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Bargaining with the Devil: The Factors of Psychopathy in Economic Decision-Making
Games

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An abstract of
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Abstract

Bargaining with the Devil: The Factors of Psychopathy in Economic Decision-Making
Games
By Joanna Berg

Economic decision-making tasks such as the ultimatum game, dictator game, and
prisoner's dilemma have been studied in a number of different contexts, and have
provided informative insights regarding human behavior under conditions of uncertainty.
Increasingly, these games have begun to be used in the context of understanding
personality correlates of behavior. In extending this literature to psychopathy, this study
adopts a factor-focused approach, examining each of the three key factors of the
Psychopathic Personality Inventory—Revised (PPI-R), Fearless Dominance (FD), Self-
Centered Impulsivity (SCI), and Coldheartedness, to obtain a more comprehensive view
of the implications of psychopathy as a whole for economic decision-making.
Participants were 211 university undergraduates who completed four economic tasks and
five personality instruments, with the aim of ascertaining the correlates and predictive
utility of each factor of the PPI-R. Results indicated that FD, SCI, and Coldheartedness
were associated with different patterns of correlations and responses across the tasks and
personality measures. Coldheartedness and SCI were more predictive of economic
selfishness, whereas FD was largely uncorrelated with the behavioral tasks. Implications
for the conceptualization of psychopathy are discussed; a subtype approach to
psychopathy confluent with DSM-5's dimensional restructuring of the personality
disorders is proposed.

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Bargaining with the Devil: The Factors of Psychopathy in Economic Decision-Making

Games

The construct of psychopathy, described in Hervey Cleckley's widely influential

book, *The Mask of Sanity* (1941/1976), is characterized by a constellation of personality

traits that includes superficial charm, lack of guilt and remorse, poor impulse control, and

emotional detachment, as well as high levels of manipulativeness, dishonesty, and low

empathy. This disorder has never been formally listed in the *Diagnostic and Statistical*

Manual of Mental Disorders (DSM), although DSM-II's (American Psychiatric

Association [APA], 1968) clinical description and diagnostic criteria of antisocial

personality are closely related to many contemporary conceptualizations of psychopathy.

Additionally, the proposed revision of antisocial personality disorder (ASPD) in DSM-5

includes many classical psychopathic traits (APA, 2011), including guiltlessness and

lovelessness, the two traits highlighted by McCord and McCord (1964) as key

components of psychopathy. These revisions potentially foreshadow an increased

clinical or diagnostic assessment of classically psychopathic traits.

Psychopathy, despite its exclusion from DSM thus far, is one of the most studied

personality disorders, and simultaneously one of the least-understood, both in terms of

etiology and operationalization. It has been identified as part of a "Dark Triad" of

personalities (Paulhus & Williams, 2002) that tend to correlate closely with each other

and with similar third-variable constructs, e.g., negatively with agreeableness (Hodson,

Hogg, & MacInnis, 2009). The other two members of this triad are narcissism (i.e., as

measured by the Narcissistic Personality Inventory; Raskin & Hall, 1979) and

Machiavellianism, a construct developed directly from the writings of Niccolò

Machiavelli (Christie & Geis, 1970). It is, however, unclear whether these personality constructs correlate with each other based on similar external manifestations, whether there are similar etiological processes underlying each of these constructs, or even whether they are nested within each other, representing not different constructs entirely, but separate traits nested within one or more larger constructs.

Modern conceptualizations of psychopathy, often derived from psychopathy assessment instruments, segment the disorder into two to four factors. The Psychopathy Checklist-Revised (PCL-R; Hare, 1991/2003), a 20-item clinical rating scale developed in part as a response to the omission of psychopathy criteria from DSM-III and DSM-IV (Hare, Hart, & Harpur, 1991), has several such proposed structures (e.g., Cooke, Michie, & Skeem, 2007). The two-factor structure consists of an affective/interpersonal and a behavioral component, whereas the three-factor model "splits" the first component into an affective and an interpersonal component (e.g., unemotionality vs. manipulativeness/ grandiosity), but carries over the behavioral component. The four-factor model splits the behavioral component into a lifestyle and an antisocial component (e.g. sensation-seeking vs. committing crimes), and carries over the affective and interpersonal components.

The factor structure of primary interest to this project derives from the self-report Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld, 1990; Lilienfeld & Andrews, 1996; Lilienfeld & Widows, 2005) and consists of two major higher-order factors, which, although not mapping directly onto the affective/interpersonal and behavioral factors of the PCL-R, correlate with and bear some resemblance to those factors (e.g., Blonigen et al., 2010; Poythress et al., 2010b). The first component, termed Fearless Dominance (FD), relates to social and physical boldness, charm, and immunity

to trait anxiety, whereas the second component, termed Self-Centered Impulsivity (SCI), relates to aggression, egocentricity, manipulativeness, alienation, and poor impulse control (Benning, Patrick, Blonigen, Hicks, & Iacono, 2005; Benning, Patrick, Hicks, Blonigen, & Krueger, 2003). A third factor of Coldheartedness has been identified, and although research on this factor's nature and correlates has been inconclusive, it is closely associated with callousness and lack of deep social emotions. It therefore may be an approximate adult analogue to callous-unemotional (CU) traits in children, which are often identified as precursors to the development of psychopathic traits in adulthood (Frick & Marsee, 2006). Whereas FD may conceptually overlap to some degree with subclinical narcissism, the latter two factors, SCI and Coldheartedness, may bear a closer resemblance to Machiavellianism.

Particular empirical interest has been shown in the concept of dual- or multiple-process models of psychopathy. According to these theories, different etiological processes lead to different phenotypes of the psychopathic construct, such as low-anxiousness, high-impulsiveness, or low-empathy (Patrick, 2001; Poythress et al., 2010a). Recently, a triarchic model has been proposed (Patrick, Fowles, & Krueger, 2009). In this model, Patrick et al. propose "three prominent recurring themes … disinhibition, boldness, and meanness" (p. 925) that arise from separate environmental and genetic influences and conjointly produce the familiar construct of psychopathy.

As a complement to this precursor-based research, behavioral and cognitive differences among the various components of psychopathy have the potential to be theoretically useful areas of exploration. Whereas an etiologically-based understanding of psychopathy may provide greater insight into processes that contribute to the

development of the disorder, it is also important to understand cognitive and behavioral patterns in psychopathic adults, not least for their predictive value and implications for intervention.

Personality disorders are notable in that they often have at least as great an impact on family, friends, and colleagues as they have on the diagnosed individual. Thus, behaviors and cognitions in an interpersonally-oriented setting may provide especially salient information about personality disordered individuals, in this case, psychopaths. The implications of psychopathy and its component dimensions for interpersonal decision-making have heretofore received little empirical attention. Different dimensions of psychopathy may hold differential implications for risk appraisal and decision-making, which in turn may shed light on the behavioral and cognitive implications of the factors of psychopathy. These implications may also illuminate ways in which FD, SCI, and Coldheartedness combine or interact, and could therefore broaden the scope of understanding about psychopaths' perceptions of appropriate behavior, and their actual behavior, in interpersonal situations.

Of particular relevance to this study is the way in which psychopaths make interpersonal decisions under various conditions of uncertainty. Because of the trait differences among FD, SCI, and Coldheartedness, individuals who score higher on one dimension versus another may behave in patently different manners. For instance, FD is associated with stress immunity and affective resilience (Patrick, Poythress, Edens, Lilienfeld, & Benning, 2006). Thus, individuals with high scores on FD may be better able to regulate their emotional responses to these scenarios and behave in more instrumental, less reactive ways toward their partners than low scorers. In contrast, SCI

is associated with impulsivity and reactive aggression (e.g., Reidy, Zeichner, Miller, & Martinez, 2007). Thus, individuals with high scores on SCI may behave more reactively and hostilely toward their partners than low scorers.

If these differences bear out, the tendency to class all psychopaths in a homogeneous group (see review in Brinkley, Newman, Widiger, & Lynam, 2004) must be revised with an eye toward behavior as well as underlying etiology. The emergence of clear-cut differences in behavioral and cognitive patterns among these dimensions may necessitate a reassessment of psychopathy as a unitary construct.

Conditions of Uncertainty and Risk

Kahneman and Tversky (1979) outlined a landmark theory of the sometimes-inconsistent, sometimes-irrational choices that people make when faced with conditions of risk, including situations in which they must choose between a certain outcome and an uncertain gamble or risk. This theory accounts for the certainty effect, which results in asymmetry in risky decision-making, as well as for the use of subjective weights that individuals assign to each possible outcome for a given scenario, potentially resulting in an irrational decision.

Several of Kahneman and Tversky's findings bear mentioning, specifically the use of decision weights and the impact of shifts of reference on decision-making. Decision weights "measure the impact of events on the desirability of prospects" (Kahneman & Tversky, 1979, p. 280), and therefore are subjective and dependent on a person's perception both of the scenario as a whole and of the individual choices at hand. Decision weights can also be influenced by the certainty effect, which bears on whether the choice concerns a gain or loss: people tend to be risk averse when choosing between a

probable versus a certain gain (meaning that they will usually opt for the certain gain in this situation), but risk seeking when choosing between a probable versus a certain loss (meaning that they will usually opt for the probable loss; Tversky & Kahneman, 1992).

Shifts of reference occur when an individual interprets a situation of potential gains or losses in light of other information or an expectation that causes the scenario to mean something more or less significant ("framing"). To use Kahneman and Tversky's (1979, p. 286) example, "an unexpected tax withdrawal from a monthly pay check is experienced as a loss, not as a reduced gain." These shifts can mean that under certain conditions a person may be more or less willing to choose a risky option.

These principles of decision-making, although not mapping precisely onto the decision-making scenarios that follow, illuminate behaviors and findings in such situations. Specifically, if individuals with elevated levels of psychopathic traits make significantly different choices in these scenarios, the aforementioned guidelines may provide a reference point for normative decision-making behavior, and thereby aid in the interpretation of abnormal responding. Measuring psychopathic traits and dividing them into component factors in these decision-making contexts may help to parse out which aspects of psychopathy predict responses to certain interpersonal situations. Additionally, a broader understanding of psychopathic decision-making may offer insights into the differential cognitive processes of individuals scoring higher on separate factors of psychopathy and, potentially, into the etiology of psychopathy.

Conditions of uncertainty and risk: Three scenarios. Several widely-used economic decision-making tasks fall under the broader purview of Tversky and Kahneman's (1992) theories of decision-making with regard to uncertainty and risk.

Two of the most common are the ultimatum game (Güth, Schmittberger, & Schwarze, 1982) and the prisoner's dilemma (e.g., Axelrod, 1980). Both are two-player games that gauge players' preferences for their own outcomes and provide a means to assess not only the degree to which players consider their partner's outcome, but how that consideration influences their decision-making. Thus, these tasks can be used to examine some of the processes that influence psychopathic individuals' decision-making, including their use of decision weights and their tendencies for risk-averse or risk-seeking behavior.

A third widely-used economic decision-making task is the dictator game (e.g., Forsythe, Horowitz, Savin, & Sefton, 1994; Hoffman, McCabe, Shachat, & Smith, 1994). This task is classed as a "game" loosely, as it is a single-person decision-making task, although the outcomes of both players are contingent on that decision. The dictator game provides a baseline for analysis of individual differences in simple economic decisions, allowing for examination of more complex decisions in light of one-round, "pie-splitting" decisions.

Ultimatum game. The ultimatum game consists of players (in the role of "Player 1") dividing a given amount of money, such as $10, between themselves and a partner ("Player 2") in any way they choose. The partners are informed of the split and told they can accept the amount given to them, in which case both players receive the amount allotted by Player 1; or Player 2 can reject the split, in which case both players receive nothing.

