicit tasks (e.g., Gray et al., 2011; Shamay-Tsoory et al., 2010).

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Table 1

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. LSRP-1	—	.23	.85**	.29 ⁺	.33*	-.14	-.52**	-.64**	-.10	-.28 ⁺
2. LSRP-2	—	—	.71**	.34*	.27 ⁺	-.01	-.38*	-.06	-.04	.21
3. LSRP total score	—	—	—	.39*	.38*	-.11	-.58**	-.50**	-.05	-.10
4. ToM score	—	—	—	—	.05	.00	-.17	-.20	-.21	.05
5. Imitation Congruency (Errors)	—	—	—	—	—	-.07	-.05	-.27 ⁺	.14	-.02
6. Imitation Congruency (Latencies)	—	—	—	—	—	—	.18	-.16	-.19	-.08
7. IRI perspective-taking	—	—	—	—	—	—	—	.29 ⁺	.08	.03
8. IRI empathic concern	—	—	—	—	—	—	—	—	.40**	.51**
9. IRI fantasy	—	—	—	—	—	—	—	—	—	.42**
10. IRI pd	—	—	—	—	—	—	—	—	—	—

Note. ⁺ $p < .10$. * $p < .05$. ** $p < .01$

Table 2

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. LSRP-1	—	.51**	.93**	.32 ⁺	.11	-.28	-.43*	-.04	.09
2. LSRP-2	—	—	.78**	.36*	-.07	-.41*	-.24	-.01	.27
3. LSRP total score	—	—	—	.38*	.05	-.38*	-.40*	-.03	.18
4. Joint Simon effect (latencies)	—	—	—	—	.04	.20	-.02	.25	.15
5. Simon Effect (latencies)	—	—	—	—	—	.08	-.05	-.00	-.10
6. IRI perspective-taking	—	—	—	—	—	—	.18	.17	-.03
7. IRI empathic concern	—	—	—	—	—	—	—	.42*	.40*
8. IRI fantasy	—	—	—	—	—	—	—	—	.37*
9. IRI pd	—	—	—	—	—	—	—	—	—

