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## Abstract

Although risk-taking has been found to be associated with economic deprivation, there is little evidence on whether the relation between individual deprivation and propensity for risk-taking is inherent to all individuals, or varies across cultural contexts. Consequently, the present study investigated the interaction effects of macroeconomic factors [Gross Domestic Product (GDP) per capita and Human Development Index (HDI)] in the relationship between individual deprivation and propensity for risk-taking using the World Values Survey data from 58 countries (N = 87,223). On average, individuals in more developed countries (higher HDI) had less propensity for risk-taking. In contradiction to this, the positive association between individual deprivation and risk-taking was stronger in countries with higher GDP per capita. The present study suggests that the association between individual deprivation and propensity for risk-taking varies with environmental variables assessing the socio-economic development of a country.

**Keywords:** risk-taking, individual deprivation, macroeconomics factors, cross-cultural differences, risk sensitivity theory

## Introduction

Attitudes toward risk are relevant for almost all important group or individual decisions. Furthermore, there is a great interest among social science researchers concerning unhealthy and/or problematic behaviors, investment behavior, job choices, education decisions, and social interactions associated with risk-taking (Figner & Weber, 2011; Vieider et al., 2015). Despite their importance, little is known about whether risk preferences are associated with country characteristics, such as the level of economic development (Falk et al., 2015). In addition, although risk-taking has been found to be associated with personal characteristics (i.e., gender, age and individual income), there is little evidence on whether such relationships are universal or context-specific (Falk et al., 2015; Mata et al., 2016). The present study aimed to investigate the propensity for risk-taking on a global basis considering both the country and individual levels.

## The context of risk-taking

The most recent global economic crisis started in 2008 and exacerbated changes in living and working conditions, decreased national wealth and public social spending (De Vogli, Vieno, & Lenzi, 2014; Karanikolos et al., 2013). The number of individuals globally living in extreme poverty remains high. According to the most recent 2015 estimates (World Bank, 2015), 9.6% of the world's population lived at or below US $1.90 a day (cost of living). Individuals who live in areas of high deprivation are less likely to live in decent housing and spaces that are sociable and congenial, and that are safe from crime and disorder (European Public Health Alliance, 2010). Studies have recently begun to examine the impact of the local condition of hardship on propensity for risk-taking. According to the relative state model (Mishra et al., 2017), individuals make risk-relevant decisions sensitive to their relative state. This relative state can be defined as a computation of competitive advantage or disadvantage derived from the interaction of embodied and situational/environmental factors. The relative state is determined through some comparison of present and desired states (either determined internally or externally). Individuals who experience

disparities between one's present and desired outcomes are hypothesized as preferring relatively higher risk options. In contrast, individuals who experience less disparity between one's present and desired outcomes are hypothesized as preferring relatively lower risk options. In other words, in a condition of difficulty to satisfy a perceived need (i.e., money), greater risk-taking is seen as a way to satisfy that need (Mishra & Fiddick, 2012; Weber, Shafir, & Blais, 2004). For example, gambling may help individuals meet their needs and wants and/or offset feelings of deprivation through the possibility of financial windfall, but is by definition very risky (Canale, Griffiths, & Santinello, 2015). Such conditions of need could be caused by situational or environmental factors and are principally relevant in competition for significant proxies of fitness, such as material resources and social status. In support of the relative state model (Mishra et al., 2017), associations between relative deprivation, competitive disadvantage, and various forms of risk-taking (e.g., drug and substance abuse, gambling, antisocial conduct, and criminal outcomes) have been demonstrated at both societal (Room, 2005; Wilkinson & Pickett, 2009) and individual levels (Chan, 2015; Mishra & Novakowski, 2016). However, little is known about the extent to which the propensity to take risks is associated with the interaction between individual deprivation and country wealth.

Neither country-level characteristics nor individual-level characteristics can solely explain individually propensity for risk behavior. For example, Bouchouicha and Vieider (2017) found that observable characteristics (e.g., GDP per capita) sustainability accounted for 10% of the variance in risk-tolerance across the globe, while individual characteristics accounted for 90% of the overall variance in their risk-tolerance data. In addition, there are theoretical reasons to hypothesize a joint effect of individual characteristics (e.g., individual deprivation) and country-level socioeconomic factors. More specifically, based on Wilkinson and Pickett's (2009) research on inequality, it is possible that the contrast between individual deprivation and national wealth exacerbates the mechanisms also responsible for the association between inequality and risk behaviors (i.e., relative deprivation and status competition; Barefoot et al., 1998; Gurr, 1970). According to Wilkinson and

Pickett (2009), in societies where the social hierarchy is highly pronounced, social status tends to be very salient (Marmot, 2004). Since the majority of the members of such societies have a disadvantageous comparison available, many individuals living in unequal societies might be motivated to compete to gain a better status. This competition is associated with chronic stress and physiological activation negatively impacting physical and mental health and encouraging risk behaviors such as substance use (Marmot & Wilkinson 2006). Similarly, social status can become very salient when an individual feels economically deprived and lives in a wealthy country. Living in a wealthy country and perceiving that higher statuses are not accessible might provide a motivation to find alternative pathways to gain a higher status (for instance, by displaying risky behaviors or fatalistic beliefs). On the contrary, it is possible that the status competition will not be so pronounced in countries with an efficient education system and a consequently higher social mobility. Indeed, it is possible that individuals who feel economically deprived, instead of searching for alternative pathways to gain a better status, will try to use the social and educational resources of the country in order to improve their socioeconomic status. In light of such findings and theoretical considerations, the main purpose of the present study was to investigate whether the association between individual deprivation and propensity for risk-taking is moderated by socio-economic factors at the country level.

