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Risky Business: Psychopathy, Framing Effects and Financial Outcomes

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Abstract

Using a risky-choice framing paradigm, we investigated (a) the extent to which psychopathic features shape behavioral responses to potential losses vs. potential gains and (b) how these relations bear on real-world economic decision-making in a community sample (N = 475). Associations among psychopathic features, risk-seeking, sensitivity to framing, and financial practices were also examined. Disinhibition manifested positive relations with risk-seeking and maladaptive financial practices, whereas boldness manifested positive relations with risk-seeking and adaptive financial practices. Individuals high in disinhibition and/or meanness were significantly less likely to endorse risk seeking in negative frames. Results provisionally suggest boundary conditions for framing effects; in particular, certain psychopathic traits may render individuals modestly less susceptible to framing or bias them towards risk-taking in positive frames.

Risky Business: Psychopathy, Framing Effects and Financial Outcomes

Financial uncertainty and risk are inescapable elements of everyday life. Should one invest money in an initial public offering? Or buy additional insurance when renting a car? Perhaps as result of the quotidian nature of such questions, behavioral economists have spilled much ink over specifying risk preference parameters for individuals and examining the effects of uncertainty on decision-making (Mas-Colell, Whinston, & Green, 1995). Nevertheless, little is known regarding the implications of personality and personality pathology for these decisions.

An influential descriptive model of risky decision-making is *prospect theory*, which posits that individuals are risk-averse at the prospect of gains and risk seeking at the prospect of losses (Kahneman & Tversky, 1984). Integral to prospect theory is the principle of *loss aversion*, whereby the psychological impacts of losses loom larger than those due to equivalent gains. Evidence supporting the generalizability and robust descriptive power of loss aversion (c.f., Gal & Rucker, 2018) has emerged across myriad contexts and paradigms, including those involving both riskless choice (e.g., status-quo bias, the endowment effect) and risky choice (Kahneman, Knetsch, & Thaler, 1991). Nevertheless, a growing body of evidence suggests that loss aversion, which correlates negatively with long-term financial outcomes (e.g., unaggressive approaches for retirement saving; Benartzi & Thaler, 2001; Rick, Cryder, & Lowenstein, 2007), varies across individuals (Boyce, Wood, & Ferguson, 2016; Canessa et al., 2013; Tom, Fox, Trepel, & Poldrack, 2007) and contexts. Hence, loss version and the cognitive biases associated with it may not be universal (see also Gal & Rucker, 2018, for a discussion of potential situational constraints on loss aversion), as their magnitude and perhaps even existence may be constrained by individual difference variables.

One set of traits potentially pertinent to loss aversion is *psychopathic personality*, a constellation of malignant interpersonal, affective, and behavioral features (e.g., deficient empathy and guilt, weak impulse control, egocentricity, and unmotivated antisociality) that are largely concealed behind a "mask" of outwardly healthy functioning and charisma (Cleckley, 1941; Skeem, Polaschek, Patrick, & Lilienfeld, 2011). Clinical and empirical descriptions often point to an association between psychopathy and risk-taking (e.g., Hunt, Hopko, Bare, Lejeuz, & Robinson, 2005); perhaps most notably, Lykken's (1995) low fear model posits that fearlessness, a disposition often tied to risk-taking, is the central disposition underpinning psychopathy. Hence, just as highly anxious individuals often over-attend to threats when faced with ambiguity or uncertainty (e.g., Van Bockstaele et al., 2014), psychopathic individuals may under-attend to threats in risky situations. If present, such a process may bear implications for loss aversion and risky decision making in the financial domain. In this study, we attempt to make inroads into these hypotheses by examining the implications of psychopathic traits for risk perception/loss aversion (e.g., framing effects), decision-making, and everyday financial behaviors in an analog sample.

Risky-choice Framing Effects

Loss aversion may bear on several well-known cognitive biases that can shape financial decision-making, including the *framing effect*, whereby most individuals react to a choice differently based on whether the choice is "framed" in terms of losses or gains (Kahneman & Tversky, 1984). In Tversky and Kahneman's (1981) "Asian disease problem," for instance, participants choose between certain and risky outcomes that are presented with either a positive or negative frame. When outcomes are framed in terms of potentially saved lives (i.e., positively; in terms of gains), most individuals prefer the certain option (e.g., "200 people will be saved

from the disease") to the risky one (e.g., "1/3 probability that 600 people will be saved and 2/3 probability that nobody will be saved"). In contrast, when outcomes are framed in terms of potentially lost lives (i.e., negatively), most prefer the risky option (e.g., "1/3 probability that nobody will die and 2/3 probability that 600 people will die") to the certain one (e.g., "400 people will die"). Given that each outcome holds an equivalent expected utility value, framing effects reveal the extent to which human decision-making can be shaped by stimulus valence.