Note. ⁺ $p < .10$. * $p < .05$. ** $p < .01$

Running head: PSYCHOPATHY & REPRESENTATION OF OTHERS

Table 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1. ToM score	—																															
2. Joint Simon effect (latencies)	-0.047	—																														
3. Joint Simon effect (errors)	0.034	-0.112	—																													
4. Simon effect (latencies)	-0.072	0.076	-0.089	—																												
5. Simon effect (errors)	-0.066	0.028	0.015	-0.175	—																											
6. LSRP-1	-0.120	-0.047	-0.148	0.096	0.018	—																										
7. LSRP-2	-0.153	-0.071	-0.125	-0.078	0.085	0.369 ***	—																									
8. LRSF total score	-0.158	-0.067	-0.166	0.035	0.052	0.905 ***	0.728 ***	—																								
9. SRP-IPM	-0.155	-0.009	-0.037	0.131	-0.025	0.652 ***	0.323 **	0.629 ***	—																							
10. SRP-CA	-0.108	0.128	0.127	0.044	0.071	0.615 ***	0.226 *	0.556 ***	0.651 ***	—																						
11. SRP-ELS	0.046	0.031	-0.035	0.101	-0.041	0.434 ***	0.426 ***	0.514 ***	0.647 ***	0.438 ***	—																					
12. SRP-CT	0.157	-0.012	-0.082	0.227 *	0.139	0.193	0.086	0.181	0.327 **	0.388 ***	0.308 **	—																				
13. Tripm-BOLD	-0.127	-0.079	0.039	-0.101	0.119	-0.246 *	0.095	-0.138	-0.531 ***	-0.242 *	-0.466 ***	-0.355 ***	—																			
14. Tripm-MEAN	0.101	-0.001	-0.018	-0.085	-0.004	-0.653 ***	-0.252 *	-0.597 ***	-0.610 ***	-0.658 ***	-0.430 ***	-0.236 *	0.348 ***	—																		
15. Tripm-DISINHIBITION	-0.060	0.087	-0.033	-0.060	-0.018	-0.369 ***	-0.507 ***	-0.504 ***	-0.517 ***	-0.318 **	-0.779 ***	-0.370 ***	0.282 **	0.351 ***	—																	
16. PPI-R F	0.023	0.194	-0.045	0.194	-0.048	0.164	0.075	0.156	0.259 *	0.169	0.558 ***	0.199	-0.470 ***	-0.303 **	-0.361 ***	—																
17. PPI-R RN	0.119	0.055	-0.017	0.024	-0.006	-0.037	0.240 *	0.083	0.311 **	0.187	0.616 ***	0.245 *	-0.250 *	-0.152	-0.541 ***	0.490 ***	—															
18. PPI-R C	-0.206	-0.005	0.174	0.092	0.100	0.551 ***	0.056	0.437 ***	0.380 ***	0.560 ***	0.115	0.128	-0.193	-0.601 ***	-0.013	0.067	-0.103	—														
19. PPI-R CN	-0.070	-0.100	0.099	0.109	-0.034	0.316 **	0.625 ***	0.522 ***	0.336 **	0.252 *	0.555 ***	0.151	-0.122	-0.265 *	-0.552 ***	0.246 *	0.439 ***	0.215 *	—													
20. PPI-R ME	-0.086	-0.068	-0.018	0.242 *	0.117	0.697 ***	0.318 **	0.666 ***	0.734 ***	0.562 ***	0.614 ***	0.314 **	-0.413 ***	-0.645 ***	-0.538 ***	0.343 ***	0.266 *	0.366 ***	0.373 ***	—												
21. PPI-R SOI	0.072	-0.057	0.078	0.140	-0.047	0.217 *	0.007	0.165	0.383 ***	0.033	0.356 ***	0.111	-0.652 ***	-0.145	-0.268 *	0.215 *	0.180	0.055	0.197	0.310 **	—											
22. PPI-R BE	-0.011	-0.174	0.045	-0.079	-0.066	0.159	0.399 ***	0.301 **	0.221 *	0.091	0.382 ***	0.208 *	0.109	-0.185	-0.486 ***	0.147	0.319 **	-0.217 *	0.161	0.241 *	-0.039	—										
23. PPI-R STI	0.120	0.073	0.113	0.040	-0.249 *	0.153	-0.124	0.057	0.214 *	0.294 **	0.158	0.249 *	-0.563 ***	-0.256 *	-0.073	0.228 *	0.017	0.401 ***	0.094	0.159	0.149	-0.234 *	—									
24. PPI-R DR	-0.037	-0.114	0.295 **	-0.044	-0.007	0.207 *	0.254 *	0.271 **	0.205	0.204	0.232 *	0.025	0.014	-0.271 **	-0.398 ***	0.089	0.183	0.160	0.216 *	0.212 *	0.041	0.382 ***	-0.005	—								
25. PPI-R VR	0.141	0.041	0.343 ***	-0.120	-0.232 *	-0.386 ***	-0.308 **	-0.429 ***	-0.418 ***	-0.227 *	-0.411 ***	-0.141	0.124	0.321 **	0.333 **	-0.080	-0.169	-0.132	-0.382 ***	-0.468 ***	-0.129	-0.135	0.210 *	0.197	—							
26. PPI-R_Total	-0.003	-0.021	0.096	0.186	-0.053	0.517 ***	0.365 ***	0.553 ***	0.671 ***	0.485 ***	0.790 ***	0.371 ***	-0.622 ***	-0.585 ***	-0.665 ***	0.643 ***	0.608 ***	0.391 ***	0.629 ***	0.723 ***	0.536 ***	0.316 **	0.408 ***	0.290 **	-0.306 **	—						
27. PPI1-R: Fearless dominance	0.102	0.090	0.072	0.187	-0.155	0.265 *	-0.014	0.191	0.430 ***	0.223 *	0.530 ***	0.261 *	-0.831 ***	-0.332 **	-0.352 ***	0.686 ***	0.338 **	0.233 *	0.267 *	0.404 ***	0.734 ***	-0.053	0.616 ***	0.063	-0.022	0.779 ***	—					
28. PPI2-R: Self-centered impulsivity	-0.021	-0.105	0.038	0.114	0.008	0.428 ***	0.572 ***	0.581 ***	0.593 ***	0.407 ***	0.789 ***	0.336 **	-0.255 *	-0.465 ***	-0.768 ***	0.446 ***	0.725 ***	0.107	0.713 ***	0.702 ***	0.241 *	0.615 ***	0.019	0.359 ***	-0.426 ***	0.832 ***	0.354 ***	—				
29. IRI fantasy	0.153	-0.194	-0.135	0.080	-0.146	-0.343 ***	-0.250 *	-0.367 ***	-0.117	-0.430 ***	-0.050	0.037	-0.080	0.283 **	0.035	-0.032	0.129	-0.466 ***	-0.211 *	-0.135	0.201	0.089	-0.285 **	-0.076	-0.003	-0.139	-0.021	-0.051	—			
30. IRI empathic concern	0.290 **	-0.121	-0.024	-0.036	-0.063	-0.585 ***	-0.117	-0.485 ***	-0.354 ***	-0.562 ***	-0.147	0.001	0.174	0.634 ***	0.031	-0.149	0.109	-0.779 ***	-0.229 *	-0.373 ***	-0.014	0.190	-0.394 ***	-0.166	0.176	-0.361 ***	-0.245 *	-0.122	0.565 ***	—		
31. IRI perspect taking	0.128	0.181	-0.097	-0.015	-0.255 *	-0.435 ***	-0.328 **	-0.471 ***	-0.185	-0.297 **	-0.048	0.113	-0.154	0.500 ***	0.104	-0.060	0.078	-0.475 ***	-0.267 *	-0.350 ***	0.069	-0.103	0.148	-0.169	0.370 ***	-0.211 *	0.075	-0.240 *	0.331 **	0.456 ***	—	
32. IRI personal distress	-0.025	-0.074	0.135	0.034	0.137	-0.221 *	0.005	-0.161	-0.425 ***	-0.283 **	-0.333 **	-0.363 ***	0.659 ***	0.269 **	0.241 *	-0.307 **	-0.144	-0.200	-0.079	-0.211 *	-0.259 *	0.022	-0.586 ***	0.084	-0.002	-0.412 ***	-0.540 ***	-0.153	0.171	0.222 *	-0.198	—