The socioeconomic development of a country can be measured by using macroeconomic indexes, such as GDP per capita and HDI (Islam, 1995). GDP per capita is a measure of development exclusively based on material wealth (affluence) and it was the most commonly used indicator to compare wealth among countries (Anand & Ravallion, 1993). There is evidence showing a significant relationship of economic development and propensity for risk-taking (e.g., Mata et al., 2017; Bouchouicha & Vieider, 2017), such that countries in which individuals are more exposed to hardship (i.e., low GDP) are likely to report higher rates of propensity for risk-taking. In addition, Bouchouicha and Vieider (2017) found a negative correlation between risk-tolerance and

GDP per capita in their cross-sectional analysis of 78 nations. Beyond material wealth measured by GDP, the HDI includes basic social indicators such as life expectancy and education. Life expectancy can be viewed as a temporal reference point that guides risk preference and risk perception (Wanga, Krugerb, and Wilkec, 2009). For example, higher life expectancy across 77 neighborhoods in Chicago was negatively correlated with criminal violence (Daly & Wilson, 1997) that can be considered an outcome of escalation of risk in social competition (Daly & Wilson, 1997). With regard to education, it has been found that risk aversion increases with education (Jung, 2015), without any significant difference between women and men (e.g., Jianakoplos and Bernasek, 1998). Such findings suggest that it is important to understand how country-level characteristics interact with individual-level characteristics to shape the level of risk tolerance felt by individuals. More specifically, based on Wilkinson and Pickett's (2009) theoretical framework, it is possible that the association between individual deprivation and risk-taking will be stronger in wealthier countries (because of the contrast between individual deprivation and country wealth) and weaker in countries with high HDI scores, where economically deprived individuals have the opportunity to take advantage of the educational resources of the country in order to improve their socioeconomic status.

**The present study**

Propensity for risk-taking, like all aspects of personality development, occurs in a broader cultural context (Bleidorn et al., 2013). Individuals growing up in different cultures are exposed to different norms and have different opportunities to engage in risky activity. Therefore, an important question is whether the relationship between individual deprivation and propensity for risk-taking is inherent to all individuals, or varies across cultural contexts. On the one hand, it might be that the effects of deprivation upon propensity for risk-taking are universal features. On the other hand, it could be argued that factors such as the socioeconomic development of a country (e.g., GDP per capita and HDI) might moderate how individual deprivation influences propensity for risk-taking.

As the aforementioned literature demonstrates, no study has ever investigated the relationship between individual deprivation and propensity for risk-taking when environmental factors are taken into account. Therefore, the present study addresses this gap by investigating whether the association between individual deprivation and propensity for risk-taking varies with environmental variables assessing socioeconomic development of a country. The study hypotheses are as follows:

**H1.** In accordance with the relative state model (Mishra et al., 2017), individuals with higher scores of individual deprivation will be more likely to report higher propensity for risk-taking than those with lower scores.

**H2.** In accordance with recent studies on the impact of the local condition of hardship on propensity for risk-taking (e.g., Mata et al., 2017; Bouchouicha & Vieider, 2017), aggregate propensity for risk-taking will correlate negatively with macroeconomic indexes, such as GDP per capita and HDI.

In accordance with Wilkinson and Pickett's (2009) theoretical framework based on status competition, and in line with the research showing that someone is poor in a poor country is very different from someone being poor in a wealthy country (Easterlin, 2001; Smith, 2003), it was also hypothesized that:

**H3.** the association between individual deprivation and propensity for risk-taking will vary with GDP per capita and the HDI[1], and that the variations will be stronger among individuals who live in wealthy countries (high GDP per capita or HDI levels) than individuals who live in poor countries (low GDP per capita or HDI levels). More specifically, it was expected that in wealthier countries, the association between deprivation and risk propensity will be stronger (with the negative effects of individual deprivation on risk-taking being amplified by the wealth of the country) because in wealthier countries individuals in a situation of economic disadvantage might be more strongly motivated to reach a higher status and thus be more willing to adopt risky behaviors (Hill & Buss, 2010), while in countries with a strong educational system, a weaker association is expected (with

the negative effects of individual deprivation on risk-taking being mitigated by educational opportunities at the country level).

## Method

### Participants and procedure

The present study used data from the sixth wave (2010-2013) of the World Values Survey (WVS; World Values Survey Association, 2014) that included the possibility to analyze data following the global economic crisis that started in 2008. Of the 90,350 individuals participating in the survey, a total of 87,223 participants (52% female) aged between 16 and 99 years (M= 42.05 years; SD= 16.48) with valid answers on the risk item and all covariates of interest in 58 countries was included in the subsequent analyses. The remaining 3127 participants (3.5% of the total of 90,350 participants) were excluded for their missing response on the variables of interest (58% female, aged between 16 and 95 years, M=49.11 years, SD=17.97). The WVS is designed to provide representative samples that are reached by stratifying a country geographically and by size of community, and then randomly sampling locations within those communities. All the country data sets contained sampling weights to correct for sampling imbalances.

### Measures

#### *Propensity for risk-taking*

Propensity for risk-taking was assessed using the answer on a 6-point scale to the statement "Adventure and taking risks are important to me; to have an exciting life" (1 = very much like me, 6 = not at all like me) (Mata et al., 2016). Item responses were reverse-coded so that high ratings indicated stronger propensity for risk-taking. This item was also used by Bouchouicha and Vieider as a measure of risk-tolerance in their working paper (Bouchouicha & Vieider, 2017). They argued that although the question comprises a specific mention to 'taking risks', which has an element of similarity to the question about one's general willingness to take risks, it also has a mention to

'adventure', which is not generally part of any of the previously validated questions. For this reason, they validated this question by correlating it with financial risk preferences as measured through the certainty equivalent of an incentivized task (administered to a sample representative of the population of one district in India). They also performed a validation of the single item at the macroeconomic level by correlating it with the aggregate country level data from Vieider and colleagues (2015; working paper) [r = 0.50, $p$ = 0.014 with general willingness to take risk; and r = 0.60, $p$ = 0.002 with willingness to take financial risks]. Additionally, the single item of the WVS stems from Schwartz's (2012) Value Survey, and reflects individuals' need for variety and stimulation to maintain an optimal level of activation, and is also associated with feelings of variety seeking, excitement, and daringness. Previous studies have found that stimulation is one of the most important correlates of high alcohol consumption in college students (Dollinger & Kobayashi, 2003). Additionally, individuals higher in stimulation were also significantly more likely to report a history of sexually transmitted diseases (Goodwin et al., 2002). This item is also closely related to the construct (and scales) of sensation-seeking, characterized as "a trait defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience" (Zuckerman, 2007; p. 27).