Research suggests that the cutoff for standard populations playing low stakes ultimatum games (i.e., with reasonably trivial amounts of money) is between 20% and

30% (Dickinson, 2000). That is to say, most individuals acting as Player 2 will begin to reject offers as their "piece of the pie" drops to 20%-30% of the total amount available. As the total amount of money increases (i.e., as the game becomes high stakes), individuals are less likely to reject the same proportion that they might have rejected in a low stakes setting. This phenomenon appears in many other decision-making scenarios, and can be described in more general economic terms: "the marginal value of both gains and losses generally decreases with their magnitude" (Kahneman & Tversky, 1979, p. 278). In other words, as the absolute amount of money (for example) increases, the same absolute difference appears subjectively less significant.

Another question raised by the ultimatum game is the explanation underlying players' tendency to reject offers that give them a low proportion of the total sum. The reasons behind this reaction – irrational based on economic reasoning that would argue for accepting any nonzero offer – are generally thought to be affective (Güth et al., 1982) and attributable to weighting the value of punishing one's partner for offering an unfair split more heavily than the value of accepting a small proportion of money. In contrast, if the game were played from a purely rational economic standpoint, players should accept any nonzero amount offered to them, because in these cases the economic payoff is greater for accepting than for rejecting the offer. These different viewpoints can quickly lead to a tug-of-war between affectively-driven responding and logically-driven responding. If both players acted purely on economic reasoning, Player 1 would offer the smallest possible nonzero proportion to Player 2, and Player 2 would accept any nonzero offer; however, this rational approach effectively eliminates the "game" nature of the exchange. Thus, the dance of the ultimatum game becomes determining how low Player

1 can drop his or her offer while still obtaining an "accept" response from Player 2.

Koenigs, Kruepke, and Newman (2010) examined psychopathy in the context of the ultimatum game. Based on classical conceptualizations of psychopathy as a two-factor model, with one factor characterized by low trait anxiety and the other by high trait anxiety, Koenigs et al. divided their sample based on scores on the PCL-R and the Welsh Anxiety Scale (WAS; Welsh, 1956, cited by Koenigs et al., 2010). Low-anxiety and high-psychopathy individuals were classed as "primary" psychopaths, whereas high-anxiety and high-psychopathy individuals were classed as "secondary" psychopaths. Using these classifications, as Player 2, primary psychopaths were willing to accept significantly fewer unfavorable splits (i.e., splits where Player 1 took more money) over the course of 19 rounds of the ultimatum game, each with a different "partner" (in fact, the offers were predetermined). Secondary psychopaths did not differ significantly from non-psychopaths. Primary, secondary, and non-psychopathic participants did not differ significantly from each other in the proposed splits they made as Player 1 to their unknown partners.

Nevertheless, dichotomization of a sample tends to result in substantial decreases in variance and consequently statistical power (Cohen, 1983). Therefore, analysis of psychopathic traits on a dichotomized scale, e.g., primary vs. secondary, rather than on a continuum, is less likely to detect significant group differences in a given study. This may be one reason Koenigs et al. (2010) obtained limited statistical significance.

Osumi and Ohira (2010) found that individuals higher on psychopathic traits play the ultimatum game more logically, in that they are willing to accept more unfavorable splits of money. They used the Levenson Self-Report Psychopathy scale (LSRP;

Levenson, Kiehl, & Fitzpatrick, 1995) to assess psychopathic traits in Japanese

undergraduates. This instrument consists of two subscales, primary psychopathy and

secondary psychopathy. The primary psychopathy scale assesses "a selfish, uncaring,

and manipulative posture towards others," whereas the secondary psychopathy scale

assesses "impulsivity and a self-defeating lifestyle" (Levenson et al., 1995, p. 152).

These two scales are often viewed as approximate, but not interchangeable, analogues of

FD and SCI, respectively; however, as described by Levenson et al. (1995), LSRP

primary psychopathy is more an index of coldness or meanness than of social charm and

glibness. Thus, overall it may be a closer analogue to PPI-R Coldheartedness than to

PPI-R FD.

In Osumi and Ohira's study, 28 undergraduates were separated into high and low

psychopathy groups based on their scores on primary psychopathy (but see discussion

above regarding dichotomization of data). Each participant played 30 one-shot rounds of

the ultimatum game, each round with a different "partner" (in reality, participants were

playing against a computer). Participants always played as Player 2. Skin conductance

was also measured.

In contrast to the findings from Koenigs et al. (2010, above), participants who

scored higher on LSRP primary psychopathy accepted significantly more unfair offers

than low-psychopathy participants. LSRP secondary psychopathy was not significantly

related to acceptance rates of unfair offers. The primary psychopathy group did not show

an increase in skin conductance when presented with unfair offers, whereas the low-

psychopathy group did. Osumi and Ohira also found a nonsignificant trend toward a

negative correlation between primary psychopathy and skin conductance in response to

unfair offers. Although these skin-conductance findings are consistent with the extant

literature on both primary psychopathy and FD (Dindo & Fowles, 2011), the authors

found no significant results for secondary psychopathy.

These distinctions between FD and SCI (and between primary and secondary

psychopathy) lead to the expectation that individuals who score highly on SCI or

secondary psychopathy may exhibit the opposite response demonstrated by high-FD

scorers or primary psychopaths. Individuals high on SCI, often impulsive and

aggressive, may reject splits they perceive as giving them less than they deserve, as

opposed to the unemotional decision-making of individuals higher on FD. This

expectation may be supported by the literature on psychopathy and hostile attribution bias

(HAB; Dodge & Coie, 1987). When individuals exhibiting an HAB "are confronted by

another person's provocative, yet ambiguous, behaviors, they are more likely than others

to attribute those behaviors to hostile intent" (Vitale, Newman, Serin, & Bolt, 2005, p.

100). In a sample of incarcerated male offenders, Vitale et al. (2005) found that, when

presented with an ambiguous stimulus, PCL-R psychopaths display more HAB. This

correlation was present in PCL-R total scores, Factor 1 scores, and Factor 2 scores.

Based on PPI-R SCI's significant correlations with PCL-R total and Factor 2 scores (e.g.,

Edens & McDermott, 2010), as well as the aggression typical of SCI psychopaths, it is

likely that high SCI scorers also display high HAB, and therefore this may predict

punishment or vengeful responding in partnered tasks.

Hence, in a situation such as the ultimatum game, in which individuals are offered

an unfair scenario, high SCI scorers may perceive their partner as offering the split with

more malicious intent, and hence reject the offer. The power to deny their partner any

monetary gain may in itself reinforce this behavior, as there may be some affective reward (e.g., satisfaction, vindication) for rejecting unfairness and giving partners "what they deserve."

Prisoner's dilemma. The classical prisoner's dilemma consists of a scenario in which Player 1 and Player 2 are two prisoners being questioned. Each has the choice to cooperate with his or her partner or to defect, with the payoffs and punishments for each contingent on the responses of both players. Players are not told whether their partner cooperated or defected until after they have made their own decision.

Research on the prisoner's dilemma suggests that in iterated games (i.e., games consisting of multiple rounds, either with the same partner or with different partners), several strategic "rules" lead to better outcomes. This is best exemplified by Axelrod's (1980) prisoner's dilemma computer tournament, in which 14 computer algorithms were pitted against each other to determine the best strategic approach to the game. The "winner" of the tournament, the Tit for Tat strategy, simply played cooperation as its first move, followed then on by whatever its opponent had played previously. Axelrod (p. 18) suggested that Tit for Tat's success indicates that "reciprocity … can also be an extremely successful operating rule for an individualistic pragmatist."

The attribute of "niceness" emerged as the single greatest predictor of how well a rule did in the tournament, with "niceness" defined as the "property of never being the first to defect" (Axelrod, 1980, p. 19). Similarly, forgiveness also paid off as a strategy, as refusing to "forgive" another program's defection often led to strings of mutual defection and neither program doing well. Indeed, though no entrant submitted it, the strategy of Tit for Two Tats, in which the rule defects only after its opponent has defected

twice in a row, would have outperformed Tit for Tat (Axelrod, 1980). Finally, optimism proved to be a good strategy, at least at the beginning of each pairing, as most of the rules cooperated initially, and defecting on the first move often led to a rut of mutual defection (Axelrod, 1980).

Although the qualities of the more successful rules are illuminating in terms of possible strategies that may lead to improved outcomes in prisoner's dilemma scenarios, Axelrod admitted that "the results of a single tournament are not definitive," because the "effectiveness of a particular strategy depends … on the nature of the other strategies with which it must interact" (p. 21). Thus, it is unclear how well these rules translate to person-to-person interaction in the prisoner's dilemma, as people may be less inclined to follow strict rules in playing the game.

In the context of a person-to-person prisoner's dilemma, Andreoni and Miller (1993) contended that most iterated games will eventually devolve into repeated rounds of mutual defection. However, in their study, a subset of the population appeared to be altruistic, continuing to cooperate longer than non-altruists, even through the end of the series of games. This subset appeared, albeit in smaller numbers, even in a condition in which players were paired with a new partner for each round of the game, effectively creating a series of one-shot prisoner's dilemma scenarios rather than an iterated game.

Still, the ultimate payoff for the prisoner's dilemma is to exploit one's partner as much as possible, i.e., to defect while they cooperate. Thus, particularly in one-shot scenarios, higher levels of certain psychopathic traits, such as manipulativeness and aggression, may predispose individuals to defect, banking on the chances of the other player acting cooperatively to obtain the greatest personal gain. In fact, some research

suggests that in prisoner's dilemma scenarios, psychopathy predicts defection. Mokros et al. (2008) administered a 40-round prisoner's dilemma game to 48 subjects (24 psychopaths previously diagnosed using the PCL-R, 24 "controls" with low levels of psychopathic traits) in which the computerized "opponent" used the Tit for Two Tats strategy described above. They assessed psychopathy using the German version of the PPI-R, but did not subdivide the scores into the two components of Fearless Dominance and Self-Centered Impulsivity. The psychopathic participants not only defected significantly more often than the controls, but also had significantly better cumulative outcomes.

Although these findings contribute to the literature on psychopathic decision-making, they are not as detailed or informative regarding the differences between the factors of psychopathy. Mokros and colleagues did conduct analyses at the subscale level, finding that the scales of Rebellious Nonconformity and Machiavellian Egocentricity, in addition to the total PPI-R score, were significantly correlated with defection. However, conducting analyses on the overarching factors separately and in combination may have revealed more about the correlates of the underlying structure of psychopathy than analyzing the total score and subscales.

In contrast, differences in game-playing behavior and strategy emerge in the prisoner's dilemma when LSRP scores are broken down into primary and secondary psychopathy scales. In a study by Widom (1976), psychopaths were selected using Cleckley personality and trait criteria from a pool of hospital inmates on the basis of staff recommendations, case histories, and Minnesota Multiphasic Personality Inventory (MMPI) scores. Results suggested that although the three subject groups (primary, $n =$

15; secondary, $n = 17$; and control, $n = 12$) did not differ at a statistically significant level on the number of cooperative responses given over the course of two 30-round prisoner's dilemma games, there were several differences between the two types of psychopathy. Primary psychopaths were reasonably adept at predicting their partner's next move, on a comparable level to the control group, whereas secondary psychopaths showed a significant deficit in this area. Secondary psychopaths also displayed a deficit when predicting punishment (i.e., defection) from their partner after defecting themselves; primary psychopaths were not significantly worse at this task than controls. Both primary and secondary psychopaths described their roles in the prisoner's dilemma as "competitive," "gambling," and "opponent," and both also "saw themselves and the other member of the pair not as partners collaborating to con the experimenter but as competitors or opponents" (Widom, 1976, p. 332); this is in contrast to control participants, who tended to view their role as cooperative and collaborative instead of antagonistic.