Sensitivity to the framing effect (SFE) may be related to loss aversion, risk perception, and decision-making. For instance, individuals who tend to disproportionately choose the gamble when facing the prospect of loss are likely to be high in loss aversion, whereas individuals who are insensitive to the framing effect may evaluate uncertainty based on each choice's expected utility. Research suggests that Need for Cognition, Big Five Openness, and allied individual difference variables manifest positive correlations with SFE (Levin, Gaether, Schreiber, & Lauriola, 2002; Smith & Levin, 1996; Weber, Blais, & Betz, 2002).

The Heterogeneity of Psychopathy

Growing evidence suggest that psychopathy is not monolithic but is instead a constellation or perhaps configuration of general personality traits drawn from multiple higher-order domains, such as antagonism, (reversed) conscientious, emotional stability, and surgent extraversion (Lilienfeld, Watts, Smith, Berg, & Latzman, 2015; Lynam & Derefinko, 2006). Some authors have attempted to synthesize the diverse traits comprising psychopathy into a coherent higher-order dimensional model. Patrick, Fowles, and Krueger's (2009) *triarchic model* proposes that psychopathy consists of three separable dimensions: *disinhibition, meanness, and boldness*. Disinhibition reflects a predisposition toward deficits in impulse control marked by a lack of planfulness, foresight and affect regulation. Meanness reflects a lack of empathy and

attachment, disdain towards others, and rebelliousness. Finally, boldness reflects an ability to remain calm in threatening situations and comprises largely adaptive features such as fearlessness, charisma, venturesomeness, and a willingness to take risks. Notably, however, the degree to which boldness traits are genuinely "psychopathic" is scientifically controversial, with some authors contending that they are irrelevant or at best peripheral to psychopathy but others contending that they are important to psychopathy (e.g., Lilienfeld et al., 2012; Lynam & Miller, 2012; Miller, Lamkin, Maples-Killer, & Lynam, 2016; Patrick, Venables, & Drislane, 2013; Vize, Lynam, Lamkin, Miller, & Pardini, 2016).

Psychopathy subdimensions as operationalized by the triarchic model often diverge, in some cases sharply, in their relations with external criteria, such that some, especially disinhibition and meanness, are positively related to overt antisocial and criminal tendencies and negatively related to largely prosocial real-world outcomes (Miller & Lynam, 2012; Sellbom & Phillips, 2013). In contrast, others, especially boldness, tend to manifest positive relations with prosociality and more rarely, certain forms of antisociality as well (e.g., Costello, Unterberger, Watts, & Lilienfeld, 2018; Smith, Edens, & McDermott, 2013). It is perhaps surprising, then, that despite longstanding conjecture (e.g., Lykken, 1995) and burgeoning research interest concerning the processes by which boldness relates to and perhaps affects behavior, few such mechanisms have been identified. Loss aversion, or a relative lack thereof, may be one such key process, potentially playing an important role in shaping adaptive functioning.

Psychopathy and Financial Behaviors: A Channeling Model

The relation between diminished loss aversion and psychopathy, and the manifold behavioral outcomes that may be associated with such a relation, are likely to differ in concert with variation in certain psychopathic features. *Configural models* of psychopathy posit that

statistical interactions among psychopathic features may account for the differences in behavioral manifestations of psychopathic traits across individuals. Although boldness is often associated with positive behavioral outcomes (Lilienfeld et al., 2012; Smith, Lilienfeld, Coffey, & Dabbs, 2013), it may be "channeled" (James, 2008) into relatively maladaptive categories of behavior in conjunction with other psychopathic features. Still, the research support for this conjecture, which implies statistical interactions between boldness and other psychopathic features, such as disinhibition, has been decidedly mixed and arguably mostly negative. In some studies, boldness has potentiated relations between disinhibition, on the one hand, and aggression and risky sexual behavior, on the other (e.g., Kastner & Sellbom, 2012; Smith, Edens, & McDermott, 2013). In contrast, such interaction effects have failed to achieve statistical significance in a number of other studies (e.g., Coffey, Cox, & Kopkin, 2018; Gatner, Douglas, & Hart, 2016; Maples et al., 2014, Vize et al., 2016).

Present Research

In light of the reviewed literature, we evaluated the relations among psychopathic traits, risk perception, sensitivity to risky-choice framing effects, and financial outcomes using an online community sample. We tested the hypotheses (all of which were formulated by the second author prior to data collection)[1] that (a) boldness will be negatively correlated with SFE; (b) boldness will be positively correlated with successful financial outcomes and negatively correlated with financial failures; (c) disinhibition will be negatively correlated with successful financial outcomes and positively correlated with financial failures; (d) the relation between boldness and successful financial outcomes will be statistically accounted for by an increased willingness to take risks; and (e) the relation between boldness and financial outcomes can be

[1] These predictions were not preregistered.

partially accounted for by a channeling (i.e., configural) model. Per this model, we posited a disordinal interaction, such that boldness features would be channeled into different financial outcomes dependent on levels of disinhibition traits. In essence, with adequate impulse control, individuals with elevated boldness should display a capacity to take calculated risks necessary for financial success; in contrast, when paired with elevated disinhibition, boldness traits should be channeled into maladaptive financial behaviors. Finally, in light of recent provisional findings (Neo, Sellbom, Smith, & Lilienfeld, 2018), in exploratory analyses, we examined the possibility of interactions between disinhibition and meanness in statistically predicting financial outcomes.