***Individual deprivation***

Klasen (2000) stated that the components of measurement of deprivation include levels of life satisfaction, access to education, income levels and employment, housing type, access to water, sanitation and electricity, transport mobility, nutrition, access to health care and safety (perception of safety inside and outside the house). In the present study, the following scale of four WVS questions was used to approximate individual deprivation: "In the last 12 months, how often have you or your family: (i) gone without enough food to eat; (ii) felt unsafe from crime in your home; (iii) gone without medicine or medical treatment that you needed; and (iv) gone without a cash

income" (1 = often, 4 = never). Item responses were reverse-coded so that high ratings indicated stronger individual deprivation. This battery of questions is similar to many of the scales assessing deprivation (e.g., Klasen, 2000) and poverty (e.g., Meyer & Keyser, 2016). For instance, Meyer and Keyser's scale (2016; p.6) asks for agreement with the following statements: "Over the last year, how often, if ever, have you or your family gone without—enough food to eat, enough clean water, medicines or medical treatment, electricity in the house, enough fuel to cook, and enough cash income". The internal consistency of the scale used in the present study was good [$\alpha$ = .80 (CI = .80–.81)]. Finally, a confirmatory factor analysis (CFA) for a one-dimensional model (all four items loading on a single factor) using the Lavaan package (Rosseel, 2012) of R software (R Development Core Team, 2012) was implemented. Weighted least estimation with robust standard errors and mean and variance estimator for ordinal items was adopted. The results of the CFA demonstrated a good model fit [$\chi^2$ = 610.50, df= 2; CFI= .99, NNFI= .99, RMSEA = .06(.05–.06)]. Standardized loadings ranged between 0.66 and 0.87.

***Demographic variables***

Age, gender, education, marital status, parental status, and current occupational status from the World Value Survey were introduced as control variables. The participant's age was used as a continuous variable, while the others were binary or dichotomized predictors to simplify coefficient estimation and interpretation (Mata et al., 2016): gender (0 = female, 1 = male), marital status (0 = not married, 1 = married), parental status (0 = no children, 1 = one or more children), education (0 = no or incomplete primary education, 1 = primary education or higher), occupational status (0 = not currently employed, 1 = currently employed). Relative household income was coded on a 10-point scale (1= the participant was in the lowest 10% of income earners in their country of residence; 10 = the participant was in the top 10%) corresponding to income deciles for the country of residence. Z-scores of this variable were first computed and then used as independent variable in the within-country model.

### *Country level variables*

GDP per capita and HDI were used as country-level variables to capture societal economic and social adversity. GDP per capita was taken from the U.S. Central Intelligence Agency Fact Book (2015) while HDI was obtained from the Human Development Reports (United Nations Development Programme, 2014). GDP per capita was measured at purchasing power parity (data are in 2015 US dollars). The HDI is a composite index of achievements in key dimensions of human development including a decent standard of living, access to knowledge, and a long and healthy life. The HDI is the geometric mean of normalized indices for each of the three components: gross national income (GNI) per capita, average years of educational attainment, and life expectancy.

## Data analysis

Data were analyzed using two separate two-level hierarchical regression models using Hierarchical Linear Modeling software version 7 (Raudenbush et al., 2011), with participants at the first level and countries at the second level. After running a preliminary unconditional model (to test for variance between countries in the dependent variable), the association between individual-level variables and propensity for risk-taking was examined (Model 1); moreover, the variability of this effect across countries was estimated. In Model 2, per capita GDP and HDI (at the country level) and income (at the individual level, group-centered or relative to the country mean) were entered to explain the variability of the effect that individual deprivation values exerted on individuals' risk-taking. Model 1 was defined as:

$$[PROPENSITY\ FOR\ RISK\text{-}TAKING_{ij} = \beta_{0j} + \beta_{1j}*(GENDER_{ij}) + \beta_{2j}*(AGE_{ij}) + \beta_{3j}*(MARITAL\ STATUS_{ij}) + \beta_{4j}*(EDUCATION_{ij}) + \beta_{5j}*(OCCUPATIONAL\ STATUS_{ij}) + \beta_{6j}*(Z\text{-}INCOME_{ij}) + \beta_{7j}*(PARENTAL\ STATUS_{ij}) + \beta_{8j}*(INDIVIDUAL\ DEPRIVATION_{ij}) + r_{ij}]$$

Here, $\beta_s$ is the impact of the individual level variables used; the subscript $j$ is the countries of the participants ($j$=1, …, J), the subscript $i$ is for the individual participants ($i$=1,…, $N_j$), and the $r_{ij}$ is the random effect.

At Level 2, the variability of the associations between individual deprivation and propensity for risk-taking was modeled as a function of per capita GDP and HDI after introducing the principal effects of those variables (expressed at the country level as the effects exerted by those variables on the variability of the intercepts: effects on β0j). Model 2 was defined as:

$$[\beta_{0j} = \gamma_{00} + \gamma_{01}*(GDP\ PER\ CAPITA_j) + \gamma_{02}*(HDI_j) + u_{0j};$$

$$\beta_{8j} = \gamma_{80} + \gamma_{81}*(GDP\ PER\ CAPITA_j) + \gamma_{82}*(HDI_j) + u_{8j}]$$

Here, $u_s$ represent the random coefficients. Income and individual deprivation were centered at the country level while all of the error terms of the other parameters at the individual level in the model were fixed (i.e., gender, age, marital status, parental status, education and occupational status).

**Results**

Table 1 reports the descriptive statistics for the individual and country variables. With regard to individual deprivation, there was considerable variation across the countries, with the highest mean score in Rwanda (M=11.06; SD= 2.33) and the lowest in Qatar (M= 4.31; 1.05). Based on the mean scores for individual deprivation, countries under investigation were grouped into quartiles (see Figure 1). The average score of propensity for risk-taking was 3.28 (SD= 0.50) on the 1-6 scale. The lowest score of propensity for risk-taking was in Japan (M=2.17; SD=1.02), whereas Nigeria showed the highest score of risk-taking (M=4.52; SD=1.30) (see Table 1).