*p < .05, **p < .01, ***p < .001

Note. LSRP (Levenson’s Self-Report of Psychopathy); SRP (Self-Report Psychopathy Scale); IPM (Interpersonal Manipulation); CA (Callous Affect); ELS (Erratic Life Style); CT (Criminal Tendencies); Tripm (Triarchic Psychopathy Measure); BOLD (Boldness Scale) MEAN (Meanness Scale); DISINHIBITION (Disinhibition Scale); PPI-R (Psychopathic Personality Inventory–Revised); F (Fearlessness); RN (Rebellious Nonconformity); C (Coldheartedness); CN (Carefree Nonplanfulness); ME (Machiavellian Egocentricity); SOI (Social Influence); BE (Blame Externalization); STI (Stress Immunity); DR (Deviant Responding); VR (Virtuous Responding); Fearless Dominance (SOI + F + STI); Self-Centered Impulsivity (ME + RN + BE + CN); IRI (Interpersonal Reactivity Index)

Figure 1

Note. Reaction times in the ToM task in Experiment 1 (error bars indicate standard errors).

P+ A+ Participants and agent believe that the ball is behind the occluder

P- A- Participants and agent believe that the ball is *not* behind the occluder (baseline condition)

P- A+ Agent but not participants believe that the ball is behind the occluder

P+ A- Participants but not agent believe that the ball is behind the occluder

Figure 2

Note. Error rates in percent in the imitation-inhibition task in Experiment 1 (error bars indicate standard errors).

Figure 3

Note. Reaction times in the imitation-inhibition task in Experiment 1 (error bars indicate standard errors).

Figure 4

Note. Relation between psychopathic traits and ToM in Experiment 1.

Figure 5

Note. Relation between psychopathic traits and imitation in Experiment 1.

Figure 6

Note. Relation between psychopathic traits and the Standard Simon effect as well as the Joint Simon Effect in Experiment 2.

Figure 7

Note. Reaction times in the ToM task in Experiment 3 (error bars indicate standard errors).

P+ A+ Participants and agent believe that the ball is behind the occluder

P- A- Participants and agent believe that the ball is *not* behind the occluder (baseline condition)

P- A+ Agent but not participants believe that the ball is behind the occluder

P+ A- Participants but not agent believe that the ball is behind the occluder