In a brief review of the literature on psychopathy in the context of the prisoner's dilemma, Mokros et al. (2008) noted that Widom's findings, particularly the lack of a difference in cooperation between psychopaths and controls, may stem from measurement problems: "The measurement of psychopathy may not have been as reliable as those done nowadays" (p. 412). However, those authors overlooked the importance of Widom's other findings regarding the behaviors and cognitions of primary and secondary psychopaths, both in comparison with each other and with controls. Primary psychopaths displayed more adaptive behavior overall, including an ability to prolong strings of mutual cooperation (termed "tolerance of boredom" by Widom) and greater accuracy in

predicting a partner's next move, as well as in predicting retaliation for defecting on their partner. Additionally, the differences between psychopaths (both primary and secondary) and controls in perception of roles and the interactional nature of the game provide valuable information about the ways in which psychopaths may process ambiguous interpersonal decision-making situations. These differences in responding echo the findings mentioned above regarding hostile attribution biases in psychopathic individuals (Vitale et al., 2005).

Finally, Rilling et al. (2007) examined psychopathy in two 2-round prisoner's dilemma scenarios, using an fMRI scanner to collect neuroimaging data during the procedure. The PPI Short Form (Lilienfeld & Andrews, 1996) and the LSRP were used to assess psychopathic traits in 30 participants (50% male). Significant correlations only emerged in male participants, whose total and primary psychopathy scores on the LSRP were negatively correlated with cooperation and with continuing a mutually cooperative succession of rounds. Imaging data supported the hypothesis that individuals with higher total and primary psychopathy scores may find punishment (i.e., defection by one's partner) less aversive than non-psychopaths, as amygdala activation in punishing trials was attenuated in participants with higher psychopathy scores.

Dictator game. The dictator game is, in essence, an "abbreviated" version of the ultimatum game. In this game, there are two players, but the game's outcome is determined solely by Player 1. Player 1 is given a predetermined amount of money and informed that he or she can divide this money in any way he or she chooses. Player 2 does not have a choice: he or she must accept whatever split Player 1 proposes.

Koenigs et al. (2010), in addition to the ultimatum game, had participants play

one round of the dictator game. "Primary" psychopaths (again, this classification was based on global psychopathy and trait anxiety scores) offered significantly lower amounts to their partners than both secondary and non-psychopathic players.

In another study, Hoffman, McCabe, Shachat, and Smith (1994) conducted a series of non-repeated ultimatum and dictator games and found that although participants as Player 1 tended to offer half of the given money under standard circumstances, when the scenario was altered (e.g., participants had to "earn" the right to act as Player 1), they were more likely to act in a self-serving manner by offering a smaller amount of money to Player 2. This effect was heightened when the game scenario was double-blind, i.e., when the experimenter did not know which participant was Player 1, suggesting that anonymity may remove some tendency toward self-enhancement or demand characteristics in participants' responses.

The ring measure of social value orientation. Although it does not fall squarely under the purview of Kahneman and Tversky's (1992) conditions of uncertainty and risk, an additional measure of attitudes in interpersonal decision-making games is the ring measure of social value orientation (SVO), developed by Liebrand (1984). This measure is premised on the theory that each individual has a true motivational vector that guides his or her decisions in social and economic situations. This vector can be determined by representing self and other outcomes in a given situation on a set of two-dimensional axes, with self outcome on the horizontal axis and other outcome on the vertical axis. Individuals are presented with a set of options with different outcomes for both self and other, generated from a circle with its center at the origin of the self-other axes; the pairs of outcomes are points along the circumference of the circle. Respondents select the pair

of outcomes most appealing to them, and thus define a set of coordinates that represents their motivational vector (see Fig. 1, from Liebrand, 1984).

Traditionally, four types of respondents are identified on this measure: altruistic, or maximizing other outcome; cooperative, or maximizing both self and other outcomes; individualistic, or maximizing self outcome; and competitive, or maximizing self outcome while minimizing other outcome. Other types of respondents exist, but are far less common (Liebrand, 1984; see Fig. 2 for illustration). Using these classifications, predictions may be made about individual differences in SVO and, following from this, behavior when presented with certain decisions. Liebrand and McClintock (1988) indicated that, when presented with the ring measure, altruists and individualists responded faster than cooperators and competitors, which the authors suggested is due to differential weighting of self and other outcomes. Because altruists and individualists only take one of these into account (other and self, respectively), they have shorter response latencies, whereas cooperators and competitors take both self and other outcomes into consideration when calculating their choice. This supports the theory behind the labels for each of the four types, lending face validity to the ring measure's classifications.

Bogaert, Boone, and Declerck (2008) argued that SVO, the construct assessed by the ring measure, is a stable personality trait rather than a state-dependent set of values, and that the four categories of respondents in the ring measure have construct validity with respect to behaviors and choices made in many social or economic situations. Literature indicates that in economic resource games involving contributing to or withdrawing from a common fund, cooperatives and altruists (grouped into a "prosocial"

category) generally act for the benefit of the collective, whereas competitors and individualists (the "proself" category) are more likely to act for their own gain, even to the detriment of the collective (De Cremer & Van Dijk, 2002; Kramer, McClintock, & Messick, 1986; both as cited by Bogaert et al., 2008).

Little work has been done examining SVO as related to psychopathic, narcissistic, or Machiavellian personality traits. However, one study (Schug, Matsumoto, Horita, Yamagishi, & Bonnet, 2010) utilized the ring measure in conjunction with a version of the ultimatum game to assess emotional expressivity. The relationship between responses on these measures was strong, with the majority of "prosocial" ring measure responders behaving fairly in the ultimatum game, and the majority of "proself" responders behaving unfairly. The sample of participants in this study was somewhat small and limited ($N = 20$; participants were all male Japanese undergraduates), although these correlations are suggestive of the construct validity of the ring measure.

Hypotheses

In light of the above literature, this study aims to elucidate the behavioral patterns and choices of individuals differing on the three factors of psychopathy as represented by the PPI-R, separately and in combination, through the use of economic decision-making tasks.

A secondary aim is to contrast these patterns with those of individuals differing on measures of narcissism and Machiavellianism, the other two members of the "dark triad." In doing so, I hope to illuminate the relationships between the factors of psychopathy and these other constructs, in particular by examining the incremental validity each PPI-R factor contributes over narcissism and Machiavellianism in

predicting behaviors on the economic tasks. These incremental contributions will also be examined in the context of the destructive testing approach (Anderson & Anderson, 1996), which establishes an empirical relationship between variables and "then [attempts] to break that relation by adding competitor variables" (p. 740). The goal of such an approach is to parse out the sub-components of each PPI-R factor that may underlie correlations with the present behavioral tasks.

A final aim of this study is to explore the predictive utility and behavioral correlates of PPI-R Coldheartedness, an as-yet poorly understood factor.

Several hypotheses present themselves: first, I hypothesize that total scores on psychopathy will correlate with total scores on narcissism and Machiavellianism. I expect that FD scores will correlate preferentially with narcissism, whereas SCI and Coldheartedness will correlate preferentially with Machiavellianism. I propose no hypotheses regarding the incremental predictive validity of each construct or factor over the others as applied to the behavioral economic measures; those analyses will be exploratory in nature.

I hypothesize that high-FD scorers, in accordance with the instrumentalism, capacity for strategic decision-making, and social adeptness described above, will make more purely rational economic decisions. Thus, they will accept lower nonzero offers on the ultimatum game, and will cooperate more on the prisoner's dilemma, than individuals scoring higher on SCI or on Coldheartedness. I expect that they will take a more instrumental and individualist approach on the Ring Measure, disregarding their partners' outcomes and focusing instead only on their own outcomes.

In contrast, I hypothesize that high-SCI scorers, in accordance with the emotional

reactivity and aggression associated with that factor, will make more decisions out of anger or revenge toward their partners. Thus, they will reject lower nonzero offers on the ultimatum game, and will defect more on the prisoner's dilemma, than individuals scoring higher on FD or on Coldheartedness. They will likely take a more competitive approach on the Ring Measure, attempting to minimize their partners' outcomes while maximizing their own outcomes.

The dictator game is a simpler task, and one that does not involve strategizing about a partner's potential decision. Thus, based on the overarching egocentrism and disregard for others that is characteristic of high-psychopathic individuals, different "phenotypes" of psychopathy may not be characterized by different strategies or approaches, as predicted in the above more complex games. Instead, individuals high on any one particular factor, as well as those high on multiple factors, are likely to respond similarly, namely, to offer a smaller fraction of the money to their partner than individuals lower on psychopathy.

<div align="center">**Method**</div>

Participants

Data were collected from 215 participants, with the sample drawn from two introductory psychology courses at a moderately-sized Southeastern private university. Participants received two research credits for taking part in the study.

Due to large amounts of missing data and high scores on the Inconsistency and Deviant Responding subscales of the PPI-R (Lilienfeld & Widows, 2005), 4 participants' responses were excluded from analyses, for a total of 211 responses. Participants were 67.8% female ($n = 143$), ranging in age from 17 to 22 ($M = 18.8$, $SD = 1.00$). The sample

comprised 104 participants identifying as Caucasian (49.3%), 54 as Asian (25.6%), 25 as African-American (11.8%), 10 as Hispanic (4.7%), 5 as Middle Eastern (2.4%), and 13 who did not answer (6.3%). Psychology majors comprised 50.9% of the sample ($n = 107$).

Procedure

Study materials consisted of a set of pencil-and-paper questionnaires and a set of online measures. Pencil-and-paper questionnaires included the Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005), the Levenson Self-Report Psychopathy scale (LSRP; Levenson et al., 1995), the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979), the Mach-IV scale (Christie & Geis, 1970), and the 33-item Multidimensional Personality Questionnaire (MPQ-33; Harkness, Tellegen, & Waller, 1995). Participants were alternately assigned to one of two orders: pencil-and-paper followed by computerized measures, or computerized measures followed by pencil-and-paper.

Measures

Psychopathy. Psychopathy was measured using two self-report questionnaire instruments.

Psychopathic Personality Inventory-Revised. The Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Andrews, 1996; Lilienfeld & Widows, 2005) was developed on a population of college students, and is intended to assess subclinical psychopathic traits. There are eight subscales and two to three higher-order factors (Benning et al., 2003), namely, Self-Centered Impulsivity (SCI), Fearless Dominance (FD), and Coldheartedness, although little research has been done on the lattermost

factor. In our sample, the PPI-R subscales, factors, and total scores all demonstrated acceptable reliability as measured by Cronbach's α ($\alpha_{SCI} = 0.89$; $\alpha_{FD} = 0.90$; $\alpha_{C} = 0.79$; $\alpha_{Total} = 0.91$; see Table 1 for complete PPI-R subscale reliability analyses).

Levenson Self-Report Psychopathy Scale. As an additional measure of psychopathy, the Levenson Self-Report Psychopathy scale was administered (LSRP; Levenson et al., 1995). This instrument is composed of a primary psychopathy subscale and a secondary psychopathy subscale, as well as a total score. Cronbach's α for all subscales were acceptable ($\alpha_{Primary} = 0.86$; $\alpha_{Secondary} = 0.70$; $\alpha_{Total} = 0.86$).

Personality correlates. Machiavellianism and narcissism were assessed using the Mach-IV (Christie & Geis, 1970) and the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979). Cronbach's α for NPI and Mach-IV total scores were acceptable (respectively: $\alpha = 0.81$; $\alpha = 0.77$).