**Table 1.** Descriptive Statistics for the individual and country variables

| Country | ISO Country Code | *n* | Level 1 – Individual (N = 88320) | | | | | | | | | Level 2- Country (N = 58) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Male (%) | Married (%) | Education (%) | Employed (%) | Parent (%) | Age M(SD) | Income[#] M(SD) | Deprivation M(SD) | PRT* M(SD) | GDP° | HDI |
| Algeria | DA | 1200 | 50.7 | 46.8 | 68.9 | 40.3 | 51.7 | 37.80(15.10) | -.09 (.96) | 6.29(2.68) | 3.56(1.88) | 14.50 | .74 |
| Azerbaijan | AZ | 1002 | 50.0 | 66.9 | 99.1 | 58.6 | 27.2 | 41.13(15.23) | .21(.66) | 7.74(2.67) | 3.07(1.64) | 18.00 | .75 |
| Australia | AU | 1477 | 44.2 | 69.7 | 96.6 | 59.7 | 23.9 | 53.86(16.77) | .01(1.00) | 5.13(1.82) | 2.85(1.39) | 65.40 | .93 |
| Bahrain | BH | 1200 | 55.0 | 53.6 | 85.5 | 62.9 | 26.6 | 39.30(13.97) | .55(1.00) | 7.90(3.17) | 4.07(1.44) | 50.10 | .82 |
| Armenia | AM | 1100 | 33.9 | 65.9 | 98.3 | 36.2 | 18.5 | 46.59(17.97) | -.40(.88) | 7.15(3.01) | 3.04(1.60) | 8.50 | .73 |
| Brazil | BR | 1486 | 37.6 | 59.9 | 67.5 | 50.1 | 23.4 | 42.82(16.37) | -.22(.99) | 6.60(2.59) | 2.72(1.50) | 15.60 | .75 |
| Belarus | BY | 1535 | 44.7 | 57.0 | 99.5 | 65.8 | 27.0 | 44.42(17.07) | -.06(.81) | 6.52(2.26) | 2.95(1.50) | 17.70 | .80 |
| Chile | CL | 1000 | 49.3 | 60.4 | 91.6 | 60.1 | 22.0 | 43.89(16.29) | -.03(.82) | 7.11(2.70) | 3.40(1.61) | 23.50 | .83 |
| China | CN | 2300 | 49.0 | 82.6 | 92.4 | 72.1 | 15.6 | 43.92(14.95) | -.22(.88) | 5.37(2.03) | 2.84(1.34) | 14.10 | .73 |
| Taiwan | TW | 1238 | 47.9 | 60.8 | 93.5 | 60.9 | 33.3 | 45.48(17.29) | -.07(.80) | 5.76(2.10) | 2.53(1.21) | 46.80 | .94 |
| Colombia | CO | 1512 | 49.6 | 58.5 | 84.6 | 53.4 | 27.4 | 40.41(15.79) | .08(1.00) | 7.52(2.87) | 3.14(1.77) | 13.80 | .72 |
| Cyprus | CY | 1000 | 46.5 | 59.1 | 94.9 | 56.0 | 40.6 | 42.16(17.53) | .15(.88) | 5.71(2.41) | 3.47(1.65) | 32.80 | .85 |
| Ecuador | EC | 1202 | 48.4 | 59.4 | 94.5 | 61.2 | 23.7 | 39.81(16.14) | .06(.89) | 6.74(2.37) | 3.85(1.54) | 11.30 | .73 |
| Estonia | EE | 1533 | 44.6 | 58.9 | 99.8 | 57.2 | 25.1 | 48.57(18.51) | -.25(.86) | 6.37(2.39) | 2.84(1.38) | 28.60 | .76 |
| Georgia | GE | 1202 | 46.0 | 64.6 | 99.5 | 38.0 | 25.0 | 44.66(17.58) | -.57(.85) | 7.73(3.06) | 3.26(1.66) | 9.60 | .75 |
| Palestine | PS | 1000 | 48.8 | 67.6 | 88.7 | 38.8 | 31.0 | 36.68(14.13) | -.06(.95) | 7.00(2.92) | 3.39(1.56) | 5.10 | .67 |
| Germany | DE | 2046 | 49.6 | 60.7 | 91.6 | 54.7 | 28.9 | 49.48(17.71) | -.03(.85) | 4.56(1.28) | 2.61(1.44) | 46.90 | .92 |
| Ghana | GH | 1552 | 50.3 | 44.8 | 80.3 | 60.2 | 48.4 | 30.92(12.70) | -.01(.98) | 6.89(2.65) | 4.29(1.40) | 4.30 | .56 |
| India | IN | 5659 | 57.9 | 85.1 | 67.0 | 42.2 | 14.0 | 40.85(14.44) | -.17(1.08) | 7.63(3.38) | 3.70(1.76) | 6.20 | .61 |
| Iraq | IQ | 1200 | 52.4 | 69.1 | 80.0 | 39.4 | 29.3 | 36.61(13.40) | .22(.88) | 6.68(2.58) | 3.21(1.64) | 15.50 | .65 |
| Japan | JP | 2443 | 48.2 | 70.0 | 100.0 | 63.2 | 25.6 | 50.74(16.30) | -.42(1.31) | 5.72(2.04) | 2.17(1.02) | 38.10 | .89 |
| Kazakhstan | KZ | 1500 | 39.6 | 62.8 | 99.4 | 63.9 | 24.9 | 40.02(15.35) | .20(.93) | 6.41(2.23) | 2.85(1.42) | 24.30 | .79 |
| Jordan | JO | 1200 | 50.0 | 71.6 | 82.1 | 31.2 | 27.6 | 39.78(15.46) | .06(.98) | 6.17(2.98) | 3.50(1.75) | 12.10 | .75 |
| South Korea | KR | 1200 | 49.3 | 63.9 | 98.3 | 59.2 | 31.7 | 43.17(14.94) | .06(.86) | 5.10(1.86) | 3.66(1.37) | 13.20 | .90 |
| Kuwait | KW | 1303 | 63.7 | 62.6 | 95.6 | 75.2 | 31.4 | 36.49(11.71) | .50(.97) | 5.16(2.10) | 3.73(1.79) | 70.20 | .82 |
| Kyrgyzstan | KG | 1500 | 49.1 | 76.2 | 96.8 | 54.6 | 22.0 | 38.75(14.38) | .33(.97) | 6.86(2.46) | 3.57(1.50) | 3.40 | .65 |
| Lebanon | LB | 1200 | 49.0 | 49.3 | 91.6 | 54.3 | 48.2 | 38.37(14.85) | .45(.93) | 6.62(3.04) | 3.87(1.59) | 18.20 | .77 |
| Libya | LY | 2131 | 51.1 | 60.8 | 83.6 | 52.3 | 39.1 | 38.42(13.50) | .24(1.04) | 6.64(2.93) | 3.43(1.76) | 14.60 | .72 |
