



# Personal relative deprivation and risk: An examination of individual differences in personality, attitudes, and behavioral outcomes



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## ARTICLE INFO

### Article history:

Received 3 July 2015

Received in revised form 15 September 2015

Accepted 10 October 2015

Available online xxxx

### Keywords:

Risk  
Risk-taking  
Relative deprivation  
Personality  
Gambling  
Future discounting  
Crime  
Inequality

## ABSTRACT

Substantial epidemiological evidence has linked societal-level inequality and outcomes associated with risk-taking (e.g., teen pregnancy, crime, violence). However, little research has examined whether downstream psychological consequences of inequality are similarly associated with risk-related outcomes. We examined whether subjective feelings of personal relative deprivation—a key affective consequence of competitive disadvantage and victimization by inequality—were associated with risk-related individual differences in a diverse community sample ( $n = 328$ ). Personal relative deprivation was associated with personality traits associated with risk (high impulsivity, low self-control, and facets of sensation-seeking), risk-related attitudes (in ethical, gambling, and health/safety domains), and behavioral outcomes (gambling and problem gambling, future discounting, antisocial conduct, and criminal outcomes), but not with two laboratory behavioral risk tasks. Together, the results indicate that subjective feelings of relative deprivation predict individual differences in key personality traits, attitudes, and behaviors associated with risk.

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## 1. Introduction

Inequality at the societal level has been associated with a wide variety of negative social and health outcomes (reviewed in Pickett & Wilkinson, 2015; Wilkinson & Pickett, 2006, 2007, 2009). Many of these negative consequences of inequality involve risk-taking, including sexual promiscuity and teenage pregnancy, violence, drug and substance abuse, and crime (reviewed in Wilkinson & Pickett, 2006, 2007, 2009). These outcomes are all risky because they involve high outcome variance (a definition of risk widely used throughout the behavioral sciences; reviewed in Mishra, 2014).

Although there is ample evidence for an inequality-risk link at the societal level, surprisingly little research has examined whether psychological consequences of inequality are associated with individual differences in risky behavior and personality. One key individual-level outcome of inequality is personal relative deprivation, which describes subjective feelings of anger, resentment, and frustration in response to negative social comparisons with relevant others (Bernstein & Crosby, 1980; Smith, Pettigrew, Pippin, & Bialosiewicz, 2012). Personal relative deprivation is an affective consequence of inequality, facilitated by comparisons

between “haves” and “have-nots” (Smith et al., 2012). That is, feelings of relative deprivation are consequences of perceived competitive disadvantage relative to relevant others.

Growing evidence and theorizing suggest that competitive disadvantage is associated with greater risk-taking consistent with risk-sensitivity theory (e.g., Ermer, Cosmides, & Tooby, 2008; Hill & Buss, 2010; Mishra, Barclay, & Lalumière, 2014; Wilson & Daly, 1985; reviewed in Mishra, 2014). Risk-sensitivity theory predicts that people will shift from baseline risk-aversion to risk-preference in circumstances that reflect conditions of need, where need describes disparity between one's present and one's desired (or goal) state (Mishra & Lalumière, 2010; reviewed in Mishra, 2014). Those who are competitively disadvantaged may not be able to achieve desired outcomes through low-risk means, and may instead switch to high-risk, high variance strategies that at least offer a chance of meeting one's needs. Victims of inequality are necessarily competitively disadvantaged, and those who are competitively disadvantaged experience greater feelings of relative deprivation (Smith et al., 2012). As a consequence, personal relative deprivation is an affective proximate mechanism that should be associated with greater risk-propensity and risk-taking.

Some extant individual-level evidence is suggestive of a link between personal relative deprivation and risk. Bernburg, Thorlindsson, and Sigfusdottir (2009) demonstrated that people who experienced relative economic deprivation were more likely to engage in delinquency and violence. Across several studies, Callan and colleagues showed that personal relative deprivation is associated with gambling urges and problem

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gambling tendencies (Callan, Ellard, Shead, & Hodgins, 2008; Callan, Shead, & Olson, 2011, 2015). Experimentally manipulated feelings of relative deprivation have also been shown to affect gambling behavior (Callan et al., 2008, 2011). Other research has shown that relative deprivation predicts gambling engagement for those who perceive gambling to be a path to upward economic mobility (a finding consistent with risk-sensitivity theory; Tabri, Dupuis, Kim, & Wohl, 2015). Although these findings are suggestive, no studies, to our knowledge, have directly examined whether personal relative deprivation is associated with individual differences in risk-taking and risk-propensity conceived broadly.