The 33-item Multidimensional Personality Questionnaire (MPQ-33; Harkness, Tellegen, & Waller, 1995) was administered to provide additional personality information. In accordance with convention, eleven subscales and three higher-order factors were calculated. The higher-order factors displayed moderate-to-acceptable reliability as measured by Cronbach's α ($\alpha = 0.79$, $\alpha = 0.65$, $\alpha = 0.74$, for Positive Emotionality, Negative Emotionality, and Constraint, respectively; see Table 2 for MPQ-33 subscale reliability analyses).

Economic tasks. Behavioral data were collected using three widely-used economic "games" or tasks. In each of these games, it was made clear that participants were playing a hypothetical partner.

Dictator game. Participants played one round of the dictator game as Player 1,

dividing $10. The amount of money allocated to oneself served as the outcome measure.

Ultimatum game. Participants played four independent rounds of the ultimatum game as Player 2, with four different "partners" and four different proposed splits of $10. Each round was analyzed independently, dummy-coded as either 1 ("reject") or 0 ("accept").

Prisoner's dilemma. Participants played ten computerized rounds of the prisoner's dilemma, each with the same "partner," with a payoff matrix illustrated in Table 3. Based on Axelrod's (1980) winning program, the computerized "partner" played a tit-for-tat strategy. The number of times an individual defected in the 10 rounds of the prisoner's dilemma scenario, PD_{tot}, served as the outcome measure for this task.

Ring measure. Participants completed the ring measure of social value orientation (Liebrand, 1984; Liebrand & McClintock, 1988), a 32-item questionnaire measuring economic preferences in a two-player situation in which participants' responses determine their outcome and the outcome of an unknown and hypothetical partner. This instrument yields a "self" monetary total and an "other" monetary total, calculated by summing participants' response choices. These totals were used as one outcome measure for this task. An additional outcome measure was obtained by using the total self and other amounts to place respondents in one of four ordinal categories (Altruist, Cooperator, Individualist, Competitor). Reliability as measured by Cronbach's α was acceptable ($\alpha = 0.75$).

Data Analyses

In addition to correlational analyses to examine the relationships among personality variables and behavioral tasks, regression analyses were performed to explore

the relationships between personality variables in the context of these tasks. For each task, hierarchical linear regressions were performed with the three PPI-R factors in all possible permutations to ensure assessment of potential cooperative suppressor effects (Cohen & Cohen, 1975). All possible two-way interaction effects among the PPI-R factors were also examined for each task. Finally, significant PPI-R predictors for each task were examined with NPI and Mach-IV scores.

To account for the nesting of ultimatum game and prisoner's dilemma rounds within participants, the associations between psychopathic personality traits and these economic tasks were analyzed using generalized linear modeling with generalized estimating equations (GEE) treating the data as nested, with participant ID as a subject variable and game round as a within-subject variable. Generalized linear models allow the outcome variables to be treated as non-normally distributed and use appropriate distributional and link functions (in this case, since the dependent variables were binary, a binomial distribution and logit link).

Results

Order

There were no significant differences on any measures between orders of administration of the protocols. Thus, the two orders were combined in all analyses.

Gender

Consistent with previous literature (e.g., Cale & Lilienfeld, 2002), there were significant differences between genders on both psychopathy measures. Males scored higher than females on PPI-R Coldheartedness, SCI, FD, and total scores ($F_C(1, 209) = 17.70$, $\eta^2 = 0.08$; $F_{SCI}(1, 209) = 22.65$, $\eta^2 = 0.10$; $F_{FD}(1, 209) = 14.81$, $\eta^2 = 0.07$; $F_{Total}(1,$

$209) = 37.02$, $\eta^2 = 0.15$; all $ps < 0.001$). On the LSRP, males again scored higher than females on the primary, secondary, and total scores ($F_{\text{Primary}}(1, 209) = 13.35$, $\eta^2 = 0.06$, $p < 0.001$; $F_{\text{Secondary}}(1, 209) = 4.50$, $\eta^2 = 0.02$, $p < 0.05$; $F_{\text{Total}}(1, 209) = 13.31$, $\eta^2 = 0.06$, $p < 0.001$).

There were also significant differences between genders on total NPI score ($F(1, 209) = 7.00$, $\eta^2 = 0.03$; $p < 0.01$) and on the Mach-IV total score ($F(1, 209) = 14.60$, $\eta^2 = 0.07$; $p < 0.001$). Males scored higher than females on both of these instruments.

There were no significant differences on the MPQ-33 Positive Emotionality or Negative Emotionality factors, but there was a significant difference on the MPQ-33 Constraint factor, with females scoring higher than males ($F(1, 209) = 13.25$, $\eta^2 = 0.06$, $p < 0.001$). Males scored significantly higher than females on Social Potency ($F(1, 209) = 4.17$, $\eta^2 = 0.02$, $p < 0.05$) and Aggression ($F(1, 209) = 33.83$, $\eta^2 = 0.12$, $p < 0.001$). Females scored significantly higher than males on Social Closeness ($F(1, 209) = 4.52$, $\eta^2 = 0.02$, $p < 0.05$), Stress Reaction ($F(1, 209) = 4.34$, $\eta^2 = 0.02$, $p < 0.05$), Control ($F(1, 209) = 7.30$, $\eta^2 = 0.03$, $p < 0.01$), and Harmavoidance ($F(1, 209) = 12.00$, $\eta^2 = 0.05$, $p < 0.01$); the mean difference on Traditionalism approached significance, with females scoring higher ($F(1, 209) = 3.90$, $\eta^2 = 0.02$, $p < 0.06$).

The only significant differences between genders on any economic measure appeared on the ring measure-other. Males chose options allotting significantly more money to their partners than did females ($F(1, 201) = 9.95$, $\eta^2 = 0.05$, $p < 0.01$).

Ethnicity

There were significant differences between Caucasian ($n = 104$) and Hispanic ($n = 10$) respondents on Coldheartedness ($F(1, 112) = 10.06$, $\eta^2 = 0.08$, $p < 0.01$), on the

LSRP primary psychopathy scale ($F(1, 112) = 7.45, \eta^2 = 0.06, p < 0.01$), and on the

LSRP total score ($F(1, 112) = 7.63, \eta^2 = 0.06, p < 0.01$). For each of these, Hispanics

exhibited the higher scores. There were also significant differences between African-

American ($n = 25$) and Hispanic respondents on the LSRP primary psychopathy scale

($F(1, 33) = 11.02, \eta^2 = 0.25, p < 0.01$) and on the LSRP total score ($F(1, 33) = 8.77, \eta^2 =$

$0.21, p < 0.01$). Again, in each of these cases, Hispanics exhibited the higher scores.

Hispanics exhibited the highest scores of all reported ethnicities on SCI,

Coldheartedness, PPI-R total score, Mach-IV total score, LSRP primary, LSRP

secondary, LSRP total score, and MPQ-33 Negative Emotionality; except for those

reported above, all differences were nonsignificant.

There were significant main effects for ethnicity on the dictator game, the third

round of the ultimatum game (where participants were offered $3 of the $10 available),

and the prisoner's dilemma. Tukey's HSD post-hoc tests on the dictator game revealed

significant differences between Hispanic and Asian ($n = 54$) participants ($p < 0.05$) and a

trend toward significance between Hispanic and Caucasian participants ($p < 0.06$); in

both of these cases, Hispanics had the higher score, i.e., retained a larger amount of the

divisible money for themselves. Post-hoc tests on the third round of the ultimatum game

revealed significant differences between African-American and Caucasian participants (p

< 0.01) and between African-American and Asian participants ($p < 0.01$). In both of

these cases, African-Americans obtained the higher score, i.e., rejected the offer more

frequently. Tukey's HSD post-hoc tests on the prisoner's dilemma revealed a significant

difference between Hispanic and Caucasian participants ($p < 0.05$), where Hispanics had

the higher scores, i.e., defected more frequently.

Controlling for ethnicity did not substantially change the results of any correlational analyses.

Academic Major

Participants were categorized based on their stated academic major. Psychology and Business/Economics majors were of particular interest, given their potential prior knowledge of the behavioral tasks used and possible differences in financial attitudes. Mean difference analyses were conducted, and significant differences emerged between these two majors for scores on the dictator game ($t(141) = -3.27, p < 0.01$), LSRP primary ($t(141) = -3.94, p < 0.001$), and LSRP total ($t(141) = -3.18, p < 0.01$). In each case, Business/Economics majors had the higher scores.

Personality Correlations

The three PPI-R factors (SCI, FD, and Coldheartedness) were all positively correlated (rs = 0.21 to 0.37). They were each substantially positively correlated with the PPI-R total score (see Table 4). LSRP primary, secondary, and total scores were also positively and significantly intercorrelated (rs = 0.40 to 0.91; see Table 4).

Coldheartedness, SCI, and PPI-R total scores were each positively and significantly correlated with LSRP primary (rs = 0.49 to 0.60), secondary (rs = 0.22 to 0.71), and total scores (rs = 0.46 to 0.76), as well as with NPI (rs = 0.19 to 0.42) and Mach-IV total scores (rs = 0.38 to 0.64; see Table 4). There was a differential pattern of correlations with FD, however, which correlated positively and significantly with only the NPI total score and LSRP primary psychopathy scale (respectively: $r = 0.48, p < 0.001$; $r = 0.17, p < 0.05$).

Coldheartedness and SCI both correlated negatively and significantly with MPQ-

33 Positive Emotionality (respectively: $r = -0.26$; $r = -0.17$), as did the Mach-IV total,

LSRP secondary, and LSRP total scores (rs = -0.22 to -0.33; see Table 5). Conversely,

FD and NPI total scores correlated positively and significantly with Positive Emotionality

(respectively: $r = 0.41$; $r = 0.48$). Positive, significant correlations emerged between SCI

and MPQ-33 Negative Emotionality ($r = 0.46$). Negative Emotionality also correlated

significantly with the Mach-IV total score and all three scales of the LSRP (rs = 0.28 to

0.49), whereas Positive Emotionality correlated negatively with these variables (rs = -

0.12 to -0.33; see Table 5). The PPI-R total score, all three PPI-R factors, Mach-IV total,

and all three LSRP scales each correlated negatively and significantly with MPQ-33

Constraint (rs = -0.18 to -0.65; see Table 5).

Differential correlational patterns emerged between the PPI-R factors and

subscales of the MPQ-33. Coldheartedness correlated positively with Aggression, and

negatively with Social Closeness, Achievement, Stress Reaction, Harmavoidance, and

Traditionalism. SCI correlated positively with Social Potency, Aggression, Alienation,

and Absorption, and negatively with Wellbeing, Achievement, Control, Harmavoidance,

and Traditionalism. FD correlated positively with Wellbeing, Social Potency, Social

Closeness, and Aggression, and negatively with Stress Reaction, Alienation, Control,

Harmavoidance, and Traditionalism (see Table 5 for all rs).

Differential correlations emerged between FD and LSRP secondary scores

depending on gender. These correlations were negative for males ($r = -0.26, p < 0.05$)

and positive, if nonsignificant, for females ($r = 0.03, p > 0.05$); the difference between

these correlations was significant ($z = -1.97, p < 0.05$).

Economic Tasks

Correlations among the economic tasks were small to moderate, but significant (see Table 6).

Dictator game. Responses on the dictator game spanned the full possible range of $0 - $10 ($M = 5.99$, $SD = 1.92$). The self-allocation amount correlated positively and significantly with Coldheartedness ($r = 0.22$, $p < 0.01$), NPI total score ($r = 0.19$, $p < 0.01$), Mach-IV total score ($r = 0.38$, $p < 0.001$), and LSRP primary and total scales (respectively: $r = 0.31$, $r = 0.26$, all $ps < 0.001$). There were negative correlations trending toward significance with Positive Emotionality ($r = -0.13$, $p < 0.07$), as well as with MPQ-33 Wellbeing ($r = -0.13$, $p < 0.07$) and MPQ-33 Social Closeness ($r = -0.13$, $p < 0.06$). Finally, there was a significant positive correlation with MPQ-33 Control ($r = 0.17$, $p < 0.05$).