| Malaysia | MY | 1300 | 51.4 | 68.9 | 92.0 | 75.8 | 32.2 | 40.01(13.96) | .53(.87) | 4.93(1.74) | 3.03(1.64) | 26.30 | .80 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mexico | MX | 2000 | 50.0 | 63.7 | 85.2 | 49.9 | 24.5 | 37.48(15.18) | -.74(1.16) | 7.80(2.95) | 3.03(1.77) | 17.50 | .76 |
| Morocco | MA | 1200 | 49.7 | 54.1 | 31.0 | 83.2 | 41.1 | 37.26(13.57) | -.47(.87) | 7.88(2.93) | 3.25(1.48) | 8.20 | .63 |
| Netherlands | NL | 1902 | 46.5 | 65.5 | 96.9 | 49.0 | 28.5 | 53.34(16.44) | -.15(1.08) | 4.52(1.27) | 2.50(1.20) | 49.20 | .92 |
| New Zealand | NZ | 841 | 42.3 | 72.7 | 98.4 | 64.8 | 23.0 | 51.44(16.90) | .40(1.33) | 5.61(2.33) | 3.07(1.39) | 36.20 | .91 |
| Nigeria | NG | 1759 | 50.5 | 51.2 | 87.5 | 58.3 | 52.9 | 31.22(11.69) | .14(1.01) | 8.96(2.80) | 4.52(1.30) | 6.10 | .51 |
| Pakistan | PK | 1200 | 51.8 | 73.0 | 74.4 | 36.2 | 29.3 | 34.34(11.86) | .30(1.01) | 8.56(2.82) | 4.06(1.48) | 5.00 | .54 |
| Peru | PE | 1210 | 50.2 | 56.9 | 90.7 | 62.1 | 30.8 | 39.42(16.40) | -.09(.87) | 8.70(3.06) | 2.96(1.54) | 12.20 | .73 |
| Philippines | PH | 1200 | 50.0 | 77.1 | 86.7 | 58.3 | 17.3 | 42.71(15.56) | -.32(1.17) | 8.19(2.98) | 4.00(1.52) | 7.30 | .67 |
| Poland | PL | 966 | 45.7 | 62.5 | 98.8 | 50.6 | 26.6 | 48.05(17.77) | -.20(.91) | 5.38(2.01) | 3.54(1.34) | 26.50 | .84 |
| Qatar | QA | 1060 | 46.0 | 69.0 | 89.8 | 57.1 | 29.7 | 37.80(12.90) | .78(.91) | 4.31(1.05) | 3.36(1.76) | 132.10 | .85 |
| Romania | RO | 1503 | 42.8 | 67.4 | 96.3 | 40.4 | 23.4 | 48.39(17.18) | -.04(1.02) | 7.38(3.04) | 2.75(1.54) | 20.80 | .79 |
| Russia | RU | 2500 | 44.6 | 55.4 | 99.6 | 60.7 | 24.5 | 46.06(17.42) | -.32(.84) | 6.91(2.63) | 3.90(.95) | 25.40 | .80 |
| Rwanda | RW | 1527 | 49.6 | 63.9 | 77.2 | 66.3 | 29.9 | 33.77(11.23) | .23(.87) | 11.06(2.33) | 3.71(1.48) | 1.80 | .48 |
| Singapore | SG | 1972 | 45.1 | 61.2 | 89.6 | 59.0 | 39.5 | 41.88(16.61) | .39(.72) | 5.20(2.22) | 3.65(1.30) | 85.30 | .91 |
| Slovenia | SI | 1069 | 42.2 | 65.9 | 96.0 | 48.3 | 25.5 | 49.50(17.67) | .02(.84) | 4.53(1.18) | 2.89(1.48) | 31.00 | .88 |
| South Africa | ZA | 3531 | 50.0 | 44.8 | 95.0 | 41.5 | 34.9 | 36.67(14.14) | .20(1.06) | 8.27(3.53) | 4.28(1.27) | 13.20 | .66 |
| Zimbabwe | ZW | 1500 | 46.0 | 55.0 | 94.2 | 47.8 | 31.8 | 33.77(13.51) | -.01(.91) | 8.72(2.95) | 3.52(1.68) | 2.10 | .51 |
| Spain | ES | 1189 | 48.8 | 60.2 | 93.2 | 43.2 | 33.9 | 46.54(18.17) | -.19(.77) | 5.12(1.91) | 3.28(1.37) | 34.80 | .88 |
| Sweden | SE | 1206 | 47.2 | 59.4 | 98.6 | 60.0 | 36.3 | 47.35(19.41) | .26(.87) | 4.70(1.48) | 3.10(1.48) | 47.90 | .91 |
| Thailand | TH | 1200 | 52.3 | 74.7 | 94.8 | 87.2 | 24.7 | 45.16(12.25) | -.12(1.15) | 6.34(2.65) | 3.29(1.52) | 16.10 | .73 |
| Trinidad | TT | 999 | 45.1 | 47.1 | 92.6 | 55.5 | 24.0 | 45.87(17.79) | .06(.96) | 6.17(2.48) | 3.42(1.61) | 32.60 | .77 |
| Tunisia | TN | 1205 | 52.6 | 50.6 | 59.1 | 39.9 | 49.3 | 38.82(16.21) | -.09(.98) | 5.45(2.58) | 3.21(1.85) | 11.40 | .72 |
| Turkey | TR | 1605 | 48.6 | 65.7 | 90.4 | 41.4 | 36.8 | 38.45(14.54) | .38(.91) | 6.35(2.61) | 3.61(1.54) | 20.40 | .76 |
| Ukraine | UA | 1500 | 40.0 | 56.7 | 95.5 | 51.1 | 22.9 | 47.23(18.25) | -.26(.89) | 7.67(2.90) | 2.76(1.38) | 7.50 | .75 |
| Egypt | EG | 1523 | 32.2 | 71.5 | 63.8 | 32.0 | 37.7 | 40.62(15.26) | -.29(.95) | 7.81(3.46) | 3.23(1.53) | 11.80 | .69 |
| United States | US | 2232 | 48.6 | 66.4 | 99.0 | 56.5 | 29.8 | 48.91(16.91) | .14(.91) | 5.90(2.61) | 2.99(1.33) | 55.80 | .91 |
| Uruguay | UY | 1000 | 47.2 | 55.0 | 88.3 | 60.6 | 24.9 | 44.99(18.27) | -.18(.86) | 6.35(2.98) | 2.54(1.56) | 21.50 | .79 |
| Uzbekistan | UZ | 1500 | 38.7 | 73.4 | 99.7 | 42.1 | 18.2 | 39.35(14.88) | .46(.84) | 6.07(2.39) | 3.45(1.62) | 6.10 | .67 |
| Yemen | YE | 1000 | 49.8 | 78.1 | 45.0 | 39.0 | 25.5 | 35.59(13.28) | -.62(1.02) | 7.17(2.84) | 2.48(1.57) | 2.70 | .50 |