Method

Participants

Participants (N = 500) were United States community members (M_{age} = 37.9; SD_{age} = 11.5) recruited from Amazon's Mechanical Turk (MTurk), an online marketplace for crowdsourced labor; several investigations suggest that MTurk provides data that are of equal or better quality than those of undergraduate samples (e.g., Buhrmester, Kwang, & Gosling, 2011; Miller, Crowe, Weiss, Maples-Keller, & Lynam, 2017). Participants were compensated $5.00. Our sample was primarily female (59.2%) and Caucasian (79.8%). Most participants identified as either employed for wages (62.8%) or self-employed (23.2%). Modal income level was low, with 22.2% of participants earning less than $10,000/year, and only 6.0% earning more than $80,000/year. Data were screened for careless responding using the PPI-R validity scales (procedures described in Measures section), resulting in a final sample size of 475[2].

[2] Post hoc power analyses using a sample size of 475, either a one- or three-predictor variable equation as baseline, and an alpha level of $p < .010$ indicated the statistical power for this investigation was .69 for detecting a small effect size ($f^2 = .02$), whereas the power exceeded .99 for detection of medium ($f^2 = .15$) and large ($f^2 = .35$) effect sizes. Statistical power for all effect sizes where $f^2 \geq .03$ exceeded .95 (but see Lakens, 2014, for a critique of post hoc power analyses).

Measures

Internal consistencies for all measures can be found in Table 1.

Psychopathy. Participants completed three measures of psychopathic traits: the *Psychopathic Personality Inventory-Revised* (PPI-R; Lilienfeld & Widows, 2005), the *Triarchic Psychopathy Measure (*TriPM; Patrick, 2009), and the *Levenson Self-report Psychopathy Scale (*LSRP; Levenson, Kiehl, & Fitzpatrick, 1995).

The PPI-R is a 154-item self-report inventory designed to assess psychopathic traits, attitudes, and dispositions, and consists of eight lower-order scales that often coalesce into two largely independent higher-order factors, Fearless Dominance (PPI-R FD), akin to boldness, and Self-centered Impulsivity (PPI-R SCI), which overlaps with both disinhibition and meanness. One lower-order dimension, Coldheartedness (PPI-R C), does not load highly onto either FD or SCI and is somewhat related to meanness, but emphasizes traits associated with socioemotional deficits (e.g., guiltlessness, low empathy, lovelessness) more heavily than active forms of antagonism (e.g., instrumental aggression).

The PPI-R includes validity scales designed to detect biased or inconsistent responding. The Deviant Responding Scale consists of 10 items that assess bizarre or unusual experiences (e.g., seeing the world in black-in-white for long periods of time) and is intended to detect malingering, careless responding, or difficulties in reading comprehension. The Inconsistency Scale consists of the sum of the absolute differences between 40 item pairs that are moderately to highly correlated and is intended to measure the proclivity to respond inconsistently to items with similar content. In this sample, scores of 30 and above on the Deviant Responding Scale or scores of 55 and above on the Inconsistency Scale were excluded from analyses (N = 25). These

cutoffs were determined by visually inspecting the distributions of the variables and are broadly consistent with recommendations in the PPI-R manual (Lilienfeld & Widows, 2005).

The TriPM is a 58-item self-report measure designed to assess the triarchic model of psychopathy (Patrick et al., 2009) via scales assessing boldness (i.e., TriPM Boldness; TriPM B), disinhibition (i.e., TriPM Disinhibition; TriPM D), and Meanness (i.e., TriPM Meanness; TriPM M). The LSRP is a 26-item self-report measure that consists of two scales, one assessing primary psychopathy, which comprises interpersonal and affective features, and another assessing secondary psychopathy, which comprises behavioral and lifestyle features.

Risk perception and risky-choice framing. To assess sensitivity to environmental cues in risky circumstances (i.e., risk perception), we adapted a between-subjects measure of framing effects from earlier investigations (e.g., Fagley & Miller, 1987; Kahneman & Tversky, 1981) to assess within-subjects differences. Participants were presented with 16 problems spanning the content domains of life-threatening disease and financial outcomes and asked to choose between a riskless, certain response option and a risky, uncertain response option of equal expected utility. Eight of these problems had positive frames (e.g., gains) and eight had negative frames (e.g., losses). The measure, which we termed the Framing Effect Scale (FES), yields two composite scores indicated by (a) the number of times the participant chooses the risky option in the negative frame condition and (b) the positive frame condition. In this sample, Cronbach's alphas for the framing scales were modest (see Table 1).