Ultimatum game. The rejection rate for the first round of the ultimatum game, in which participants were offered $7 of the $10 available, did not correlate significantly with any measure. The range of responding in this round was restricted, with only 10 participants (4.7%) rejecting the offer.

The rejection rate for the second round, in which participants were offered $5 of the $10 available, correlated positively with SCI ($r = 0.17$, $p < 0.05$), LSRP secondary psychopathy ($r = 0.17$, $p < 0.05$), and trended toward significance with the LSRP total score ($r = 0.12$, $p < 0.08$). There were significant positive correlations with MPQ-33 Negative Emotionality ($r = 0.21$, $p < 0.01$), as well as with Alienation and Absorption ($r = 0.18$, $p < 0.05$; $r = 0.15$, $p < 0.05$), and trends toward significance with MPQ-33 scales of Stress Reaction and Aggression ($r = 0.12$, $p < 0.08$; $r = 0.13$, $p < 0.08$). However, there was extreme restriction of range in this round, with only 7 participants (3.3%)

rejecting the offer. One of these participants was an outlier on SCI (more than 3 standard deviations above the mean), and when this individual was removed from analyses, all correlations became nonsignificant.

In the third round of the ultimatum game, participants were offered \$3 of the \$10 available, and 45% of participants rejected the offer. The rejection rate for this round correlated positively with SCI, FD, and PPI-R total scores ($r = 0.18, p < 0.05; r = 0.15, p < 0.05; r = 0.22, p < 0.01$); there was a trend toward significance with Coldheartedness ($r = 0.13, p < 0.06$). There were also positive correlations with NPI total scores ($r = 0.18, p < 0.05$), as well as with all three LSRP scores ($r_{Primary} = 0.16, p < 0.05; r_{Secondary} = 0.16, p < 0.05; r_{Total} = 0.19, p < 0.01$). A positive correlation emerged with MPQ-33 Social Potency ($r = 0.22, p < 0.01$), and a negative correlation emerged with MPQ-33 Control ($r = -0.14, p < 0.05$).

The rejection rate for the fourth round, in which participants were offered \$1 of the \$10 available, correlated significantly and positively with MPQ-33 Tradition ($r = 0.15, p < 0.05$). In this round, 75.8% of participants rejected the offer.

Prisoner's dilemma. The total number of defections on the prisoner's dilemma was tallied for each participant ($M = 3.30, SD = 3.24$). Significant positive correlations emerged for Coldheartedness ($r = 0.16, p < 0.05$) and SCI ($r = 0.19, p < 0.01$), as well as with Mach-IV total ($r = 0.28, p < 0.001$) and LSRP primary, secondary, and total scores (respectively: $r = 0.31, p < 0.001; r = 0.21, p < 0.01; r = 0.32, p < 0.001$). PD_{tot} correlated negatively with MPQ-33 Wellbeing ($r = -0.18, p < 0.05$) and positively with MPQ-33 Aggression ($r = 0.16, p < 0.05$).

Ring measure. Correlations were conducted using ring measure-self ($M = 21.35$,

SD = 7.92) and ring measure-other (*M* = 7.36, *SD* = 9.78) totals across the 32 items. Ring

measure-self totals correlated negatively with only MPQ-33 Alienation (*r* = -0.17, *p* <

0.05) and MPQ-33 Absorption (*r* = -0.17, *p* < 0.05). Ring measure-other totals correlated

negatively with Coldheartedness, Mach-IV total, and LSRP primary and total scores

(respectively: *r* = -0.24, *p* < 0.01; *r* = -0.18, *p* < 0.05; *r* = -0.20, *p* < 0.01; *r* = -0.17, *p* <

0.05).

Due to previously-described gender differences on the ring measure-other total,

partial correlations were conducted controlling for gender. In addition to the significant

correlations reported above, significant negative correlations emerged for SCI and PPI-R

total scores (respectively: *r* = -0.18, *p* < 0.05; *r* = -0.20, *p* < 0.01).

To assess the categorical outcomes, responses on the ring measure that did not fall

into one of the four predetermined categories (n = 4) were excluded from analyses (see

Fig. 3 for plot of all responses). These outcomes correlated positively and significantly

with Coldheartedness, and Mach-IV total scores (respectively: *r* = 0.17, *r* = 0.14; *p*s <

0.05). Correlations with LSRP primary scores trended toward significance (*r* = 0.13, *p* <

0.08).

A priori hypotheses regarding the ring measure were tested using one-way

ANOVAs with contrast coefficients. The expectation that high-FD individuals would

adopt an individualist approach to the ring measure trended toward significance (*t*(203) =

1.93, *p* < 0.06). The expectation that high-SCI individuals would take a competitive

approach was not supported.

Global economic selfishness. To determine if there was a common component

or mechanism driving selfish responding on the economic tasks, a principal components

analysis was conducted on the seven economic measures (dictator game; ultimatum game, rounds 1-4; prisoner's dilemma; ring measure) with forced extraction of one component. Using the loadings of each measure on this factor, a weighted variate was calculated to represent "global economic selfishness" (GES), or the tendency to, respectively, keep more money, reject offers, defect, and minimize one's partner's outcome. Correlations were conducted with all personality measures using this variate.

GES scores were positively correlated with Coldheartedness, Mach-IV, LSRP primary, and LSRP total scores (respectively: $r = 0.26$, $r = 0.26$, $r = 0.29$, $r = 0.25$; all ps < 0.001). A significant positive correlation also emerged with MPQ-33 Aggression ($r = 0.17$, $p < 0.05$). Positive correlations trended toward significance with SCI and PPI-R total scores (respectively: $r = 0.14$, $p < 0.06$; $r = 0.13$, $p < 0.08$).

Regression Analyses

Incremental validity of PPI-R factors. One aim of this study was to ascertain the incremental validity of PPI-R Coldheartedness in predicting behaviors above and beyond FD and SCI. To this end, exploratory hierarchical linear regression analyses were conducted on tasks in which Coldheartedness as well as one or both of these latter factors were significant correlates of a given task. Additionally, regressions were conducted on all economic measures utilizing interaction terms among the three PPI-R factors to determine whether interaction effects were present above main effects in any situation.[1]

In the dictator game, although Coldheartedness was the only significant predictor of amount retained for oneself, the interaction term for Coldheartedness and SCI was

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[1] See Data Analysis section; only significant results are reported here.

significant ($R^2 = 0.03$, $F(1, 207) = 5.69$, $p < 0.05$) above the main effects for these variables. This interaction term correlated positively with the dictator game outcome ($r = .22$, $p < 0.01$).

In the third round of the ultimatum game, FD and SCI were both significant correlates of rejection rates; Coldheartedness trended toward significance. Regression analyses indicated that SCI was the most robust predictor of this task ($R^2 = 0.03$, $F(1, 209) = 6.84$, $p < 0.05$), remaining significant or trending toward significance regardless of when it was entered into the model. FD was a lesser predictor, nonsignificant except when entered first ($R^2 = 0.02$, $F(1, 209) = 4.79$, $p < 0.05$). Coldheartedness at most only trended toward significance even when entered first ($R^2 = 0.02$, $F(1, 209) = 3.71$, $p < 0.06$). On this task, the interaction term for Coldheartedness and SCI was significant above the main effects for these variables ($R^2 = 0.02$, $F(1, 207) = 4.34$, $p < 0.05$).

Coldheartedness and SCI were significant correlates of prisoner's dilemma total defection score. Regression analyses indicated that again, SCI was the most robust predictor ($R^2 = 0.04$, $F(1, 209) = 7.47$, $p < 0.01$), whereas Coldheartedness was only a significant predictor when entered into the model first ($R^2 = 0.03$, $F(1, 209) = 5.68$, $p < 0.05$).

Coldheartedness was a significant correlate of GES scores, and SCI trended toward significance. Regression analyses indicated that Coldheartedness was the most robust predictor ($R^2 = 0.07$, $F(1, 201) = 14.32$, $p < 0.001$), remaining significant regardless of when it was entered into the model, whereas SCI only trended toward significance even when entered first.

Incremental validity of dark triad members. As a further indicator of the

incremental validity of Coldheartedness, SCI, and FD, hierarchical linear regressions were conducted including Mach-IV and NPI total scores.

Coldheartedness, Mach-IV, and NPI were significant correlates of the amount retained for oneself on the dictator game. Coldheartedness was a significant predictor only when entered before Mach-IV total score ($R^2 = 0.05$, $F(1, 209) = 10.49$, $p < 0.01$), as was NPI ($R^2 = 0.04$, $F(1, 209) = 7.66$, $p < 0.01$). In contrast, Mach-IV was a highly robust predictor, remaining significant regardless of when it was entered ($R^2 = 0.12$, $F(1, 209) = 27.15$, $p < 0.001$).

On the third round of the ultimatum game, Coldheartedness, SCI, FD, and NPI were significant correlates of rejection rates. Regression analyses were conducted using NPI total scores paired with each of the PPI-R factors separately to determine incremental predictive utility of each of these variables (see above for analyses examining the PPI-R factors together). In each set of analyses, NPI was a robust, significant predictor of variance ($R^2 = 0.03$, $F(1, 209) = 6.76$, $p < 0.05$). SCI was the next most robust predictor ($R^2 = 0.03$, $F(1, 209) = 6.84$, $p < 0.05$), remaining significant regardless of whether entered before or after NPI. In contrast, Coldheartedness and FD, while each was significant or trending toward significance when entered first (respectively: $R^2 = 0.02$, $F(1, 209) = 3.71$, $p < 0.06$; $R^2 = 0.02$, $F(1, 209) = 4.79$, $p < 0.05$), were nonsignificant predictors when entered after NPI.

Coldheartedness, SCI, and Mach-IV correlated significantly with prisoner's dilemma total defection scores. Of these, Mach-IV was the most robust predictor ($R^2 = 0.08$, $F(1, 209) = 17.77$, $p < 0.001$). Coldheartedness and SCI were each significant when entered first (respectively: $R^2 = 0.03$, $F(1, 209) = 5.68$, $p < 0.05$; $R^2 = 0.04$, $F(1,$

209) $= 7.47, p < 0.01$), but when entered after Mach-IV, both were rendered

nonsignificant.

Coldheartedness and Mach-IV correlated significantly with ring measure-other

totals. Coldheartedness was the more robust of these, predicting a significant amount of

variance whether entered first or second ($R^2 = 0.06, F(1, 201) = 11.96, p < 0.01$). When

entered first, Mach-IV was also significant ($R^2 = 0.03, F(1, 201) = 6.75, p < 0.05$), but

when entered after Coldheartedness it was no longer a significant predictor.

Coldheartedness and Mach-IV were significant correlates of GES scores; SCI

trended toward significance. Regression analyses indicated that Coldheartedness and

Mach-IV were both robust predictors of variance (respectively: $R^2 = 0.07, F(1, 201) =$

$14.33, p < 0.001; R^2 = 0.07, F(1, 201) = 14.32, p < 0.001$), remaining significant

regardless of when each was entered into the regression model. SCI trended toward

significance when entered first ($R^2 = 0.02, F(1, 201) = 3.82, p < 0.06$), and when entered

after Mach-IV, it was a nonsignificant predictor.

Trends in Round-Based Tasks

The prisoner's dilemma and the ultimatum game used in this study are both

round-based tasks. Generalized estimating equation analyses were conducted to

determine the linearity of trends in these tasks, as well as to examine the potential

interaction effects contributed by each of the PPI-R factors.