*PRT: propensity for risk-taking; #Zscore; ° GDP per capita

**Figure 1.** World map showing values of individual deprivation across the countries (n=58). Category= low (1st quartile), medium (med) (2nd quartile), high (3rd quartile) and vhigh (4th quartile)

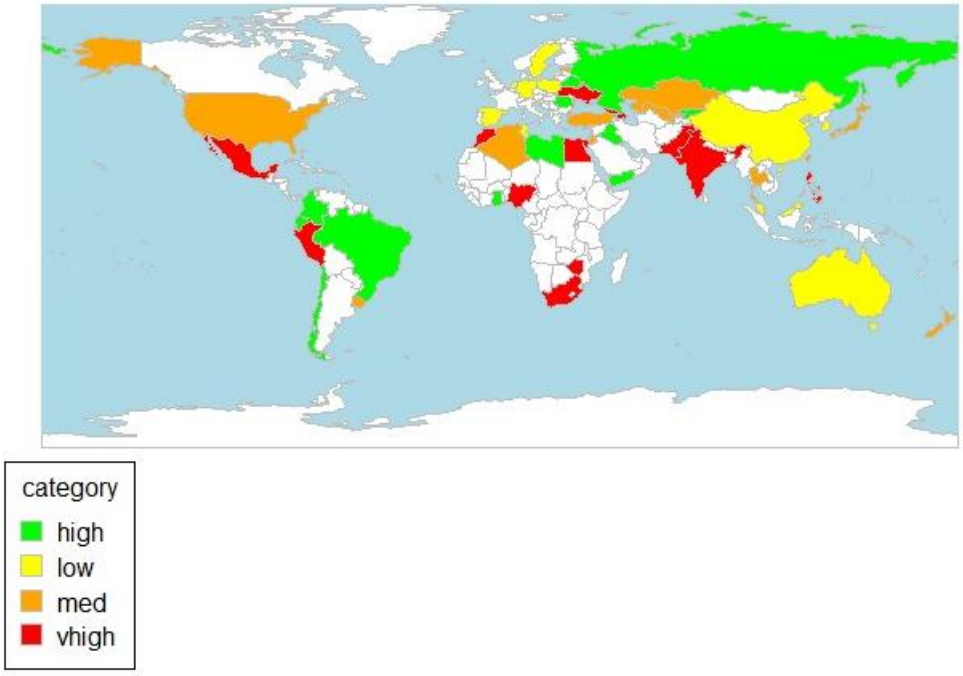



Table 2 reports the correlations among the individual and contextual variables. No problem of collinearity among the predictors was detected (Variance Inflation Factor ranged between 1.30 and 2.89, and the model's Cook distance was 0 (Kutner, Nachtsheim, Neter, & Li, 2004).

**Table 2.** Between individual- and country-level variables: Descriptive statistics and correlations

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean (SD) | Minimum-Maximum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Individual Level (N = 90259)* | | | | | | | | | | | |
| 1. Age | - | | | | | | | | | 42.05(16.48) | 16-99 |
| 2. Gender | -.03*** | - | | | | | | | | 0.48(0.50) | 0-1 |
| 3. Education | -.15*** | .06*** | - | | | | | | | 0.88(0.32) | 0-1 |
| 4. Marital status | .22*** | .02** | -.06*** | - | | | | | | 0.64(0.48) | 0-1 |
| 5. Parental status | -.46*** | .10*** | .10*** | -.57*** | - | | | | | 0.29(0.45) | 0-1 |
| 6. Occupational status | -.14*** | .22*** | .13*** | .09*** | -.02** | - | | | | 0.54(0.50) | 0-1 |
| 7. Income | -.12*** | .03*** | .17*** | .02** | .08*** | .12*** | - | | | 0(1.00) | -1.84-2.43 |
| 8. Individual Deprivation | -.08*** | -.02*** | -.13*** | -.03*** | -.02** | -.06*** | -.23*** | - | | 6.67(2.94) | 4-16 |
| 9.Propensity for risk-taking | -.24*** | .12*** | .04*** | -.10*** | .16*** | .04*** | .11*** | .08*** | - | 3.31(1.60) | 1-6 |
| *Country Level (N=58)* | | | | | | | | | | | |
| 1. GDP per capita | - | | | | | | | | | 24.94(23.24) | 1.80-132.10 |
| 2. HDI | .67*** | - | | | | | | | | 0.76(0.12) | 0.48-0.94 |
| 3. Propensity for risk-taking | -.19 | -.42*** | - | | | | | | | | |

***=Bonferroni adjusted 2 sides significance level of $\alpha \leq 0.05/9 = p \leq 0.005$ (at individual level); $\alpha \leq 0.05/3 = p \leq 0.016$ (at country level)

The HLM models are reported in Table 3. A preliminary step in HLM involves fitting an unconditional model and examining the variance of the dependent variable, partitioning it into individual- and country-level components. In the studied sample, the variation in propensity for risk-taking at the country level was 10.85 (ICC) significant $\chi^2(57) = 10709.41$, $p < .001$, with a random coefficient reliability of .99. A model where the error terms of the slopes of the individual-level independent variables to zero were fixed (with the exception of Income and Individual Deprivation) showed that individual deprivation was positively related to the dependent variable, and this effect varied across countries (see the between-countries β8j line and the respective $\chi^2$ values). Moreover, being a male, being a parent, and having a high income were associated with higher propensity for risk-taking whereas being an older person and married were negatively related to the propensity for the risk-taking.

