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Validation of the Domain-Specific Risk-Taking Scale in Chinese college students

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Abstract

Using college student samples, two studies were conducted to validate the Chinese version of the Domain-Specific Risk-Taking (DOSPERT) Scale. The results replicated important findings reported by Weber et al. (2002) in the Chinese culture. Risk-taking and risk perception were domain-specific, whereas perceived-risk attitudes were relatively stable across domains, supporting the risk-return model of risk taking. Results of both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) showed that the ethical, recreational, health/safety, and gambling domains were preserved in the Chinese version of DOSPERT and that the items from social and investment domains formed one factor. This result may be explained by Weber and Hsee's (1998) cushion hypothesis. Other possible reasons for this cross-cultural difference in the factor structure were also discussed.

Keywords: risk-taking; risk perception; risk attitude; domain specificity; Chinese culture.

1 Introduction

Significant past research has been conducted to understand people's differences in their risk-taking behaviors, which are often referred as differences in risk attitude. According to the expected utility theory (Von Neumann, & Morgenstern, 1947) and prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992), risk attitude is explained by the shape of a utility function. In this model, risk attitude—an individual's location on the continuum from risk aversion to risk seeking—is assumed to be a personality trait (Weber, Blais, & Betz, 2002).

Based on this single trait view of risk attitude, researchers have employed various methods to measure it. Some studies require participants to choose between lotteries and then compare participants' observed choices to choices predicted by the expected value (e.g., Holt & Laury, 2002; Mellers, Schwartz, & Weber, 1997). Using the probability equivalence method, Kogan and Wallach (1964) developed the Choice Dilemma Questionnaire, asking respondents for probability equivalents in twelve choice dilemmas, which are combined into a single score that represents risk attitude. Nonetheless, according to Blais and Weber (2006), these studies were questionable due to two major problems. Firstly, people may be classified as risk seeking or risk averse depending on the method employed to measure risk attitude (Slovic, 1964). Secondly, even the same method may categorize an individual into different groups across different situations and domains (Schoemaker, 1990; MacCrimmon & Wehrung, 1990). These problems suggest that those measurements do not possess a satisfactory predictive validity across a range of situations (Bromiley & Curley, 1992).

Given this obvious deficiency of many risk attitude measurements, recently some researchers have claimed that risk attitude should be conceptualized in the risk-return framework of risky choice and treated in a domain-specific manner (Bell, 1995; Sarin & Weber, 1993). Risk-return models assume risk taking to reflect a tradeoff between perceived risk (fear) and expected return (hope) (Weber, 2001):

Risk Taking Preference (X) = a (Expected Benefit (X)) + b (Perceived Risk (X)) + c

where a represents the marginal effect of expected benefit of X on the risk taking preference, b represents the marginal effect of perceived risk of X on the risk taking preference, and c is the error term.

Researchers have found systematic situational and group differences in perceived risk and expected benefit of risky behaviors (Bontempo, Bottom, & Weber, 1997; Weber, 1988; Johnson, Wilke, & Weber, 2004). Nevertheless, people's perceived-risk attitude (coefficient b)—remains relatively stable across situations and groups (Weber, 1998, 2001). Therefore, differences in perceived risk and expected return of risky choices seem to play a major part in the observed domain-specificity of risk attitude (Weber, 2001).

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In this risk return framework, Weber et al. (2002) developed the Domain-Specific Risk-Taking (DOSPERT) Scale in order to assess both conventional risk attitudes (apparent risk taking; i.e., risk taking preference in the formula above) and perceived-risk attitudes in six domains, namely, social, recreational, gambling, investment, health/safety, and ethical decisions. The conventional risk attitudes is defined as people's stated level of risk taking, and perceived-risk attitude is defined as the willingness to engage in a risky behavior as a function of its perceived risk (Weber et al., 2002). Therefore, the DOSPERT Scale measures both individuals' propensity to engage in risk activities and their perceived risk and expected return of these activities, making it possible to study the relationship between apparent risk taking and risk perception (and thus perceived-risk attitude). Using this scale, Weber et al. (2002) demonstrated that participants' degree of risk taking differed across domains and these differences were primarily associated with differences in perceived risk and expected return of risky behaviors rather than differences in perceived-risk attitude. These results provided strong support to the risk-return model of risky choice.

Researchers have provided strong evidence for the DOSPERT Scale's reliability and validity (e.g., Weber et al., 2002; Johnson et al., 2004). Weber et al. (2002) reported its initial psychometric properties, including moderate reliability estimates, satisfactory construct validity and convergent/discriminant validity with respect to constructs such as sensation seeking, intolerance for ambiguity, and social desirability.