Further, in line with the recommendations laid out in Nilsson, Rieskamp and Wagenmakers (2011), we fit a prospect theory model (see Supplementals) to these risky-choice frame data using a hierarchical Bayesian analysis so as to derive an alternate measure of risk-taking after parceling out variance from the potential confounds of sensitivity to scale and

sensitivity to changes in probability[3]. Our model was performed using the RStan (Stan Development Team, 2018) package in R (RC Team, 2017). R-hat values indicated good convergence for all parameters. Code and raw outputs are available in Supplementary Materials. The risk-taking variable that resulted is subsequently referred to as a Bayesian Risk Score (BRS).

Risk perception was also assessed with a modification of the *Choice Dilemma Questionnaire* (CDQ; Kogan & Wallach, 1964), a self-report measure designed to assess risk preferences through the use of hypotheticals. Participants read 12 short vignettes about a stranger, each ending with a risky choice, and indicated the lowest probability of success that they would consider acceptable to make it worthwhile for the stranger to choose the risky option on a 0-100 scale. In an adaptation for this study, participants also indicated probabilities that they would consider acceptable if they, themselves, were in the scenario. A total score was aggregated across these 24 items, with higher scores indicating greater risk aversion.

Financial outcomes. The *Financial Behaviors Questionnaire* (FBQ; Garman, Leech, and Grable, 1996) is a self-report measure adapted for use in the present study to examine real-world negative financial outcomes. Participants rated the frequency with which they had engaged in a variety of maladaptive financial behaviors on a Likert-type scale with varying response options. We added 10 items assessing adaptive financial behaviors and outcomes (e.g., annual salary, promotions), yielding 36 items in total. Participants also answered open-ended questions concerning the amount of money they had won and lost due to risky financial behaviors (e.g., gambling, investing).

[3]We had originally planned to use this parameter (λ) as a measure of loss aversion, as is more consistent with the literature. Yet, after inspection of the convergent and discriminant validity of λ with our FES variables, it became apparent that λ was better conceptualized as a measure of risk taking. In subsequent analysis, we therefore construed the parameter as a risk perception variable.

To aid in the interpretation of FBQ results, we conducted an exploratory factor analysis on these 37 items using principal axis factoring and Promax rotation. Velicer's MAP criteria (1976) and parallel analysis (Velicer & Jackson, 1990) were employed to ascertain the appropriate number of factors to retain in our factor analysis. Both tests suggested a 5-factor solution (see Supplementals for item content, factor pattern coefficients, and scree plot with parallel analysis). Eigenvalues of the five factors ranged from 9.08 to 1.44, and collectively accounted for 50.47% of total variance. Three factors assessed engagement in maladaptive financial behaviors and two factors assessed engagement in adaptive financial behaviors. The first factor was named "Illegal Acts and Consequences" and explained 25.22% of the variance; it comprised items describing antisocial financial behaviors such as illegal or unethical activities (e.g., embezzlement, check fraud) and outcomes commensurate with extreme misconduct (e.g., personal bankruptcy). The second factor, which explained 8.95% of the total variance, was termed "Credit Card Misuse" and comprised items reflecting the antecedents and consequents of outsized personal credit card debt. The third factor explained 7.54% of the total variance and was named "Financial Instability;" it reflected relatively commonplace maladaptive financial behaviors and outcomes (e.g., having a utility service cut off, using a pawnshop). The fourth factor explained 4.75% of the total variance and was named "Long-term Planning;" it comprised items reflecting behaviors such as contributing to a savings plan or being able to survive off of emergency funds for an extended period of time. The fifth factor explained 4.01% of the total variance and was named "Work Success;" it comprised items describing the frequency with which one has received promotions and raises at work. Factor scores were computed using a regression-based method.

Analysis Plan

Given the substantial number of significance tests conducted, we adopted a conservative alpha level of .01 across analyses to provide a balance between Type I and Type II error. To further minimize risk of Type I error, conceptually overlapping and highly correlated variables were combined by standardizing and summing scores on each variable. PPI-R FD and TriPM B were combined to yield a Boldness composite score and PPI-R SCI, TriPM D, and LSRP 2[4] were combined to yield a Disinhibition composite score (see below for intercorrelations). We kept PPI-R C and TriPM M separate in the analyses given their conceptual and empirical differences, with Meanness more imbued with Antagonism than Coldheartedness.

We assessed relations between psychopathic traits and SFE by comparing the difference between each psychopathy variable's correlation with (a) FES Positive and (b) FES Negative using methods presented by Steiger (1980) to test the statistical significance of the difference between dependent correlations. We considered instances in which the correlation between a given psychopathy variable and FES Negative were higher than said variable's correlation with FES Positive to indicate that it was positively related to SFE, and vice versa.