Regarding the intercepts at the country level, higher HDIs were associated negatively with propensity for risk-taking. Thus, individuals who live in a country in which the HDI is higher have a lower propensity for risk-taking. The cross-level interaction between participants' individual deprivation and their countries' per capita GDP was significantly associated with the propensity for risk-taking. More specifically, the positive association between individual deprivation and risk-taking was stronger in countries with higher per capita GDP; countries in which GDP per capita was lower are characterized by a flatter line for individual deprivation-propensity for risk-taking (see Figure 2). In summary, these results suggest that in rich environments, individuals living in more deprived conditions may be even more prone to take risks than deprived individuals who live in the poorest countries.

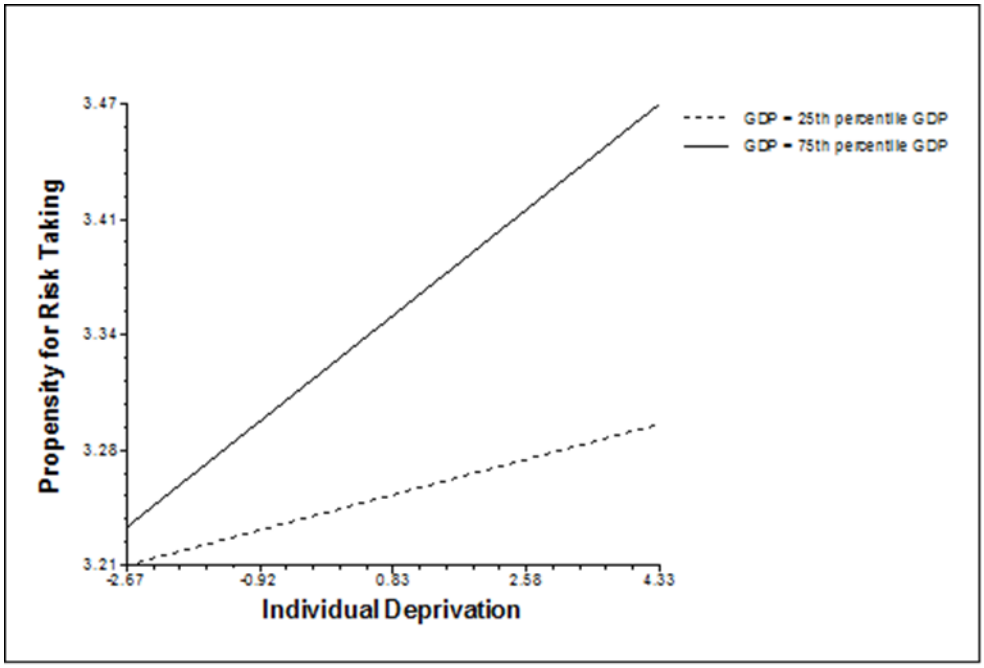
**Table 3** Multilevel correlates of the propensity for risk-taking

| | Unconditional model | | Model 1 | | Model 2 | |
|---|---|---|---|---|---|---|
| | Coefficient (SE) | t | Coefficient (SE) | T | Coefficient (SE) | t |
| *Individual level* | 3.28(.06)*** | 51.61 | 3.71(.07)*** | 52.56 | 3.70(.07)*** | 51.38 |
| Age | | | -.01(.001)*** | -13.24 | -.01(.001)*** | -13.40 |
| Male | | | .32(.02)*** | 13.24 | .32(.02)*** | 13.22 |
| Education | | | .04(.04) | 1.00 | .04(.04) | 1.03 |
| Married | | | -.10(.02)*** | -5.14 | -.11(.02)*** | -5.12 |
| Parental status | | | .16(.02)*** | 6.60 | .17/.(02)*** | 6.63 |
| Employed | | | .01(.01) | .45 | .01(.01) | .45 |
| Income# | | | .11(.01)*** | 10.16 | .11(.01)*** | 10.19 |
| Individual deprivation# | | | .03(.004)*** | 4.50 | .03(.004)*** | 5.37 |
| *Country level (intercept)* | | | | | | |
| GDP per capita | | | | | .003(.002) | 1.42 |
| HDI | | | | | -1.81(.78)* | -2.30 |
| *Country Level ($\beta_{8j}$) (cross-level interaction)* GDP per capita | | | | | .01(.001)** | 3.35 |
| HDI | | | | | -.02(.05) | -.46 |
| *Var. Comp.(Intercepts)* | | | | | | |
| Within country $\beta_{0j}$ | 2.281 | | 2.152 | | 2.152 | |
| Between country $\beta_{0j}$ | 0.245 | | 0.194 | | 0.172 | |
| $\chi^2$ | 10709.411 | | 7959.735 *** | | 6128.681*** | |
| Between country $\beta_{8j}$ | | | 0.002 | | 0.001 | |
| $\chi^2$ | | | 337.703*** | | 287.807*** | |

***$p$<.001. **$p$<.01; #Group mean centered

**Figure 2**

Effect exerted on propensity for risk-taking by the cross-level interaction between deprivation (individual level) and GDP per capita (country level).