Linear and quadratic equations were tested for each task, and in both cases the

linear model was significant (prisoner's dilemma Wald $\chi^2(1) = 44.49, p < 0.001$;

ultimatum game Wald $\chi^2(1) = 93.8, p < 0.001$).

For both the prisoner's dilemma and the ultimatum game, none of the interactions

with the three PPI-R factors contributed a significant amount of variance above that contributed by the linear trend.

Discussion

These results support some, but not all, of the proposed hypotheses, and suggest several questions and further avenues of investigation regarding the three factors of the PPI-R.

As expected, all three factors of the PPI-R were intercorrelated. Additionally, the predicted differential associations of FD correlating with NPI scores, as compared with SCI and Coldheartedness correlating with Mach-IV scores, were borne out in the analyses. Consistent with past findings (Witt, Donnellan, Blonigen, Krueger, & Conger, 2009), SCI was correlated with all LSRP scales; FD correlated only with LSRP primary psychopathy. Coldheartedness, like SCI, was correlated with all LSRP scales, but there is a dearth of research establishing correlational patterns for this factor.

Regarding the economic tasks, hypotheses regarding FD were not supported; rather than predicting instrumentalism and unemotional, rational decision-making, FD was largely nonpredictive and uncorrelated with each task. Instead, Coldheartedness and, to a lesser extent, SCI emerged as the primary predictors of behavior on these tasks. Minor suppressor effects were found in some regression analyses, in which SCI scores were more predictive when FD was controlled, but none of these were substantial or qualitatively changed the results of these analyses. This is consistent with past findings, where suppressor effects between FD and SCI are small or nonexistent due to the orthogonality of these two factors (e.g., Blonigen et al., 2010), although the magnitude of the correlation between these factors in the present study was higher than is typically

found.

Predictors of Economic Decision-Making

Past studies of economic decision-making have, in large part, used instruments other than the PPI-R (see above, including Osumi & Ohira, 2010, and Koenigs et al., 2010) to assess psychopathy, and even when the PPI-R is used, the three overarching factors are sometimes overlooked (e.g., Mokros et al., 2008). In addition, few studies have utilized measures assessing overlapping personality constructs to ascertain more precisely the nature of any correlations that may emerge. In this study, an attempt has been made to begin filling these gaps.

Of the PPI-R factors, SCI and Coldheartedness were the more robust predictors, with FD contributing no unique variance beyond other variables. However, when Mach-IV and NPI were included in regression analyses, more often than not one of these factors subsumed the variance contributed by psychopathic traits; only in two instances was a PPI-R factor the most robust predictor, and in both situations that factor was Coldheartedness. Of note, only one behavioral task, the ultimatum game, appeared to tap narcissistic traits, and the variance on this task was explained best by both the NPI and PPI-R SCI. This implies that two constructs may be called upon in bargaining situations like the ultimatum game: narcissism, as well as the impulsive, reactive aggression typical of high-SCI psychopaths.

Whereas past research has suggested that the cold, unemotional decision making of primary psychopathy may play a role in such situations, these findings suggest that this may not entirely be the case. Instead, impulsive aggression and some qualities of narcissism may lead to rejecting offers, as demonstrated by the correlations between

rejection rates and both SCI and FD on the 30/70 split ultimatum game trial.

It is notable that this round was the only task invoking narcissistic and fearless dominance traits; specifically, these include charm and compelling social skills, as reflected by correlations with MPQ-33 Social Potency, as well as with PPI-R Social Influence (formerly PPI Social Potency; Lilienfeld & Andrews, 1996), examined in supplementary analyses. These choices may reflect the sense of entitlement often associated with narcissists, and a supplementary analysis of the NPI's seven factors (Raskin & Terry, 1988) indicated that Entitlement was the most marked correlate of the third round. Thus, while individuals higher on fearless dominance traits do accept fair offers at a rate comparable to others, these traits may, contrary to prediction, predispose individuals to begin rejecting offers as soon as the scales tip towards unfair.

Interestingly, the third round of the ultimatum game was also one of two tasks on which the interaction of two PPI-R factors contributed a significant amount of variance above either factor alone. In both cases, the factors were Coldheartedness and SCI, suggesting that individuals with high levels of both of these factors present a somewhat different behavioral profile than either factor alone.

Supplementary analyses also revealed that when controlling for SCI, the correlation between Coldheartedness and round 3 of the ultimatum game became nonsignificant. This suggests that individuals high on Coldheartedness alone may have a more tempered reaction to unfair proposals. Although Coldheartedness still did not predict acceptance of unfair proposals, as might be expected based on the characteristic affective nonreactivity of individuals high on this factor (Lilienfeld & Andrews, 1996), the nonsignificant correlations with all rejection rates indicate that high-Coldheartedness

individuals may make decisions that are saturated with less emotion overall than those decisions of high-FD or high-SCI individuals.

Of note, the only personality variable that was negatively correlated with rejection rates on the ultimatum game was MPQ-33 Control, which assesses planfulness, rationality, and care in decision-making. This subscale was negatively correlated with both SCI and FD, and was largely uncorrelated with Coldheartedness. Based on these negative correlations, it is arguable that psychopaths' ability to engage in level-headed decision-making may be impaired by other personality traits or mechanisms, and that regardless of whether their decisions are motivated by aggression and impulsivity or by a narcissistic sense of affront, they may be prone to reject any offer unless it is an over-fair deal (i.e., more than 50%).

On the dictator game and the prisoner's dilemma, both of which are tasks with more straightforward options to treat one's partner fairly or unfairly, Machiavellian traits emerged as the most robust predictor of unfair treatment, with no other variable predicting a significant amount of unique variance above it. In contrast to these simple games, the ring measure of social value orientation is a more complex set of scenarios with two dimensional outcomes of self-total and other-total; the former of these correlated negatively with MPQ-33 Alienation and Absorption (perhaps hinting at low self-esteem, lack of concern about one's own outcome, or both as potential factors), whereas the latter was best predicted by Coldheartedness. Although Mach-IV was a significant predictor of this outcome as well, it contributed no unique variance above Coldheartedness, indicating that there may be some Machiavellian aspect of the "coldhearted" constellation of traits driving participants to attempt to minimize their

partner's gain. Perhaps this is embodied by the sentiment of "if you haven't won, you've lost"; that is, perhaps the Machiavellian and coldhearted attitude motivating this behavior is driven by a feeling that to ensure one's own success, one must ensure another's failure.

Whereas Coldheartedness and Mach-IV contributed overlapping variance on all other behavioral tasks, they were both robust predictors of GES scores independently of each other. Clearly, then, these scales are not assessing interchangeable aspects of personality, but rather separable traits with considerable overlap.

Additional Personality Correlates of the PPI-R Factors

Although these analyses were secondary to the economic decision-making tasks in the focus of this study, the correlations between the PPI-R factors and subscales of the MPQ-33 revealed several interesting differential patterns across FD, SCI, and Coldheartedness. To gain a better understanding of the interplay of these factors, as well as potential mechanisms underlying differences in responding to the economic tasks, I discuss these secondary correlations here.

There were several similarities across factors of the PPI-R: all three factors correlated positively with Aggression and negatively with Harmavoidance and Traditionalism. None of these are surprising correlations based on the current understanding of psychopathic individuals, who are classically characterized as aggressive and sensation-seeking with little regard for societal norms (e.g., Cleckley, 1976).

However, more interesting are the differential correlational patterns across factors. For instance, FD associated strongly with positively-valenced subscales, such as Wellbeing and Social Closeness, while associating with the abovementioned three

variables. These correlations paint the image of a socially skilled, confident individual who simultaneously has aggressive, sensation-seeking tendencies and little regard for societal convention. In fact, this bears a striking resemblance to the type of individual described in classical psychopathy literature (e.g., Cleckley, 1976; McCord & McCord, 1964).

In addition, FD, as well as Coldheartedness, correlated strongly and negatively with Stress Reaction, indicating low levels of anxiety and an ability to remain unaffected by stressors. This is consistent with a growing literature that suggests certain features of psychopathy may be protective against mood and anxiety disorders (see, e.g., Lee & Salekin, 2010; Witt et al., 2010). Traditionally, FD has been the only PPI-R factor strongly associated with these tendencies, sparking controversy over its inclusion as a valid aspect of psychopathy (Miller & Lynam, 2011; Lilienfeld, Patrick, Benning, Berg, Sellbom, & Edens, 2011). However, these results suggest that Coldheartedness, arguably the most theoretically critical factor of psychopathy based on some classical conceptualizations (particularly McCord & McCord, 1964), may have similar protective properties, bolstering the support for this aspect of the disorder. Interestingly, both FD and SCI correlated significantly with Social Potency, which reflects glibness, social dominance, and charm. These are features generally associated with FD, but their positive associations with SCI may again add support to FD's status as a valid feature of psychopathy.

Correlations with the three higher-order factors of the MPQ-33 (Positive Emotionality, Negative Emotionality, and Constraint) also provide insight into some of the traits that may underlie each of the PPI-R's three factors. It is unsurprising, given

known correlates of SCI and FD (e.g., Blonigen et al., 2010; Poythress et al., 2010b) that the former correlated positively with Negative Emotionality and negatively with Positive Emotionality, whereas the latter displayed the opposite pattern. However, all three factors were negatively correlated with Constraint, which assesses careful decision-making, avoidance of dangerous situations, and adherence to conventional societal standards. These correlations provide additional support for disinhibition, an externalizing trait often associated with irresponsibility, impulsivity, distrust, and reactive aggression (Patrick et al., 2009), as a key component of psychopathy.

Whereas FD correlated negatively and SCI correlated positively with Negative Emotionality, Coldheartedness barely correlated with this dimension. Taken together, these associations yield quite the picture of a "Coldhearted" individual: low on social charm, or uncaring enough about others' opinions to put in the effort; aggressive, but unaffected by stressors – implying, incidentally, a more instrumental approach to aggression (see, e.g., Blair, 2001) – and sensation-seeking and unconcerned with adhering to social mores. This individual is similar in many ways to Cleckley's (1976) classical psychopath, yet is missing a key component: namely, the social charm and glibness that enable the psychopath to seduce so many unsuspecting victims. In turn, this component is contributed by the boldness and social adeptness associated with high scorers on FD.

The Argument for a Subtype Conceptualization of Psychopathy

As demonstrated by the interaction regressions discussed above, it is clear that high-SCI, high-Coldheartedness individuals display a different pattern of behavior than individuals high on either one of the factors alone. These individuals are missing the

charm, social adeptness, and manipulative skill possessed by high-FD individuals, yet they may meet diagnostic criteria as assessed by, for instance, Hare's PCL-R (1991/2003). Does the absence of these fearless dominance traits render such individuals non-psychopathic? By a similar token, an individual may possess the profile described above, high on FD and Coldheartedness, but without a criminal history; is this person non-psychopathic merely because he or she has never broken the law? These questions raise the issue of what, if any, the requisite features of a psychopath are.

Psychopathy is often strongly associated with antisocial behaviors (e.g., Harris, Rice, & Cormier, 1991), and in the context of the PPI-R, SCI serves as a marker for such behavior in addition to certain other personality traits, including impulsivity and reactive aggression. Certainly, according to Cleckleyan lore, antisocial behavior – lying, cheating, stealing, assault – is typical for a psychopath. However, it may be conceptually and clinically limiting to mandate the inclusion of antisocial behavior for a diagnosis of psychopathy, or to imply that a psychopath without a criminal history is an oxymoron (Skeem & Cooke, 2010). Doing so may ignore valuable variance within the disorder, found in, for example, successful psychopaths – individuals who have the "two-faced" affective traits of the psychopath without the antisocial behaviors to go with them (e.g., Mullins-Sweatt, Glover, Derefinko, Miller, & Widiger, 2010).

