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Psychopathy-related traits and decision-making under risk and ambiguity: An exploratory study

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ABSTRACT

Studies on the association between psychopathy and decision-making in laboratory tasks have revealed mixed results. These might be due to an insufficient consideration of the different aspects related to both psychopathy and decision-making. Here we measured different facets of psychopathy in a non-clinical sample using the triarchic psychopathy measure. Decision-making was assessed using a task that measured risk taking in both gain and loss domains under different levels of probability and ambiguity. Boldness was positively associated with risk taking in a gain context; Disinhibition was positively associated with risk taking in a loss context, especially under a high loss probability level. These results provide a differentiated picture of the relation between psychopathy-related traits and decision-making, which might be useful for the interpretation of results of previous studies and the design of future studies.

1. Introduction

Psychopathy is a personality disorder typified by a cluster of interpersonal, affective, and behavioral characteristics, such as social dominance, a shallow affect, and antisocial and risk-taking behaviors. The psychopathy construct has been operationalized in a number of assessment instruments, such as the Psychopathy Checklist-Revised (PCL-R; Hare, 2003). Recent research suggests that, rather than constituting a distinct entity or taxon, psychopathy can be conceptualized as a constellation of extreme scores on personality traits that are continuously distributed and present in samples from the general community (Guay, Ruscio, Knight, & Hare, 2007), allowing for an extension of the construct towards non-clinical samples.

A recent self-report inventory to measure psychopathy-related traits in community samples is the triarchic personality measure (TriPM; Patrick & Drislane, 2015). This questionnaire is based on a conceptualization of psychopathy in terms of three distinct constructs: Boldness, Meanness, and Disinhibition. Boldness refers to interpersonal facets, reflecting social dominance and emotional resilience. Meanness is primarily associated with manipulative behavior and affective features, such as callousness and lack of empathy. Finally, Disinhibition captures antisocial and erratic lifestyle components. Each of the constructs is believed to have unique neurocognitive correlates. In this regard, the triarchic framework converges with (neuro)cognitive accounts of psychopathy that highlight the role of various cognitive impairments in explaining dysregulated and antisocial behavior (Blair, 2005).

One such approach views psychopathy as a disorder primarily typified by disturbed affective processing and decision-making (Blair, 2015). This model assumes that maladaptive behaviors seen in relation to psychopathy are (partly) caused by a reduced ability to optimally use rewards and punishments to guide choices (Blair, 2013). For example, a study in non-offenders found hyper-activation of the reward circuit in the brain with increasing levels of impulsive-antisocial traits (Buckholtz et al., 2010). Moreover, Blair et al. (2004) found individuals with psychopathy to be especially insensitive to different levels of punishment, which is indicative of a hyposensitivity to aversive stimuli.

Hypersensitivity to rewards and hyposensitivity to punishments can bias the generation of expectancies of reward and punishment and ultimately lead to poor decisions. Importantly, in order to increase the precision of the predictions regarding the outcome of our choices, we try to reduce the amount of uncertainty in the information on which the predictions are based (Mathys et al., 2014). From this perspective, aversion to excessive uncertainty plays a central role in decision-making, and might also play a role in explaining some of the learning impairments seen in relation to psychopathy (Brazil, Mathys, Popma,

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Hoppenbrouwers, & Cohn, 2017).

Importantly, not all choices involve the generation of predictions and decision-making is influenced by different sources of uncertainty, such as risk and ambiguity Tymula, Rosenberg Belmaker, Ruderman, Glimcher, & Levy, 2013). People typically show an aversion towards both risk and ambiguity when making choices, at least when these choices involve options that differ in terms of magnitude and probability of gaining positive outcomes (Tymula et al., 2013). We define risk preferences as the willingness to accept offers with exact probability information and ambiguity preference as the willingness to accept offers with (partially) unknown probabilities. Thus, ambiguity includes an additional source of uncertainty relative to risk. Moreover, risk and ambiguity have been shown to be associated with distinct neural mechanisms (Krain, Wilson, Arbuckle, Castellanos, & Milham, 2006). The influence of ambiguity on decision-making has received little attention in psychopathy research, but risky decision-making has been more prominent.

Most studies have examined the association between psychopathic features and risky choices using the Iowa Gambling Test (IGT). However, the results are mixed, with some studies reporting a positive association (e.g., Beszterczey, Nestor, Shirai, & Harding, 2013; Dean et al., 2013), some failing to find any strong relations (Kuin & Masthoff, 2016; Takahashi, Takagishi, Nishinaka, Makino, & Fukui, 2014), and yet others finding a negative association (Hughes, Dolan, Trueblood, & Stout, 2015).