**Discussion**

The present study investigated the interaction effects of macroeconomics factors in the relationship between individual deprivation and propensity for risk-taking using data from a large-scale survey of individuals from 58 countries. Three main results emerged from the data analysis. First, individuals who reported higher scores of individual deprivation were slightly more likely to report higher propensity for risk-taking than those with lower deprivation scores. This finding provides further support for risk sensitivity theory (i.e., Mishra et al., 2016). Deprived individuals live in circumstances of disparity and consequently experience competitive disadvantage compared to more privileged others. Risk-sensitivity theory specifically posits that individuals are more likely to engage in various forms of risk-taking, if they are unsuccessful (or expect themselves to be unsuccessful) in social or economic competition (Mishra et al., 2014; Wohl, Branscombe, & Lister, 2013). Individuals who live in poverty conditions have fewer resources to mitigate the risks provided by environmental hazards and to overcome the impediments posed by environmental disadvantages to obtain access to opportunities (Marmot et al., 2012). Therefore, in accordance with the relative state model (Mishra et al., 2017), in a possible condition of difficulty to satisfy a perceived need (i.e., money, feeling of security, etc.), risk-taking may be viewed as a valid opportunity leading to outcomes not otherwise available.

Second, the overall reported preferences for risk-taking showed a variation, ranging from 2.17 (Japan) to 4.52 (Nigeria). However, the present study pointed out that part of the variation in propensity for risk-taking can be attributed to country-level characteristics. More specifically, individuals who live in a country in which the HDI is higher have a lower propensity for risk-taking. This finding supports the neo-material theory (Lynch, Due, Muntaner, & Smith, 2000) in which higher availability of resources is linked to better health behaviors. It is possible to argue that enough resources for a basic standard of living in a wealthier society (such as in a country with high level of HDI) may provide individuals (including the poorest part of its population) with an amount

of resources that can change their ordinary life experience (Cifuentes et al. 2008). Consequently, in a context of facilitated access to resources, taking risks related to reward seeking may not be relate to the drive to gain access to these resources (van Wilsem, 2004). Thus, in accordance to the relative state model (Mishra et al., 2017), individuals who live in countries with a higher level of HDI (that also reflects a higher level of education and life expectancy) are also more likely to live in conditions of low disparity between one's present and desired needs (and consequently prefer lower risk options). Moreover, in countries with a higher HDI, individuals (i) are more educated, therefore it is possible that they are also more knowledgeable about the potential negative consequences of risk behaviors and tend to avoid them, and (ii) have higher life expectancy, which can help them to set and adjust their goals and deadlines in life (e.g., making these life goals and deadlines less risks worth taking, (Wang et al., 2009).

Third, the study found that the effect of individual deprivation on propensity for risk-taking vary by the average level of material wealth available for the population as a whole (per capita GDP values). More specifically, individuals living in more deprived conditions (in rich countries) may be more prone to take risks than deprived individuals who live in poorer countries, and therefore (in general) appears to be in contradiction to the between-country effects found in the present study. One explanation for this finding concerns social comparisons theory (Easterlin, 1974). Easterlin maintained that individuals in wealthy countries are more likely to compare their economic standing with that of their peers than in poorer countries (Esterlin, 2001). Given that individuals develop a standard of desirable income based on what others around them possess. in accordance with the relative state model (Mishra et al., 2017), if they are financially better off than this standard, they should be less prone to take risks, and if they are worse off (and competitively disadvantaged), they should be more prone to take risks. In this direction, previous studies have also found that higher-level need fulfillment is perceived to be more important in wealthier nations than in poorer ones (Lever et al., 2005; Oishi et al., 1999). This matches expectations from risk

sensitivity theory that associate condition of high need (i.e., disparity between one's present and desired outcome) with relatively higher risk preferences (Mishra et al., 2016). Contrary to what was hypothesized, there was no interaction between individual deprivation and country-level HDI (i.e., the socio-educational development of a country did not seem enough to compensate for the effect of individual deprivation on propensity for risk-taking). It is possible that living in a country that is at the same time wealthier and characterized by more educational opportunities has opposite effects on the association examined, thus resulting in a lack of interaction. Future studies should evaluate this hypothesis by selecting an indicator exclusively based on the socio-educational development of the country.

Despite the large sample size, the present study is not without limitations. Firstly, the data were self-report and subject to standard limitations (e.g., memory recall biases). Secondly, the measure of propensity for risk-taking was less than ideal for several reasons: (i) it consisted of a single item; (ii) the item reflects several constructs (i.e., sensation seeking and impulsivity). The present authors acknowledge the single-item measure of risk-taking is a broad proxy [one that includes ideas of adventure and excitement but also "taking risks"], but with that caveat, it is justifiable for several reasons, including that in international survey research (with large and representative samples), use of single-item proxy measures are widely accepted. The item in the present study was used in two previous studies comparing the attitude towards risk across countries (i.e., Mata et al., 2016: Bouchouicha and Vieider (2017). Thirdly, although these results confirm correlational support for the relative state model (Mishra et al., 2017), they are unable to verify a causal path from individual deprivation to propensity for risk-taking for country samples. For example, there is the possibility that causation runs in the opposite direction, with higher propensity to risk-taking leading to higher individual deprivation.

Finally, the present study demonstrates that the association between individual deprivation and propensity for risk-taking vary with environmental variables assessing the socioeconomic

development of a country. A recent study found that ecologies with scarce resources lead to increased propensity for risk-taking irrespective of age and gender (Mata et al., 2016). The present study complements this finding by showing that propensity to take risks is associated with the interaction among individual deprivation and country wealth. These findings suggest that macroeconomic factors may have significant psychological costs that go beyond economic welfare. Welfare programs or intervention would target individual deprivation directly by breaking the link between deprivation and propensity for risk-taking and improving welfare. The results of the present study also suggest that individual deprivation may play a causal role in motivating risk-taking choices. In everyday situations, it is possible that deprived individuals experience persistent feedback emphasizing such a condition of deprivation and higher-level need fulfillment, potentially leading to even higher preferences for risk-taking. Specific social policies, aiming to address modifiable circumstances that encourage increased competition (i.e., scarcity of resources) warrant consideration.

**Note**

[1]Parallel analyses were conducted to control the effects of GINI index (inequality measure). The results showed that the model with Gini coefficients did not add significantly to the explained variance in risk-taking.

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