Geographically, the DOSPERT has been validated in many other cultures such as German, Dutch, Italian, and Spanish (e.g., Johnson et al., 2004). Nonetheless, to date, the scale has not been tested in eastern cultures. As mentioned above, the items and the six content domains in the DOSPERT were originally developed and validated in the U.S. Since substantial cultural differences exist between western societies and eastern societies, there is a need to examine its psychometric properties in an eastern culture.

Therefore, in order to further examine the cross-cultural validity of the DOSPERT, the current paper validated the scale in Chinese culture using university students in China. In this process, we looked for similarities and differences in risk taking as a function of culture and then discuss possible explanations for observed differences.

Specifically, we conducted two studies to address these issues. For simplicity sake, we will refer to our translated and revised version of the scale as DOSPERT-C. In Study 1, we attempted to identify the factor structure of the DOSPERT-C using an exploratory factor-analytic procedure. Moreover, we examined the reliability of the DOSPERT-C. We also performed a regression to examine the relationship between risk perception and risk behavior. As mentioned above, the risk-return framework assumes the involvement of various determinants, namely, perceived risk, expected benefit, and perceived-risk attitude. However, because of logistical constraints, expected benefit could not be collected in the present study. Thus, this study's emphasis is on conventional risk attitudes, the perception of risk, and perceived-risk attitude. In Study 2, in order to provide further empirical support for the factor structure of the DOSPERT-C, we conducted confimatory factor analysis. In addition, we provided evidence for convergent validity for the DOSPERT-C.

2 Study 1

2.1 Method

2.1.1 Participants and procedure

Participants were 216 (125 females, 57.9%) students at Peking University, China. The average age of the sample was 20.96 years (SD = 0.66, range = 18 to 24). Each participant completed the scales and provided demographic information.

2.1.2 Measures

The domain-specific risk-taking (DOSPERT) scale of Weber et al. (2002) consisted of 40 items. Eight items of the scale represent risky behaviors from each of five content domains: financial, health/safety, recreational, ethics, and social. Those eight financial items further split into two groups with four items each, related to investing and gambling, which were identified as independent and separate risk-raking domains by Weber et al. (2002). The risk-taking scale of the DOSPERT assesses participants' likelihood of engaging in these risk actions on a five-point scale, ranging from "Very unlikely" to "Very likely". The risk perception scale asks participants to rate their perception of risk entailed by each risky behavior on a five-point scale, ranging from "Not at all risky" to "Extremely risky". The DOSPERT-C was developed using back-translation methodology. As in the English version of the scale, items were not presented by domains but were randomly interspersed. Items appeared in different orders for the two scales. The presentation order of the two scales was counterbalanced across participants. Worth noting here is that no order effect was found in the current study.

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2.2 Results and discussion

2.2.1 Item discrimination

In the assessment of item discrimination, the *Discrimination Index(D)* is computed by subtracting the mean score of participants in the lower group (27%) from the mean value of those in the upper group (27%) and dividing it by the maximum possible discrimination. A value of 0.19 or below indicates that the item is subject to improvement (Hopkins et al., 1990). Items with D < 0.19 include: item 4 (buying an illegal drug for your own use), item 8 (consuming five or more servings of alcohol in a single evening), item 20 (illegally copying a piece of software), item 25 (shoplifting a small item (e.g. a lipstick or a pen), and item 27 (engaging in unprotected sex). These five items are also those ones participants regarded as problematic according to their feedback and thus may not be applicable to Chinese university students. For instance, university students in China, especially in large cities, have very little chance to encounter illegal drugs which are very strictly banned by the government. For another example, software piracy is not well prevented in China and illegally copies of software can be always seen around university students. Due to the apparent limitations of these five items, they were eliminated for the DOSPERT-C; this reduced the number of items from 40 to 35.

2.2.2 Factor analysis

A principal components analysis (PCA) using varimax rotation was conducted on the 35 items of the risk-taking scale. 10 factors were identified based on the eigenvalues $\geq$ 1.0 criterion and the scree plot identified either four or five factors that could be extracted. Each of the factor solutions from 4 to 6 factor solutions were examined for simple structure and interpretability. Among the factor solutions, the five-factor solution was most interpretable. As shown in Table 1, investment and social items loaded on factor 1. The remaining four factors corresponded well to the gambling, recreational, ethical, health/safety risk, respectively. Thus, the factor structure of the DOSPERT-C is similar to that of the DOSPERT except that the investment and social items of the original DOSPERT were combined in the DOSPERT-C.