In the following, we present a study examining whether feelings of relative deprivation are associated with individual differences in numerous manifestations of risk—namely, personality traits associated with risk (impulsivity, sensation-seeking, and low self-control), risk-accepting attitudes, behavioral risk-taking (including future discounting), antisocial behavior, criminal outcomes, and gambling. Personality traits associated with risk, including sensation-seeking, impulsivity, and low self-control have been consistently associated with persistent engagement in various forms of real-world risk-taking (e.g., Jones & Quisenberry, 2004, Mishra, Lalumière, Morgan, & Williams, 2011, Mishra, Lalumière, & Williams, 2010, Zuckerman, 2007). Risk-accepting attitudes describe people's favorable or unfavorable feelings toward various risky behaviors (Blais & Weber, 2006). Behavioral risk-taking describes preference for high variance outcomes over low variance outcomes (e.g., the choice of \$5 guaranteed over a 10% chance of \$50). Future discounting—the tendency to prefer smaller, immediate rewards to larger, later rewards—is considered by some to be a manifestation of risk-taking (e.g., Hill, Jenkins, & Farmer, 2008, Reynolds, 2006). Finally, antisocial behavior, crime, and gambling have all been argued to be instantiations of a broader “taste for risk” (e.g., Jones & Quisenberry, 2004). Substantial evidence suggests that these outcomes, along with other risky behaviors, tend to co-occur among individuals, consistent with a “generality of deviance” account (e.g., Hirschi & Gottfredson, 1994, Jones & Quisenberry, 2004).

This study extends previous research in several ways. First, we utilize a diverse community sample recruited to maximize variability in relative deprivation and risk-propensity. Second, we examine risk conceived broadly. Previous research has focused on such specific outcomes as gambling or delinquency, instead of a suite of risk-related traits, behaviors, and outcomes. Finally, we specifically measure *subjective* personal feelings of relative deprivation. This approach is a key strength of the current study given that most other studies examining relative deprivation have relied on socioeconomic measures (e.g., economic inequality) rather than directly measuring people's personal experience of deprivation. We predicted that personal relative deprivation would be broadly associated with individual differences in behaviors, attitudes, and personality traits associated with risk.

## 2. Methods

A total of 328 participants (160 men, 165 women, 3 unreported sex; age:  $M = 31.0$ ,  $SD = 12.5$ , range: 18 to 73) were recruited using posters in the general community, the local university and college, homeless shelters, local employment offices, food banks, and the John Howard Society (a non-profit organization dedicated to re-integrating former prisoners into general society). Participants were recruited from these diverse sources in order to maximize variance in measures of interest, particularly reported relative deprivation, risk-propensity, and engagement in risk-taking behaviors. The same participants were used in Mishra and Carleton (in press) to answer different research questions on mental and physical health. All participants were provided with \$30 compensation for their time. Participants also received compensation from individual decision-making tasks as described below. All of the following measures were presented in random order on a computer to each participant.

### 2.1. Relative deprivation

Relative deprivation was measured using the *Personal Relative Deprivation Scale* (Callan et al., 2008), a four-item measure of the degree to which people feel subjectively deprived relative to others (e.g., “I feel resentful when I see how prosperous other people seem to be”). Items were rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). This measure has been demonstrated to have acceptable internal consistency (Callan et al., 2011), and has been previously associated with gambling urges (Callan et al., 2008) and poorer physical and mental health (Mishra & Carleton, in press).

### 2.2. Personality traits associated with risk

#### 2.2.1. Impulsivity

Impulsivity was assessed using *Eysenck's Impulsivity Scale* (Eysenck, Pearson, Easting, & Allsopp, 1985), which consists of 19 yes/no statements about impulsive behaviors. This measure has been used in hundreds of studies and has been shown to have high reliability and validity (reviewed in Webster & Jackson, 1997).