To examine the extent to which risk perception accounts statistically for the relations between boldness psychopathy features and financial outcomes, we employed the PROCESS macro (Hayes, 2013) in SPSS to generate bias-corrected bootstrap confidence intervals for indirect effects. We also used PROCESS to examine the degree to which statistical interactions among psychopathy variables accounted for differences in financial behaviors by means of moderated multiple regression analyses, entering the multiplicative term between two psychopathy subdimensions and a financial outcome variable following main effects. In both cases, confidence intervals were generated using 10,000 bootstrapped samples.

[4] Although LSRP 1 is also imbued with Disinhibition, we chose to examine it as a standalone scale.

Results

Table 1 presents descriptive statistics for the primary measures. As seen in Tables 2, 3, and 4, PPI-R SCI, TriPM D, and LSRP 2 were highly intercorrelated (*rs* > .75); TriPM M manifested large correlations with PPI-R SCI, TriPM D, LSRP F1, LSRP F2, and PPI-R C (*rs* from .50 to .78); and PPI-R FD manifested a large correlation with TriPM B. FES Positive and FES Negative were moderately-to-strongly associated, whereas the BRS manifested a strong positive correlation with FES Positive and FES Negative; the CDQ manifested small-to-medium positive correlations with all risk indicators (*rs* = .23). All three FBQ maladaptive factors were moderately to highly intercorrelated (*rs* from .47 to .68); FBQ adaptive factors, income, and money won due to risky choices were weakly to moderately intercorrelated (*rs* from .20 to .46).

Consistent with research on framing effects, a dependent samples t-test across FES Positive and FES Negative indicated that the manipulation produced a significant impact on risky decision-making (t = -18.2; p <.010, d = -0.84). Overall, participants were less risk seeking in the positive frame condition and more risk seeking in the negative frame condition. Numerous participants either did not demonstrate the framing effect (N = 80) or endorsed the risky option in gain conditions more frequently than in loss conditions (N = 57).

Correlations

Psychopathy and risk perception. As shown in Table 5, results were consistent with our hypotheses, with the key exception of the relation between SFE and Boldness. Boldness was modestly positively associated with both FES Positive and FES Negative and was not significantly correlated with the BRS. A test of dependent correlations revealed no significant differences across the FES Positive and FES Negative correlations (Steiger's Z = .22, p = .830, df = 443). Still, Boldness was significantly positively correlated with the CDQ, manifesting a

relation that was small-to-moderate in magnitude. In subsidiary exploratory analyses, we examined the extent to which one salient boldness indicator, namely PPI-R Fearlessness, accounted for these findings; to do so, we conducted a simultaneous multiple regression in which the PPI-R Fearlessness was entered along with two other PPI-R boldness indicators, namely Social Influence and Stress Immunity. PPI-R Fearlessness was the only subdimension that accounted for a statistically significant degree of unique variance in either FES Positive ($\beta = .13$, $p < .010$) or the CDQ ($\beta = .23$, $p < .001$). No PPI-R lower-order boldness indicators were significantly related to FES Negative after accounting for their shared variance.

Disinhibition was significantly correlated with neither FES Positive nor FES Negative. Although we did not advance predictions concerning the relation between disinhibition and SFE, exploratory analyses revealed that relations between Disinhibition, on the one hand, and FES Positive and FES Negative, on the other, differed significantly (Steiger's $Z = 4.18$, $p < .001$, df = 443), even though neither correlation reached statistical significance. The relation between Disinhibition and FES Positive was positive, whereas the relation between Disinhibition and FES Negative was negative. Disinhibition also manifested a small, yet statistically significant, positive correlation with the CDQ. Disinhibition and BRS were not significantly related.

As with Disinhibition, although we did not hypothesize that meanness would be significantly related to either risk perception or risk taking, exploratory analyses revealed that TriPM M was significantly negatively correlated with FES Negative but was not significantly correlated with FES Positive. A test of dependent correlations revealed significant differences across these relations ($Z = 4.40$, $p < .001$, df = 454). PPI-R C was not significantly related to the FES scales and relations did not differ significantly across FES Positive and FES Negative (Steiger's $Z = 1.34$, $p = .181$, df = 465). Unlike TriPM M, however, PPI-R C was significantly

positively related to the CDQ, manifesting a small effect. Post-hoc comparisons revealed that Boldness differed from both Disinhibition and Meanness in its correlation with FES Negative (respectively, Steiger's *Z*s = 3.21 and 3.95, *ps* < .001), although this effect was not present for any of the other risk indicators, including FES Positive.