There may be many reasons for these mixed results, including the use of different psychopathy measures and samples (e.g., children, adults, clinical or non-clinical populations). However, in the present study we aimed to circumvent three specific likely causes: i) the failure to untangle the individual roles of risk and ambiguity during decision-making, ii) a lack of systematic assessment of the role of the reinforcement domain (i.e., gain vs. loss) in which those choices are made, and iii) the use of tasks known to engage many different cognitive mechanisms that are difficult to disentangle (e.g., Stocco, Fum, & Napoli, 2009). For example, the IGT involves an initial learning phase and requires monitoring and updating of choice outcomes in working memory. The involvement of such additional processes complicates the generation of conclusions about individual cognitive processes involved in decision-making. In order to understand if and how the dimensions of psychopathy are related to suboptimal decision-making, we need to investigate the links with the cognitive mechanisms involved more precisely and systematically. Therefore, the main goal of the present study was to probe for unique relations between psychopathy-related dimensions and risky and ambiguous choices that do not require any learning or working-memory processes.

Because the links between the triarchic framework with risk and ambiguity during decision-making are unknown, our novel approach makes it difficult to generate firm hypotheses. However, the TriPM subscales can be linked to subscales from other psychopathy questionnaires (Drislane, Patrick, & Arsal, 2014), which in turn *have* been assessed for their relation with decision-making tasks, albeit mostly the IGT. Accordingly, Disinhibition is strongly linked to other measures of impulsive antisociality (Patrick & Drislane, 2015), which mostly have been found to be associated with a relative positive attitude towards risky and ambiguous choices (e.g., Beszterczey et al., 2013; Dean et al., 2013; Miranda, MacKillop, Meyerson, Justus, & Lovallo, 2009). Boldness includes interpersonal features like social dominance and tolerance for unfamiliarity and danger (Patrick & Drislane, 2015). These features may be expected, and partially have been found, to encourage risk-taking (e.g., Anderson & Galinsky, 2006). Meanness primarily entails affective features, such as a deficient empathy and coldheartedness, but also incorporates interpersonal aspects, such as manipulation and exploitativeness (Drislane et al., 2014). This mix of features makes it particularly difficult to make predictions, but the (primarily) affective aspects may be hypothesized to have no strong link with risk taking (see also references above reporting a link with impulsive antisociality: these studies found no significant association with interpersonal-affective traits).

2. Materials and methods

2.1. Participants

The original sample consisted of 205 young adults. This concerned a convenience sample, collected from two separate studies (Study 1: $N = 80$; Study 2: $N = 125$) that each included the TriPM, the risk and ambiguity task (RAT; Tymula et al., 2013), and Raven's Advanced Progressive Matrices test (RAPM; Raven, Raven, & Court, 1998). The data of four participants were excluded because of their relatively low score on the RAPM test (4–6 correct items of the 12 items). However, inclusion or exclusion of these cases did not affect the conclusions reported below. The data of one additional participant were excluded because of an excessively high number of irrational choices in the task (more than half of the corresponding trials, see Supplementary Material). The remaining 200 participants (81 men) had a mean age of 23.0 years (SD = 2.56; range = 18–30). The majority of the participants (71%) were students, 91% of which had received 6 years of primary education in addition to 5 years of high-level secondary education or a university degree, 9% had 6 years of primary education and 4 years of average level education, and 1 participant had < 6 years of primary education. The participants were recruited via social networks and at the university. The studies from which the present data were derived were approved by the local ethical committee and all experimental manipulations were performed in accordance with the approved guidelines. All participants gave written informed consent and either received course credit or participated without receiving any compensation.

2.2. Materials

2.2.1. RAPM Set 1

As intelligence is known to modulate risk-taking during decision-making (Deakin, Aitken, Robbins, & Shahakian, 2004), we corrected for IQ in all analyses, using the score on Set 1 of Raven's Advanced Progressive Matrices test as measure of general intelligence. This test consists of 12 problems of increasing difficulty. The outcome variable is the number of items with a correct response.

2.2.2. TriPM

We used a Dutch translation of the TriPM as measure of psychopathy-related traits (Van Dongen, Drislane, Nijman, Soe-Agnie, & van Marle, 2017). The questionnaire consists of 58 statements, each scored on a 4-point Likert scale. Boldness and Meanness are each covered by 19 items, Disinhibition by 20 items. Higher scores indicate a stronger agreement to items such as “I am a born leader” (Boldness), “I don't mind if someone I dislike gets hurt” (Meanness), and “I often act on immediate needs” (Disinhibition).

2.2.3. RAT

We used a short version of the RAT to measure decision-making. Briefly, each participant was asked to make a series of binary choices between a certain monetary amount and a lottery. Across trials, the lottery option varied in three features: amount to be gained or lost, outcome probability, and ambiguity level. The task consisted of 42 unique lotteries [(4 outcome probabilities + 3 ambiguity levels) × 3 amounts × 2 blocks (gain/loss)]. Each lottery was presented twice resulting in a total of 84 experimental trials. The main output from this task were the proportion of trials on which the participant made risky gain choices, risky loss choices, ambiguous gain choices, and ambiguous loss choices, for each outcome probability and ambiguity level. See Supplementary Material and Tymula et al. (2013) for further details.