Rather than engaging in the circular arguments that have proliferated of late and have stalemated at fundamental differences in understanding of the core psychopathic traits and interpretations of the empirical literature (see Miller & Lynam, 2011; Lilienfeld et al., 2011), it may be worth considering a dimensional analysis of psychopathy with the potential of different subtypes based on trait levels. Several different phenotypes of

psychopathy have already been proposed (Poythress et al., 2010a) based on a cluster-analytic study done on a group of male offenders. One phenotype that emerged in this study was "Karpman's secondary psychopath," an individual with elevated impulsivity, anxiety, and antisocial behavior who aligns with Karpman's (1941/1948) descriptions of secondary psychopathy. The second phenotype was the "fearful psychopath," an unanticipated cluster displaying high levels of antisocial impulsivity and callousness, but notably also displaying high harm avoidance. Clinically and empirically, psychopathy has been consistently linked to low fear (Lykken, 1957), so this phenotype certainly merits replication and additional investigation.

A third phenotype that emerged was that of the "primary psychopath," which aligns with many theoretical conceptualizations of classic psychopathy: low harm avoidance, low anxiety, and sensation-seeking, as well as affective and interpersonal traits including callousness, manipulativeness, and interpersonal charm. The fourth and final phenotype that emerged was labeled the "nonpsychopathic ASPD," embodying the behavioral traits typical of ASPD without the affective or interpersonal traits of psychopathy.

Here it becomes important to draw the line – and introduce the potential for blurring it – that distinguishes antisocial personality disorder (ASPD) from psychopathy, as each is currently conceptualized. According to DSM-IV, ASPD is characterized by "a pervasive pattern of disregard for and violation of the rights of others," (APA, 2000, p. 706), including unlawful behaviors, lying, impulsiveness, aggression, lack of remorse, and irresponsibility. These traits bear a close resemblance to those assessed by the SCI factor of the PPI-R. However, the diagnosis of ASPD also requires a childhood diagnosis

of conduct disorder (CD), which includes as its criteria what amounts to a "rap sheet" of offenses: assault, property destruction, theft, or rule violations. This requisite criminal history is one of the primary differences between psychopathy and ASPD, and as long as the two disorders remain separate, the conceptualization of psychopathy as necessarily a criminal disorder will remain contentious.

DSM-5 and the New Psychopathy

In DSM-5, this academic debate may begin to progress toward resolution. The proposed reorganization of personality disorders will begin to transition the field to a dimensional model, based on broad personality ratings with a diagnosis that becomes increasingly specific with an individual's particular set of symptoms. Psychopathy as a dimensional rather than taxonic construct is not a new idea (Edens, Marcus, Lilienfeld, & Poythress, 2006), but DSM-5 proposes more extensive revisions than the transition away from a categorical system. In particular, the reformulation of ASPD, or dyssocial personality disorder as it may be renamed, disposes of the criminal history criterion and instead invokes personality traits in affective and interpersonal areas, creating a clinical picture much closer to conceptualizations of psychopathy (APA, 2011). These new criteria, along with the dimensional model itself, may allow for increased flexibility in diagnosing individuals with a personality disorder, thereby leading to broader acceptance of different subtypes of psychopathy. In turn, this change may open the door to a new focus in psychopathy research: greater understanding of the etiology of the disparate psychopathy factors themselves. These factors are represented in the PPI-R by SCI, FD, and Coldheartedness, but more broadly understood as, respectively, antisocial, impulsive, self-centered behavior; social charm, manipulative skill, and glibness; and callousness,

remorselessness, and inability to form close, affectionate interpersonal relationships.

Individuals high on different sets of these factors, as was demonstrated in the economic tasks used here, display substantially differing patterns of behavior, and the factors themselves display substantially different patterns of correlations with other personality variables. Studying these factors individually, as well as in different combinations (e.g., high-Coldheartedness and high-SCI vs. high-Coldheartedness and high-FD), will probably contribute a great deal to the understanding of psychopathy as a whole, above what might be revealed through examination of only individuals who score highly on all factors. For example, in the present study all three PPI-R factors correlated with MPQ-33 Aggression. However, research has demonstrated that different factors of psychopathy predict different types of aggression, with LSRP primary psychopaths displaying both instrumental and hostile or reactive aggression, but LSRP secondary psychopaths displaying only hostile/reactive aggression (Reidy et al., 2007).

This is far from the only instance in which the study of isolated psychopathic traits would inform the field as a whole. In fact, the recognition, if not canonization, of psychopathy subtypes may lead to an increased breadth of study and subsequent improvements for clinical treatment as well as for a theoretical understanding of the disorder.

Limitations

A major limitation of this study is the hypothetical nature of all behavioral tasks. Participants were aware that in each case they were not playing for real amounts of money, and it is possible that their choices reflected this knowledge. If anything, one might expect this to skew scores in a more socially desirable direction; i.e., knowing that

the games were hypothetical, participants may have been more likely to sacrifice money for themselves so that their "partners" would have a more favorable outcome, whereas in a more realistic setting, they might be less willing to sacrifice an actual amount of money for the good of their partners. Supplementary analyses controlling for the PPI-R Virtuous Responding scale, a rough proxy for socially desirable responding (Lilienfeld & Widows, 2005), slightly decreased the magnitude of most correlations but did not change overall patterns or significance of findings.

Research has shown that when asked to imagine that a hypothetical scenario is real and respond accordingly, most participants will do so, producing data that are not significantly different from genuine scenarios (Ajzen, Brown, & Carvajal, 2004). The most consistent results are found when participants are also educated about hypothetical bias (i.e., the discrepancy between intention and action). In the present study, participants were not educated about hypothetical bias, but were simply asked to "imagine" that they were in the given scenarios and respond accordingly. Although there was presumably some hypothetical bias effect, ideally, replication of the present study either in real scenarios or with specific instruction about hypothetical bias may confirm or disconfirm these findings.

An additional limitation of this study was its sample: university undergraduates. This may be a particular weakness because several of the economic tasks used, in particular the ultimatum game and prisoner's dilemma, may be familiar to students who have taken economics, mathematics, government, or psychology classes dealing with game theory. Foreknowledge of the conditions and expected responses may also have influenced responding.

A further limitation is the extreme restriction of range for some rounds of the ultimatum game. More informative results may have been obtained through the use of additional rounds with finer gradations of offers (e.g., offers in each round decreasing by 10% increments instead of 20%).

Conclusion

These findings bear implications for the conceptualization of the factor structure of the PPI-R and perhaps current conceptualizations of psychopathy. Although it has been the subject of little research thus far, Coldheartedness emerged in this study as a significant predictor of selfish behavior. In contrast, Fearless Dominance predicted little variance in most economic tasks; although an extracted global selfishness variable exhibited the highest associations with Coldheartedness, Self-Centered Impulsivity, and Mach-IV scores, one trial of the ultimatum game activated what appeared to be a sense of narcissistic entitlement rather than impulsivity and reactive aggression.

These results highlight that Coldheartedness, a largely-overlooked factor of the PPI-R, and of psychopathy more generally, contributes substantially to psychopathic decision-making. Its correlations with other personality measures also illuminate some of the sub-facets comprising the trait itself, and suggest that, if classical (i.e., Cleckley, 1976; McCord & McCord, 1964) criteria and clinical descriptions are at all reflective of the disorder, coldheartedness may be a critically important factor in assessing and understanding psychopathy.

Additionally, evidence supporting the consideration of psychopathy as not one unitary construct but rather a condition consisting of differing levels of a set of core traits emerged in the present study (i.e., the different and sometimes conflicting affective and

behavioral contributions of each of the PPI-R factors to the economic tasks at hand).

This dimensional "core traits" model must be further examined to determine its clinical

and empirical utility, especially given the dimensional reconfiguration of personality

traits in DSM-5.

    Further research is, of course, necessary to elucidate these conceptualizations, but

these approaches may provide fresh perspectives and the potential to uncover important

information about the etiology of key features of psychopathy.

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Table 1

Psychopathic Personality Inventory—Revised (PPI-R) Reliability Statistics

Factor / *Subscale*	Mean (*SD*)	Cronbach's α
PPI-R Total	249.34 (*29.79*)	0.91
Fearless Dominance	112.58 (*18.48*)	0.90
Social Influence	47.73 (*8.47*)	0.86
Fearlessness	33.03 (*8.69*)	0.85
Stress Immunity	31.82 (*7.68*)	0.88
Impulsive Antisociality	136.76 (*19.81*)	0.89
Machiavellian Egocentricity	43.44 (*8.54*)	0.83
Rebellious Nonconformity	33.41 (*7.68*)	0.82
Blame Externalization	27.17 (*6.34*)	0.81
Carefree Nonplanfulness	32.74 (*6.68*)	0.81
Coldheartedness	28.79 (*6.46*)	0.79

Table 2

Multidimensional Personality Questionnaire (MPQ-33) Reliability Statistics

Factor / *Subscale*	Mean (*SD*)	Cronbach's α
Positive Emotionality	44.64 (*6.34*)	0.79
Wellbeing	11.51 (*2.14*)	0.66
Social Potency	9.99 (*2.15*)	0.63
Social Closeness	11.51 (*2.64*)	0.77
Achievement	11.64 (*2.35*)	0.79
Negative Emotionality	20.98 (*4.86*)	0.65
Stress Reaction	8.53 (*2.69*)	0.68
Aggression	6.44 (*2.32*)	0.59
Alienation	6.01 (*2.26*)	0.68
Constraint	31.82 (*5.41*)	0.74
Harm Avoidance	10.01 (*2.73*)	0.68
Traditionalism	10.99 (*2.03*)	0.49
Control	10.83 (*2.24*)	0.55
Absorption	10.67 (*2.41*)	0.54

Table 3

Payoff Matrix for the Prisoner's Dilemma

		Player 1	
		Cooperate	Defect
Player 2	Cooperate	1: Receives $25 2: Receives $25	1: Receives $50 2: Loses $50
	Defect	1: Loses $50 2: Receives $50	1: Loses $25 2: Loses $25

Table 4

Dark Triad Correlations

	PPI-T	SCI	FD	C	LSRP-T	LSRP-1	LSRP-2	NPI
PPI-T	--							
SCI	.79†	--						
FD	.74†	.21**	--					
C	.55†	.37†	.24†	--				
LSRP-T	.61†	.76†	.11	.46†	--			
LSRP-1	.55†	.60†	.17*	.49†	.91†	--		
LSRP-2	.46†	.71†	-.03	.22**	.74†	.40†	--	
NPI	.42†	.19**	.48†	.20**	.24†	.37†	-.06	--
MACH	.51†	.64†	.09	.38†	.70†	.68†	.45†	.23**

Notes: PPI-T = Psychopathic Personality Inventory—Revised (PPI-R) total; SCI = PPI-R Self-Centered Impulsivity; FD = PPI-R Fearless Dominance; C = PPI-R Coldheartedness; LSRP-T = Levenson Self-Report Psychopathy (LSRP) total; LSRP-1 = LSRP primary psychopathy; LSRP-2 = LSRP secondary psychopathy; NPI = Narcissistic Personality Inventory total; MACH = Mach-IV total.
* $p < .05$. ** $p < .01$. † $p < .001$.