Psychopathy and financial outcomes. As predicted, Boldness manifested significant positive correlations with both of the adaptive financial outcome factors; effects were medium in magnitude (see Table 6). Boldness was not significantly related to maladaptive financial outcome factors. Further, Boldness manifested a significant positive correlation with both annual income and profits accrued from financial risk taking[5]. Disinhibition was positively correlated with all maladaptive FBQ dimensions (*rs* ranged from .24 to .41) and negatively correlated with FBQ Long-term Planning with a small-to-moderately sized effect. Similarly, TriPM M manifested positive relations with all maladaptive FBQ dimensions (*rs* from .15 to .44) and a small negative relation with FBQ Long-term planning.

Incremental Validity and Moderation Analyses

Incremental validity. Contrary to our hypotheses, the CDQ, BRS, FES Positive, and FES Negative scales did not account significantly for the relation between Boldness and financial outcome measures.

Statistical moderation. Disinhibition did not significantly moderate the relation between boldness and financial outcomes ($\Delta R^2 < .01$ for all analyses). When TriPM M and PPI-R C were examined as moderators in exploratory analyses, no significant effects were found. In contrast, exploratory analyses revealed that TriPM M potentiated (a) the relation between Disinhibition and FBQ Credit Card Misuse, $\Delta R^2 = .100$, $F(1, 443) = 14.59$, $p < .001$, and (b) the negative

[5]PPI-R Fearlessness was significantly associated with FBQ Illegal Acts and Consequences, FBQ Long-term Planning, money won, money lost, and income (*rs* ranged from .15 to .20).

relation between Disinhibition and FBQ Long-term Planning: $\Delta R^2 = .014$, $F(1, 443) = 7.82$, $p = .005$.

Discussion

This investigation provides several new insights regarding relations among psychopathic features, risk-seeking and risk perception, and financial outcomes. Our results suggest that psychological phenomena often associated with loss aversion, such as many classical framing effects (i.e., risk-seeking in conditions of loss), may be marked by more boundary conditions than commonly assumed (see Gal & Rucker, 2018). Nevertheless, many of the effects were modest in magnitude and will require replication in independent samples.

By and large, our prediction that individuals with elevated levels of boldness would be especially risk seeking (or less risk averse) was provisionally supported. Individuals with high levels of boldness were more willing to take risks across all measures of risk-seeking. As expected, disinhibition was also associated with risk seeking. Contrary to our hypotheses, boldness was equally positively related to risk seeking in both gain and loss frames, a finding that suggests that boldness is not related to SFE.

Individuals high in disinhibition and meanness traits, on the one hand, were more likely to endorse risk-seeking behaviors in gain frames, on the other, perhaps indicating that they display a bias opposite in direction from classic loss aversion. Few studies have reported that certain individuals endorse more risk seeking in response to positive than negative frames. This may be because, although researchers have examined SFE as an individual difference variable (e.g., Stanovich & West, 1998), only a handful have used a within-subjects design with continuous indicators (but see Weller & Thulin, 2012); this gap may stem from the fact that effect sizes for framing effects are larger for paradigms involving between-subject experimental

designs (Keren, 2014). Yet, between-subject manipulations do not allow researchers to examine the possibility that some individuals, at baseline, are most risk-seeking in gain frames than in loss frames. Given the ubiquity of traditional framing effects in normal populations, such a "positive framing effect" would likely be washed out at the mean-level if aggregated with data from other participants. Another implication of our results, then, is that effect sizes for framing paradigms may be underestimated for non-psychopathic individuals in the literature because participants who demonstrate positive framing effects are pulling results in the opposite direction. Still, as observed earlier, the magnitudes of these associations were modest, suggesting that the findings may be of more theoretical than practical importance.

Our results also suggest that risk perception may differ, albeit modestly, across triarchic psychopathy domains. This conclusion is consistent with literature indicating that distinct trait constellations predict differing biases when appraising risk. Capra, Jiang, Engelman and Berns (2013) found that motivated individuals with lower levels of emotional dysregulation (i.e., individuals who ostensibly exhibit boldness features) tended to be loss averse yet optimistic when appraising risk, mirroring the combination of elevated risk-taking and normative SFE among individuals with boldness traits in our data; in contrast, impulsive individuals tended to be both reward-responsive and lacking in risk aversion, mirroring our finding that disinhibition may be modestly associated with bias in positive, but not negative, frame conditions.

Boldness was positively correlated with adaptive financial behaviors, annual income, and profitable financial risk taking, even after controlling for income and socioeconomic status (see Supplementals). These results raise the possibility that, although highly bold individuals take many financial risks and accordingly suffer periodic financial losses, they are slightly more likely than others to exhibit good "financial hygiene." Still, incremental validity analyses did not

substantiate our prediction that boldness statistically predicts positive financial outcomes through risk-taking. Similarly, contrary to prediction, we found no evidence that boldness interacted with disinhibition to statistically predict financial outcomes.