The same PCA procedure was performed on the 35 items of risk-perception scale and the factor structure of this scale is similar to the risk-taking scale reported above. The factor loading of each item is shown in Table 2.

Since investment and social items loaded on one factor, the DOSPERT-C corresponded well to a five-factor

Table 1: Factor loadings of the 35 items of Risk-taking scale. Loadings greater than or equal to 0.30 are shown in bold.

	Factor				
Item	1	2	3	4	5
Investment					
24	**0.68**	−0.18	0.03	0.16	0.17
7	**0.66**	0.10	0.07	0.16	−0.03
30	**0.58**	−0.18	0.01	0.07	0.29
18	**0.56**	0.07	0.12	**0.34**	0.03
Social					
16	**0.56**	−0.07	−0.12	−0.19	0.18
10	**0.52**	0.03	0.17	−0.09	0.17
34	**0.49**	0.09	−0.20	−0.07	0.37
26	**0.47**	0.21	0.25	−0.07	0.13
35	**0.47**	0.29	−0.09	−0.08	0.20
19	**0.46**	0.21	0.07	0.17	−0.08
1	**0.46**	0.10	−0.18	−0.03	−0.09
23	0.23	0.05	−0.02	0.02	−0.15
Recreational					
21	−0.05	**0.69**	−0.03	0.12	0.05
17	0.10	**0.64**	0.10	0.10	−0.04
38	0.21	**0.59**	0.05	−0.16	0.28
31	0.01	**0.58**	0.14	0.13	0.08
2	−0.02	**0.54**	0.02	0.20	0.10
6	0.00	**0.53**	0.15	0.11	0.02
15	0.29	**0.49**	0.15	0.10	−0.05
37	0.04	**0.39**	0.07	−0.05	0.01
Ethical					
13	0.12	0.09	**0.75**	0.01	0.02
14	−0.14	0.13	**0.68**	0.08	−0.02
5	0.05	0.11	**0.67**	−0.01	0.05
12	−0.04	0.22	**0.63**	0.12	0.11
9	0.07	0.10	**0.60**	0.20	0.08
28	0.00	−0.04	**0.54**	0.05	0.28
Gambling					
3	0.07	0.06	0.01	**0.83**	0.00
11	0.01	0.08	0.16	**0.77**	0.12
22	0.12	0.24	−0.01	**0.71**	0.12
33	0.00	0.12	0.28	**0.58**	0.05
Health/safety					
36	0.10	0.00	0.02	0.14	**0.72**
29	0.15	0.01	0.14	0.02	**0.59**
39	0.04	**0.48**	0.09	−0.02	**0.58**
40	0.01	0.11	0.28	0.05	**0.56**
32	0.15	0.28	0.03	0.20	**0.41**

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Table 2: Factor loadings of the 35 items of the Risk-perception Scale. Loadings greater than or equal to 0.30 are shown in bold.

	Factor				
Item	1	2	3	4	5
Recreational					
38	**0.69**	0.14	−0.09	0.25	−0.20
21	**0.69**	−0.12	0.31	0.24	−0.06
6	**0.56**	0.10	0.09	0.00	0.38
31	**0.55**	0.13	0.28	0.28	0.02
17	**0.50**	0.04	0.23	−0.08	0.18
5	**0.50**	0.16	0.18	0.05	0.25
2	**0.49**	0.29	0.08	−0.05	0.19
29	**0.33**	−0.01	0.00	0.21	0.17
Investment					
3	0.03	**0.63**	0.13	0.04	−0.02
24	−0.23	**0.48**	0.06	−0.16	0.24
7	0.14	**0.42**	0.28	−0.21	0.03
19	0.36	0.16	**0.43**	−0.11	0.12
Social					
35	0.15	**0.79**	−0.08	0.05	−0.03
16	−0.10	**0.74**	0.09	0.01	0.05
40	0.29	**0.48**	−0.13	0.09	−0.15
34	−0.09	**0.46**	0.21	−0.02	0.21
1	0.10	**0.46**	−0.04	−0.27	0.25
8	0.14	**0.43**	−0.09	0.02	0.10
26	0.07	**0.38**	0.01	0.29	0.01
18	0.17	**0.34**	0.11	−0.06	0.14
Gambling					
30	0.02	0.09	**0.82**	0.09	0.03
33	0.06	0.20	**0.76**	0.19	−0.03
22	0.29	−0.05	**0.71**	0.09	−0.06
11	0.09	−0.05	**0.67**	0.20	0.11
Ethical					
28	−0.11	−0.01	0.30	**0.71**	0.16
32	0.03	0.01	0.12	**0.61**	0.24
25	0.27	−0.06	0.04	**0.60**	−0.17
37	0.16	0.25	−0.06	**0.54**	−0.07
9	0.19	−0.15	0.14	**0.52**	0.24
14	0.27	−0.22	0.09	**0.48**	0.20
Health/safety					
15	0.04	0.21	−0.05	0.14	**0.67**
13	0.18	−0.04	0.02	0.17	**0.64**
36	0.21	0.28	0.06	0.05	**0.49**
23	0.19	0.29	0.18	0.28	**0.32**
39	**0.68**	0.04	−0.04	0.19	0.06