Table 5

Correlations with Multidimensional Personality Questionnaire (MPQ-33) Subscales

	PPI-T	SCI	FD	C	LSRP-T	LSRP-1	LSRP-2	NPI	MACH
Well	.07	-.20**	.39†	-.13	-.25†	-.12	-.38†	.31†	-.28†
SocPot	.42†	.22**	.50†	.04	.18**	.23**	.03	.58†	.17*
SocCl	-.07	-.13	.16*	-.37†	-.20**	-.19**	-.14*	.13	-.25†
Ach	-.16*	-.32†	.13	-.21**	-.33†	-.20**	-.41†	.33†	-.22**
Stress	-.28†	.10	-.50†	-.26†	.13	.02	.25†	-.16*	.03
Agg	.48†	.53†	.18**	.33†	.54†	.49†	.41†	.32†	.43†
Alien	.03	.34†	-.27†	-.12	.21**	.08	.34†	-.11	.18**
Control	-.49†	-.48†	-.34†	-.04	-.30†	-.11	-.49†	.01	-.18**
HarmA	-.61†	-.37†	-.60†	-.25†	-.25†	-.18**	-.27†	-.14*	-.18**
Trad	-.38†	-.38†	-.19**	-.23**	-.22**	-.12	-.30†	.01	-.28†
Abs	.11	.21**	-.02	.00	.07	.02	.14*	.10	-.01
PosE	.08	-.17*	.41†	-.26†	-.23**	-.12	-.33†	.48†	-.22**
NegE	.09	.46†	-.32†	-.04	.43†	.28†	.49†	.02	.31†
Constr	-.65†	-.53†	-.51†	-.23**	-.34†	-.18**	-.45†	-.06	-.27†

Notes: PPI-T = Psychopathic Personality Inventory—Revised (PPI-R) total; SCI = PPI-R Self-Centered Impulsivity; FD = PPI-R Fearless Dominance; C = PPI-R Coldheartedness; LSRP-T = Levenson Self-Report Psychopathy (LSRP) total; LSRP-1 = LSRP primary psychopathy; LSRP-2 = LSRP secondary psychopathy; NPI = Narcissistic Personality Inventory total; MACH = Mach-IV total; Well = MPQ-33 Wellbeing; SocPot = MPQ-33 Social Potency; SocCl = MPQ-33 Social Closeness; Ach = MPQ-33 Achievement; Stress = MPQ-33 Stress Reaction; Agg = MPQ-33 Aggression; Alien = MPQ-33 Alienation; Control = MPQ-33 Control; HarmA = MPQ-33 Harm Avoidance; Trad = MPQ-33 Traditionalism; Abs = MPQ-33 Absorption; PosE = MPQ-33 Positive Emotionality; NegE = MPQ-33 Negative Emotionality; Constr = MPQ-33 Constraint.
* $p < .05$. ** $p < .01$. $^\dagger p < .001$.

Table 6

Correlations among Economic Tasks

	Dictator	UG-1	UG-2	UG-3	UG-4	RM-S	RM-O
Dictator	--						
UG-1	-.07	--					
UG-2	.00	.21**	--				
UG-3	-.03	.07	-.01	--			
UG-4	-.05	.13	-.02	.33†	--		
RM-S	.13	.03	-.01	-.04	.02	--	
RM-O	-.32†	.04	-.16*	-.11	-.07	-.13	--
Prisoner	.16*	.01	.16*	.20**	.12	.07	-.31†

Notes: Dictator = Dictator Game; UG = Ultimatum Game; RM-S = Ring Measure-Self Total; RM-O = Ring Measure-Other Total; Prisoner = Prisoner's Dilemma.
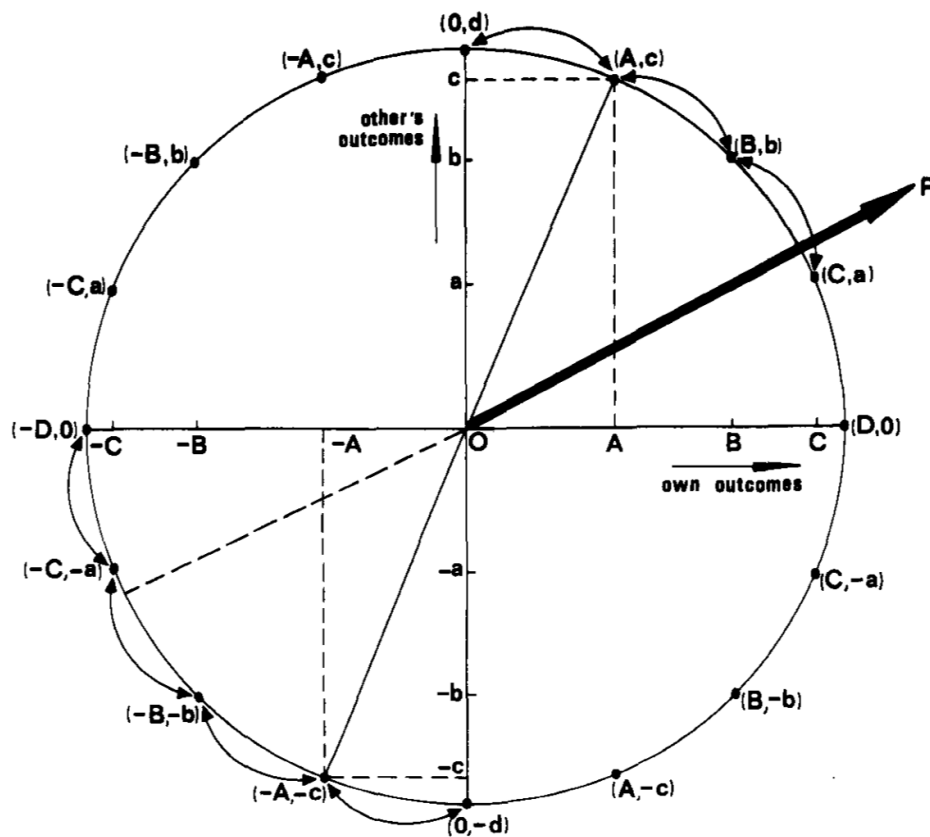* $p < .05$. ** $p < .01$. † $p < .001$.

Figure 1. An illustration of a motivational vector derived from the ring measure of social value orientation
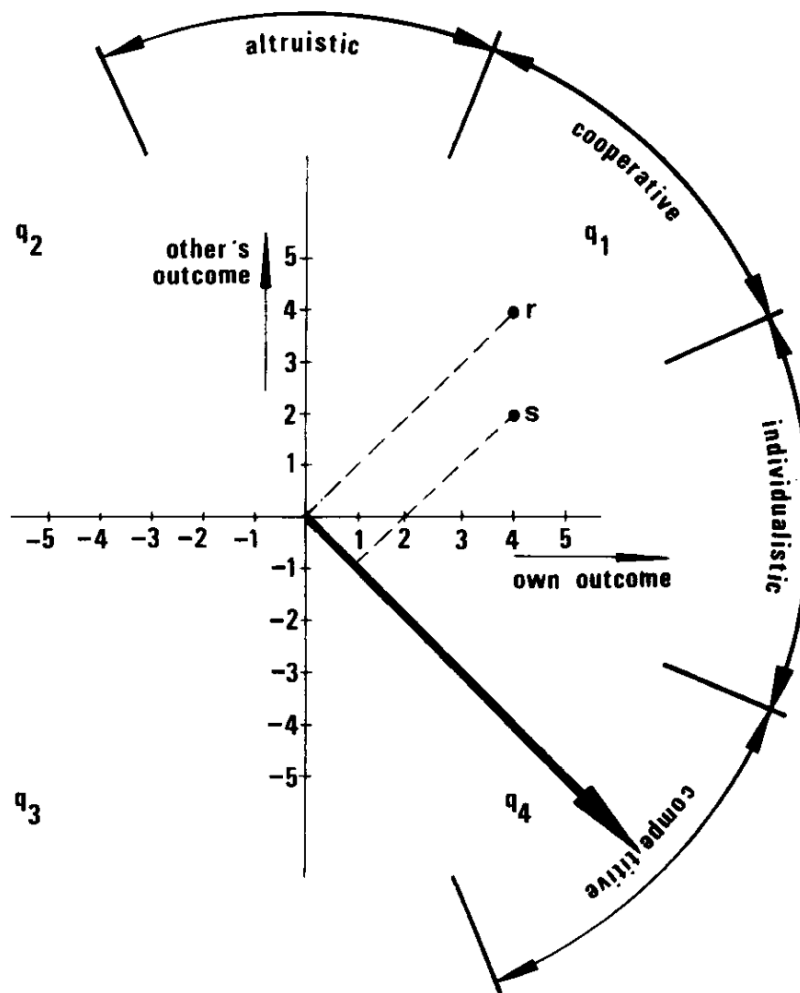
(from Liebrand, 1984).

Figure 2. Categories of respondents identified by the ring measure of social value orientation (from

Liebrand, 1984).

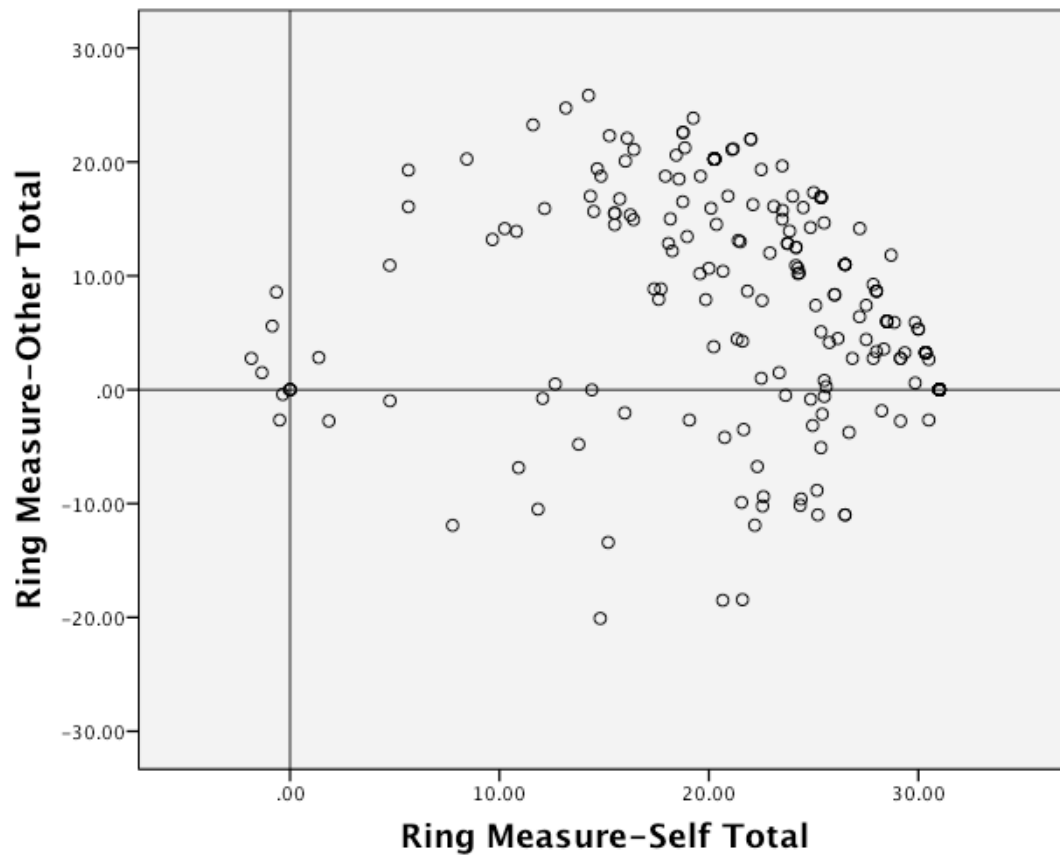*Figure 3*. Scatter plot of self-total and other-total responses on the ring measure of social value orientation.