#### 2.2.2. Sensation-seeking

Sensation-seeking was assessed using the *Sensation-Seeking Scale* (Zuckerman, 1994), which consists of 40 choices between paired statements regarding preferences for varied, stimulating experiences and disinhibited behavior. The items make up four subscales: boredom susceptibility, disinhibition, experience seeking, and thrill and adventure seeking. This measure has been used in many thousands of studies and has been shown to be highly reliable and valid (reviewed in Zuckerman, 2007).

#### 2.2.3. Self-control

Self-control was assessed using the *Retrospective Behavioral Self-Control Scale* (Marcus, 2003). It consists of 67 items, measuring the frequency of behaviors associated with low self-control in childhood, adolescence, and adulthood. Behaviors were rated on a scale from 1 (*never*) to 7 (*always*). Scores were reversed so that higher scores indicated greater self-control. This measure has been associated with a number of different risk-related outcomes and has high internal reliability (>.91) and test-retest reliability (.89) (Marcus, 2003).

### 2.3. Risk-accepting attitudes

Risk-accepting attitudes in multiple domains were assessed using the revised *Domain Specific Risk-Taking Scale* (DOSPERT; Blais & Weber, 2006; Weber, Blais, & Betz, 2002), which measures likelihood of engagement in 30 risky behaviors in six domains of life: ethical, financial, gambling health/safety, social, and recreational. Behaviors were rated on a scale from 1 (*extremely unlikely*) to 7 (*extremely likely*). The DOSPERT has been widely used, including cross-culturally, and has been shown to have high internal reliability (approximately .78) and moderate test-retest reliability (approximately .65) (reviewed in Blais & Weber, 2006).

### 2.4. Behavioral outcomes

#### 2.4.1. Future discounting

Future discounting was assessed through 27 monetary choices between smaller, immediate rewards and larger, later rewards. (e.g., “Would you rather have \$24 tonight or \$35 in 25 days?”; Kirby, Petry, & Bickel, 1999). One of the choices was chosen at random at the end of the task and participants received money in the amount of their choice in the form of a cheque (either immediately cashable, or post-dated to the relevant date in the future). The dependent measure was a discounting parameter ( $k$ ) calculated for each of the subsets of small, medium, or large rewards (Kirby et al., 1999). Higher discounting parameters indicated greater preference for smaller, immediate rewards. This

measure has been associated with a wide array of relevant real world behaviors (reviewed in Reynolds, 2006), and has been shown to have adequate test–retest reliability (.71 one-year stability; Kirby, 2009).

#### 2.4.2. Balloon Analogue Risk Task (BART)

Participants saw a computer screen with a deflated balloon and a “PUMP” button (Lejuez et al., 2002). For each pump of the balloon, participants earned one cent and increased the balloon in size. The balloon was set to pop randomly, with an average of 65 pumps required before popping. If the balloon popped, participants lost all money gained for that trial. Participants could end the trial at any time by clicking on a “COLLECT” button. Thirty trials were presented; the first five were excluded from analysis as training. The average number of pumps for all trials where the balloon did not pop was computed (Lejuez et al., 2002). Participants received full earnings from the BART. The BART has high reliability (>.70) and test–retest reliability (.77) and has been associated with a wide array of real-world risky behaviors (reviewed in Ferrey & Mishra, 2014).

#### 2.4.3. Choice Task

Participants made six decisions, each between two monetary options (Mishra & Lalumière, 2010; adapted from Fessler, Pillsworth, & Flamson, 2004). Both options had equal expected values, but differed in payoff variance (e.g., “Would you rather choose (A) \$3 guaranteed, or (B) a 10% chance of earning \$30?”). At the end of the task, participants randomly received the value of one of the six choices they made (simulated by the software and shown visually). A total score of number of risky choices was computed. The Choice Task has been shown to be associated with individual differences in risky personality (e.g., Mishra et al., 2010, Mishra et al., 2011).