model. Henceforth we will refer to the new combined domain as social-investment and will examine the characteristics of this domain together with other the four domains below.

2.2.3 Reliability

Table 3 shows coefficient alphas and average item-total correlations for the risk-taking and risk-perception scales, separately for each of the five subscales. Although internal consistencies were acceptable with Cronbach alphas for the subscales ranging from 0.63 to 0.80, with the majority clustering around 0.75, they were somewhat lower than those reported by Weber et al. (2002). For both scales, the gambling subscale was most reliable according to Cronbach's alphas and the health/safety subscale was least reliable. For item-total correlations, gambling subscale had the highest mean values for both scales while social-investment subscale had the lowest values.

2.3 Subscale correlations

Correlations among the five subscales of both scales are reported in Table 4 and Table 5. Consistent with Weber et al. (2002), the generally moderate correlations, coupled with the EFA results, indicate that both risk behavior and risk perception are domain-specific.

2.3.1 Relationship between risk perception and risk behavior

In order to test the relationship between risk perception and apparent risk taking reported by Weber et al. (2002), we regressed risk behavior on risk perception across respondents. As presented in Table 6, the largest proportion of explained variance is 0.41 in the recreational domain and the smallest one is 0.16 in social-investment domain. The perceived risk coefficient shows the impact of perceived risk on apparent risk behavior.

3 Study 2

Study 2 was designed to confirm the factor structure found in study 1 using another sample and to examine the convergent validity of our instruments. In addition to the risk-taking scale revised in Study 1, participants also completed the Chinese version of Zuckerman's sensation seeking scales (Wang et al., 2000) and the Chinese version of Budner's scale for intolerance of ambiguity (Zhu, 2006). As explained by Weber et al. (2002), these scales measure attributes of people's response to risk that may well surpass domain-specific aspects of their behavior. Therefore, we predict significant correlations between these scales and most subscales of risk-taking scale.

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Table 3: Cronbach's alphas and mean item-subscale-total correlation (and ranges of correlations) for Risk-taking and Risk-perception subscales

Domain	Alpha		Item-total correlation	
	Risk-taking	Risk-perception	Risk-taking	Risk-perception
Social-investment	0.77	0.75	0.53 (0.30–0.65)	0.52 (0.40–0.70)
Recreational	0.72	0.77	0.59 (0.51–0.66)	0.62 (0.46–0.68)
Ethical	0.76	0.72	0.67 (0.60–0.73)	0.64 (0.55–0.73)
Gambling	0.78	0.80	0.77 (0.70–0.83)	0.79 (0.75–0.83)
Health/safety	0.66	0.63	0.65 (0.59–0.72)	0.64 (0.60–0.67)

Table 4: Pearson correlations among subscales and with total score for Risk-taking scale

	Social-investment	Recreational	Ethical	Gambling	Health/safety
Recreational	0.24**				
Ethical	0.11	0.28**			
Gambling	0.17*	0.28**	0.27**		
Health/safety	0.32**	0.36**	0.32**	0.23**	
Total	0.66**	0.69**	0.58**	0.55**	0.66**

* $p < .05$, ** $p < .01$.

3.1 Method

Participants in study 2 were 383 (200 females, 52.2%) students at Peking University. The average age of the sample was 21.13 years (SD = 0.78, range = 18–25). They filled out the 35-item risk-taking scale revised in Study 1. Items for this scale were presented in a random order. Participants also provided responses to the validation scales described above as well as demographic information.

3.2 Results and discussion

3.2.1 Factor analysis

In order to confirm the factor structure found in study 1, we performed confirmatory factor analysis (CFA) on the 35 items of the risk-taking scale. In the CFA, the scale of the latent factor was set by fixing the variance of the latent factor equal to 1.