In contrast, both disinhibition and meanness were robustly correlated with maladaptive financial behaviors and negatively correlated with adaptive financial behaviors. Further, exploratory analyses revealed that meanness potentiated the relation between disinhibition and some, but all not all, indicators of financial misconduct. Our positive interactional findings may reflect Type I error, especially given the low power of moderation analyses, which can readily result in "winner's curses" (i.e., spurious) positive findings (Button et al., 2013; Kenny, 2018). Still, if replicated these findings would support the possibility that specific configurations of psychopathic traits are tied to maladaptive behavior (see Neo et al., 2018, for similar findings).

Our investigation was marked by several limitations. First, our reliance on self-report measures for psychopathic features and financial outcomes raises the specter of mono-method bias. Still, self-reported psychopathic features manifested heterogeneous relations with outcomes, indicating at least some substantive variance rising above method co-variance. Second, participants were predominantly Caucasian and of relatively low SES. For instance, unemployment in our sample was 1.6% higher than that of the national average at the time data were collected (Bureau of Labor Statistics, 2016). Psychopathic features may be tied to risk-taking only in high SES samples (Gao, Baker, Raine, Wu, & Bezdjian, 2009), calling into question the generalizability of our findings.

Third, our measures of risk perception potentially conflate risk perception with risk tolerance. Risk-taking comprises both an ability to discern risks and a willingness to accept risks (Ricciardi & Rice, 2014). If one is functionally behaving dangerously but is not aware of said

danger, he or she has not intentionally taken a risk. Willingness to tolerate good (or bad) odds consequently may be challenging to parse from risk perception. Measures used in this study such as the CDQ and FES probably assess both risk tolerance and risk perception. Work by Weber et al. (2002) and Hosker-Field et al. (2016) suggests that a simple methodology, such as asking participants on a Likert-type scale how risky they perceive a situation to be, may help to disentangle risk perception from risk tolerance.

Fourth, our measure of risky-choice framing relied heavily on hypothetical scenarios, perhaps accounting in part for its modest internal consistency. Psychopathic individuals may be less motivated than others to reveal genuine preferences under such paradigms; alternatively, their choices in hypothetical situations may merely reflect their suppositions about how participants are expected to respond. As a result, it will be important to ascertain the extent to which our findings generalize to more ecologically valid paradigms, including those that involve actual risk-taking in high stakes situations.

Fifth, the absence of general personality measures in our study constrains the extent to which we can attribute our results to psychopathy *per se*. Examinations of general personality and risk may advance our understanding of processes driving relations among psychopathy, risk perception, and financial outcomes.

These qualifications notwithstanding, our study furthers scholarship examining the role of psychopathic features in everyday life and raises the possibility that framing effects are bounded and/or opposite in direction for some individuals. The current work further highlights the continued need for bridging the traditionally siloed domains of personality, psychopathology, and real-world decision-making. Because research on risky decision-making has often

deemphasized individual differences, continued exploration of this domain through the lens of personality may enhance our understanding of decision-making under conditions of uncertainty.

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Author Contributions

SL and SS contributed the conception of the study. SL and SS provided the research design and methodological approach. SL and SS oversaw the collection of data. SS and TC organized the dataset. SR and TC performed the statistical analysis and interpretation. TC wrote the first draft of the manuscript. TC, SS, SR, and SL wrote sections of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

- Risk perception may differ modestly across triarchic psychopathy domains.
- Psychopathic individuals make more risky choices in response to gain than loss frames.
- Boldness was equally positively related to risk-seeking in gain and loss frames.
- Boldness predicts adaptive financial behaviors.
- Disinhibition and meanness predict maladaptive financial behaviors.

Table 1.

Means, SDs, and internal consistencies of primary measures.

Measure	Mean (*SD*)	α	N
PPI-R			
Coldheartedness	31.1 (7.5)	.85	475
Fearless Dominance	132.6 (26.8)	.91	475
Self-Centered Impulsivity	102.3 (21.5)	.89	475
TriPM			
Boldness	47.6 (8.5)	.84	464
Disinhibition	35.1 (8.2)	.87	464
Meanness	32.3 (7.8)	.86	464
LSRP			
LSRP 1	28.4 (9.0)	.92	461
LSRP 2	18.0 (5.3)	.81	461
CDQ			
Total	61.2% (14.3%)	.92	453
Framing Effects Scale			
Positive	14.3 (2.6)	.61	468
Negative	16.5 (2.7)	.67	470
Financial Behaviors			
Money Won	$4407 ($16,726)	–	305
Money Lost	$2680 ($12,573)	–	349

PPI-R = Psychopathic Personality Inventory – Revised, FD = Fearless Dominance, SCI = Self-centered Impulsivity, C = Coldheartedness; TriPM = Triarchic Psychopathy Measure; LSRP = Levenson's Self-report Psychopathy Scale, 1 = Factor 1, 2 = Factor 2; CDQ = Choice Dilemma Questionnaire.