#### 2.4.4. Gambling

Problem gambling tendencies were assessed using the nine-item *Problem Gambling Severity Index* (PGSI; Ferris & Wynne, submitted for publication), which measures frequency of nine outcomes and behaviors associated with disordered gambling. Items were rated on a scale from 0 (*never*) to 3 (*almost always*). The PGSI is widely considered the best non-clinical measure of problem gambling (reviewed in Stinchfield, Govoni, & Frisch, 2007), and has sound internal consistency (.84) and test–retest stability (.78) (Ferris & Wynne, 2001).

General gambling tendencies were assessed using self-reports of frequency of engagement in various gambling behaviors, as well as the number of different gambling behaviors engaged in (Mishra et al., 2011). A total score of *general gambling involvement* was computed by summing the z-scores of the frequency and number of activities measures. This measure has been associated with other gambling and risk measures in previous research (e.g. Mishra et al., 2010, Mishra et al., 2011).

#### 2.4.5. Antisocial behavior

Antisocial behavior was assessed using the *Self-Report Early Delinquency Instrument* (Moffitt & Silva, 1988), which measures frequency of engagement in 36 antisocial behaviors (e.g., “Carried a weapon”; 0 = *never*; 1 = *once*; 2 = *more than once*). The instrument was modified to assess engagement in antisocial behaviors in the past year and over the lifetime. This measure has high internal consistency (.90) and test–retest stability (.85) (Moffitt & Silva, 1988).

#### 2.4.6. Criminal outcomes

Participants self-reported if they were ever arrested, charged, convicted, or incarcerated for a crime.

### 3. Results

Missing values were observed for impulsivity ( $n = 1$ ), self-control ( $n = 1$ ), all DOSPERT subscales (except health/safety; all  $n_s = 1$ ),

antisocial behavior in the last year and over the lifetime (both  $n_s = 1$ ), future discounting (small:  $n = 24$ ; medium:  $n = 23$ ; large:  $n = 21$ ), and BART scores ( $n = 1$ ).<sup>1</sup> No imputation procedure was used for these missing values. More than 5% of values were missing for the future discounting measures; these values were imputed using the series mean. Future discounting scores were highly skewed and so non-parametric statistics were used for relevant analyses.

Bivariate correlations between relative deprivation and behaviors, attitudes, and personality traits associated with risk are summarized in Table 1.

#### 3.1. Risky personality

Relative deprivation was associated with greater impulsivity and lower self-control, but not with overall sensation-seeking. However, a closer exploratory examination revealed significant associations between relative deprivation and the disinhibition ( $r = .16, p = .004$ ) and boredom susceptibility ( $r = .11, p = .05$ ) subscales, but not the thrill and adventure seeking or experience seeking subscales (both  $r_s < .01, p_s < .91$ ).

#### 3.2. Risk attitudes

Relative deprivation was associated with risk-prone attitudes in the ethical, gambling, and health/safety domains, and risk-averse attitudes in the investment domain. No significant associations were observed between relative deprivation and social or recreational risk attitudes.

#### 3.3. Behavioral outcomes

##### 3.3.1. Gambling

Relative deprivation was associated with both greater general gambling involvement and greater problem and pathological gambling tendencies.

##### 3.3.2. Future discounting

The three future discounting parameters were highly correlated (both  $\rho_s > .81, p_s < .001$ ), and so all values were z-scored and summed to create a composite measure. Relative deprivation was associated with the composite future discounting measure, as well as all three subsets of future discounting measures (i.e., small, medium, and large; all  $\rho_s > .22, p_s < .001$ ).

##### 3.3.3. Behavioral risk-taking

Relative deprivation was not associated with behavioral risk-taking as measured using the BART or the Choice Task.

##### 3.3.4. Antisocial conduct

Relative deprivation was associated with both antisocial behavior reported in the last year and over the lifetime.

##### 3.3.5. Criminal outcomes

Participants who indicated that they had been arrested ( $n = 95$ ), charged ( $n = 89$ ), convicted ( $n = 85$ ), or incarcerated ( $n = 57$ ) for a crime all reported higher levels of relative deprivation than participants who had never been arrested, charged, convicted, or incarcerated (all  $t_s > 3.67, p_s < .001$ ; Fig. 1).

### 4. Discussion

Relative deprivation was associated with higher levels of personality traits associated with risk (impulsivity, low self-control, and facets of

<sup>1</sup> The relatively large number of missing values for future discounting scores is due to the fact that some participants showed nonsensical switch points from later to immediate rewards, and so parsimonious  $k$  parameters could not be computed.

**Table 1**  
Correlations between relative deprivation and measures of risk.

Risk measure	PRDS
Risky personality	
Impulsivity	.30***
Self-control	−.30***
Sensation-seeking	.08
Risk attitudes	
Ethical	.21***
Investment	−.17***
Gambling	.19***
Health/safety	.20***
Social	−.04
Recreational	−.10
Gambling	
General gambling	.14**
Problem gambling	.25***
Behavioral measures	
Antisocial behavior (last year)	.16**
Antisocial behavior (lifetime)	.19***
Future discounting	.25***
Choice Task	.09*
Balloon Analogue Risk Task	−.04

Note: PRDS = Personal Relative Deprivation Scale.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

sensation-seeking), greater risk-related attitudes (in ethical, gambling, and health/safety domains), and behavioral outcomes associated with risk (gambling and problem gambling, future discounting, antisocial conduct, and criminal outcomes). Relative deprivation was not associated with two facets of sensation-seeking, risk-related attitudes in the social or recreational domains, or behavioral risk-taking as measured using the Balloon Analogue Risk Task or the Choice Task.

#### 4.1. Personality

Relative deprivation was fairly strongly associated with higher levels of impulsivity and lower levels of self-control, but was inconsistently associated with sensation-seeking. Unlike impulsivity and low self-control, which have both been dependably associated with risk-taking, associations between sensation-seeking and various measures of risk have been more inconsistent. Studies of gambling, for example, have found positive, negative, and null associations with sensation-seeking (reviewed in Fortune & Goodie, 2010). These inconsistencies may be due to the common practice of using the overall sensation-seeking score from the Zuckerman (1994) instrument, rather than conducting analyses using the subscales. For example, problem gamblers tend

to consistently score more highly on the disinhibition and boredom susceptibility subscales (Fortune & Goodie, 2010); these two subscales were also significantly associated with relative deprivation in this study. Further clarifying research examining sensation-seeking in the context of relative deprivation and risk-taking more generally is necessary.

#### 4.2. Risk attitudes

Relative deprivation was associated with risk attitudes in the ethical, gambling, and health/safety domains. These findings are consistent with literature linking inequality and relative deprivation to antisocial behavior (which clearly embodies unethical risk-taking), gambling, and poorer health (Callan et al., 2011; Mishra & Carleton, in press; Wilkinson & Pickett, 2009). These associations are also consistent with previous research demonstrating that being an inmate is a significant predictor of greater acceptance of ethical and health/safety risks, but not risks in other domains (Hanoch & Gummerum, 2010).

Relative deprivation was not, however, associated with risk-taking in the social or recreational domains, and was negatively associated with financial risk-taking. These three domains of risk-taking (as assessed in the DOSPERT) are all non-antisocial. Mishra, Barclay, and Sparks (under review) review evidence suggesting that non-antisocial forms of risk-taking (e.g., extreme sports participation) tend to be engaged in by those possessing greater training, dedication, ability, and high embodied capital (i.e., positive intrinsic qualities such as health, intelligence, or attractiveness; Lalumière, Harris, Quinsey, & Rice, 2005). Furthermore, Mishra et al. (under review) suggest that non-antisocial forms of risk-taking function to signal one's own abilities or qualities to others—that is, non-antisocial risk-taking serves to signal competitive *advantage* as opposed to *disadvantage*. For investment risk attitudes in particular, it is unlikely that those who feel most relatively deprived have the financial resources to engage in stock market speculation, for example. Consequently, it is not necessarily surprising that consistent relationships between relative deprivation and non-antisocial risk attitudes were not observed.