Table 2.

Intercorrelations among psychopathy scales.

	PPI-R SCI	PPI-R FD	PPI-R C	TriPM D	TriPM B	TriPM M	LSRP 1	LSRP 2	PPI-R F
PPI-R SCI	–								
PPI-R FD	.19**	–							
PPI-R C	.36**	.24**	–						
TriPM D	.84**	.06	.24**	–					
TriPM B	.01	.88**	.19**	-.10	–				
TriPM M	.78**	.07	.52**	.76**	-.09	–			
LSRP 1	.73**	.24**	.56**	.65**	.13**	.76**	–		
LSRP 2	.77**	-.08	.28**	.78**	-.22**	.66**	.63**	–	
PPI-R F	.54**	.69**	.25**	.45**	.46**	.43**	.43**	.31**	–

Note. ** p < .01; LSRP = Levenson's Self-Report Psychopathy Scale, 1 = Factor 1, 2 = Factor 2; PPI-R = Psychopathy Personality Inventory – Revised, FD = Fearless Dominance; SCI = Self-Centered Impulsivity, F = Fearlessness; TriPM = Triarchic Psychopathy Measure, B= Boldness; D = Disinhibition; M = Meanness.

Table 3.

Intercorrelations among financial behavior measures.

	FBQ IAC	FBQ CC	FBQ FI	FBQ LTP	FBQ WS	FBQ $ Won†	FBQ $ Lost†	Income
FBQ IAC	–							
FBQ CC	.46**	–						
FBQ FI	.56**	.66**	–					
FBQ LTP	-.28**	-.12**	-.43**	–				
FBQ WS	.24**	.24**	.12**	.33**	–			
FBQ $ Won†	.08	-.03	-.02	.30**	.24**	–		
FBQ $ Lost†	.26**	.07	.13	.07	.20**	.64**	–	
Income	.02	.07	-.12	.46**	.35**	.28**	.21**	–

Note. ** p < .01. FBQ = Financial Behaviors Questionnaire, IAC = Illegal Acts and Consequences, CC = Credit Card Misuse; FI = Financial Instability; LTP = Long-term Planning (reversed), WS = Work Success (reversed). †Money Won and Money Lost were log transformed due to non-normal distributions.

Table 4.

Intercorrelations among risk indicators.

	CDQ	FES Positive	FES Negative
CDQ	–		
FES Positive	.23**	–	
FES Negative	.23**	.54**	–
BRS	.23**	.81**	.84**

Note. ** p < .01; CDQ = Choice Dilemma Questionnaire; BRS = Bayesian Risk Score; FES = Framing Effects Scale.

Table 5.

Correlations among psychopathy and risk perception measures.

	FES Positive	FES Negative	CDQ	BRS
Boldness	.13**	.12**	.23**	.11
Disinhibition	.09	-.10	.12**	-.02
PPI-R Coldheartedness	.06	-.01	.12**	-.04
TriPM Meanness	.08	-.13**	.09	.10
LSRP 1	.05	-.07	.21**	-.07
PPI-R Fearlessness	.15**	.08	.26**	.08

Note. ** p < .01; *CDQ* = Choice Dilemma Questionnaire; LSRP = Levenson's Self-report Psychopathy Scale, 1 = Factor 1; PPI-R = Psychopathy Personality Inventory – Revised; TriPM = Triarchic Psychopathy Measure; FES = Framing Effects Scale; BRS = Bayesian Risk Score.

Table 6.

Correlations among psychopathy and financial behavior measures

	Financial Behaviors Questionnaire							
	IAC	CC	FI	LTP	WS	$ Won†	$ Lost†	Income
Boldness	-.11	.01	-.04	-.32**	-.33**	.23**	.13	.34**
Disinhibition	.24**	.39**	.41**	.25**	.09	.04	.09	-.05
PPI-R C	.03	.06	.03	-.05	-.04	.04	.08	.18**
TriPM M	.15**	.44**	.31**	.13**	.06	.02	.07	.05
PPI-R F	-.00	.19**	.10	-.12**	-.11	.18**	.15**	.20**
LSRP 1	.14**	.32**	.24**	.06	.03	.08	.17**	.16**

Note. ** p < .01. FBQ = Financial Behaviors Questionnaire, IAC = Illegal Acts and Consequences, CC = Credit Card Misuse; FI = Financial Instability; LTP = Long-term Planning (reversed), WS = Work Success (reversed); PPI-R = Psychopathic Personality Inventory – Revised, C = Coldheartedness, F = Fearlessness; TriPM = Triarchic Psychopathy Measure, M = Meanness; LSRP = Levenson's Self-report Psychopathy Scale, 1 = Factor 1. †Money Won and Money Lost were log transformed due to non-normal distributions