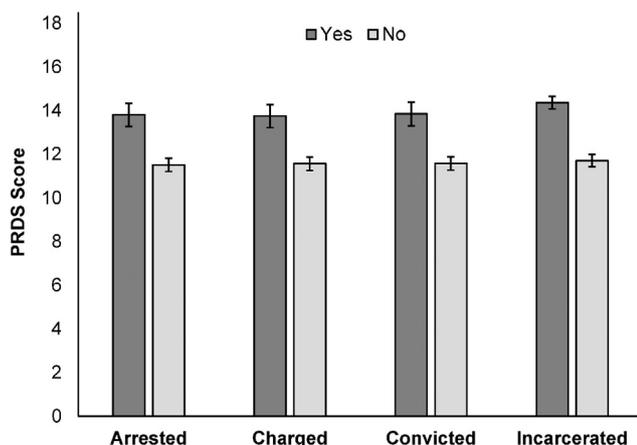
#### 4.3. Behavioral outcomes

Our results replicate previous research linking relative deprivation to gambling, problem gambling, and future discounting (Callan et al., 2008, 2011, 2015; Tabri et al., 2015). Furthermore, we demonstrated that retrospective antisocial behavior and criminal outcomes were consistently associated with greater feelings of relative deprivation. However, we did not observe significant associations between relative deprivation and behavioral risk-taking in the Balloon Analogue Risk Task (BART) or the Choice Task (CT).

People taken out of their everyday social environments to complete behavioral measures in a laboratory setting may no longer have familiar (and meaningful) contextual cues to guide behavior. Almost all other measures in this study (save for future discounting) were retrospective reflections of one's past experiences. The BART and the CT may be better considered “state” instead of “trait” measures (a position supported by research demonstrating that experimental manipulations can affect levels of risk-taking on these measures; e.g., Fessler et al., 2004; Mishra et al., 2014, 2015). Another possibility is that the BART and the CT may not represent ideal instruments to measure behavioral risk preference (Charness, Gneezy, & Imas, 2013). Further research is necessary to understand the relationship between relative deprivation and different types of behavioral risk-taking.

#### 4.4. Limitations

Our results cannot determine whether feelings of relative deprivation precede or succeed risk-related outcomes. Risk-sensitivity theory suggests that inequality and relative deprivation should precede greater engagement in risk-taking, and some experimental evidence supports



**Fig. 1.** Reported relative deprivation based on whether participants were ever arrested, charged, convicted, or incarcerated for a crime;  $M$  ( $SE$ ).

this claim (e.g., Mishra et al., 2014, 2015). It is similarly unclear whether individual differences in personality associated with risk precede or succeed feelings of relative deprivation. Personality traits are a complex product of genetics, developmental environments, and social experiences (Caspi, Roberts, & Shiner, 2005). It is likely that experiences of relative deprivation facilitate personality change to some degree, and individual differences in personality affect people's experiences of relative deprivation. Potential epigenetic effects reflecting the interaction of genes, psychological experiences, and physical and social environments further complicate any causal inferences that might be made. Additional research is required to examine both potential causal directions of the deprivation-risk relationship. In particular, structural equation modeling of various antecedents of relative deprivation (e.g., developmental environment, socioeconomic status, inequality, social and embodied capital) would be illuminating.

The source and content of social comparisons leading to relative deprivation is unclear. Social comparisons can take the form of either intragroup comparison or ingroup/outgroup comparison (Smith et al., 2012), and these comparisons may occur in multiple domains. People are likely sensitive to inequalities in multiple facets of socioeconomic status, as well as multiple facets of embodied capital (e.g., are you more attractive or more intelligent than others?).

The current study focused on the relationship between relative deprivation and risk conceived broadly. However, some of the results of this study are consistent with mounting evidence that people tend to engage in domain-specific patterns of risk-taking (e.g., Gomà-i-Freixanet, 1995; Mishra et al., under review). Although this study examined some aspects of domain-specific risk-taking, future studies would benefit from a stronger focus on the influence of relative deprivation on different domains of risk-taking (e.g., non-antisocial vs. prosocial risk).

#### 4.5. Implications

A large body of evidence indicates that inequality and risk-taking are linked at the societal level. The results of this study suggest that this association may be in part due to the link between relative deprivation (a downstream psychological consequence of inequality), risk-propensity, and risk-taking behavior at the individual level. Our results in particular highlight the importance of the *subjective* experience of relative deprivation. Targeting sources of subjective relative deprivation—especially such root sources as economic or social inequality—may have the key downstream consequence of reducing harmful risk-taking behaviors in multiple domains.

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