As presented in Table 8, a number of indexes were used to determine the goodness of fit. The comparative fit index (CFI) may range from 0 to 1 and values equal to or greater than 0.90 indicate a good fit to the data (Bentler & Bonett, 1980; Kline, 1998). Similarly, scores 0.90 or above are desired with the non-normed fit index (NNFI) and the incremental fit index (IFI). Finally, a value of 0.08 or less for the root mean square error approximation (RMSEA) reflects a model with an adequate fit to the data, while values greater than 0.10 suggest strongly that the model fit is unsatisfactory (Browne & Cudeck, 1989, 1993).

The model in the study fulfilled all these criteria except the NNFI, which was very close to the criterion (0.90). Therefore, the fit statistics for this model generally indicated a good fit to the data and supported the factor structure found in study 1.

3.2.2 Validity

The correlations between risk-taking subscales and sensation seeking/intolerance of ambiguity are presented in Table 7. As predicted, sensation seeking correlated significantly with the risk-taking subscales in all five domains. In particular, physical risks (i.e., recreational and health/safety) have the highest correlations with sensation seeking, which makes conceptual sense. Intolerance of ambiguity correlated significantly with all risk-taking subscales except health/safety subscale.

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Table 5: Pearson correlations among subscales and with total score for Risk-perception scale

	Social-investment	Recreational	Ethical	Gambling	Health/safety
Recreational	0.32**				
Ethical	0.03	0.39**			
Gambling	0.20**	0.35**	0.31**		
Health/safety	0.39**	0.49**	0.33**	0.23**	
Total	0.66**	0.78**	0.58**	0.59**	0.71**

* $p < .05$, ** $p < .01$.

Table 6: Coefficients and R^2 of regression of Risk-taking scale mean on Risk-perception scale mean by domain

Domain	Intercept	Perceived risk	R^2
Social-investment	4.62	−0.46**	0.16
Recreational	5.07	−0.72**	0.41
Ethical	4.38	−0.61**	0.30
Gambling	4.34	−0.59**	0.29
Health/safety	5.05	−0.62**	0.28

Notes. ** p < .01, * p < .05.

3.2.3 Gender differences

As shown in Table 9, male and female respondents differed significantly in ethical and health/safety domains. Men were more likely to engage in risky behaviors than were women in ethical and health/safety domains as well as total scores.

4 General discussion

Our results replicate many important findings reported by Weber et al. (2002) in Chinese culture. Both apparent risk taking and perceived risk differed across domains. As shown in Table 4 and Table 5, risk behaviors and risk perceptions in one content domain had small relationships with risk behaviors and risk perceptions in another domain, documenting the appropriateness of using domain-specific scales. Those differences in apparent risk taking seems to be associated, to a great extent, with differences of the perceived risk (Table 6), rather than perceived risk attitude (the coefficient in the risk-return regression), which did not vary greatly across domains.

The paper contributed a Chinese version of the original scale. The DOSPERT-C exhibits acceptable psychometric properties and it proves to be a useful instrument for Chinese university students. Still, there is room for improvement. First of all, based on the EFA, a few items had multi-loadings or did not load on the expected factor. Secondly, Cronbach's alphas for the health/safety domain were below 0.70, indicating that items in this domain may need further improvement. Thirdly, after deleting five items from the original scale and combining the items from social and investment domains, the number of items in each domain in the DOSPERT-C differs from others. Therefore, we might consider add new items to the DOSPERT-C in the future to order to increase its reliability and validity. In any event, this paper provided a useful scale that could help those scholars to assess conventional risk attitude as well as perceived-risk attitude in five domains in Chinese populations.

A very interesting finding of current studies is the difference in the factor structure between the DOSPERT and the DOSPERT-C. The main difference in the factor structure is that social items and investment items loaded on a single factor in the DOSPERT-C. We offered several possible reasons to explain what may lead to this difference.

It is possible that university students in China have less chance to gamble than university students in America. There are few horse races in Beijing and betting large sums of money on sports events is illegal. Therefore, gambling may be relatively distant to the daily lives of Chinese students in comparison with investment. In addition, gambling is often considered as an inappropriate behavior for university students in China but may not be in America. This can also be the reason why gambling items and investment items are separate in the DOSPERT-C.

It is also possible that students in China regard investment risk and social risk as more closely connected than American students. This explanation is consistent with Weber and Hsee's (1998) cushion hypothesis. In this hypothesis, they claimed that in collectivistic cultures like China, in-group members would help out any group member who faced a great financial loss after a risky choice. In contrast, people are expected to per-

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Table 7: Pearson correlations between Risk-taking subscales and Sensation Seeking/Intolerance of Ambiguity

Validation scale	Social-investment	Recreational	Ethical	Gambling	Health/safety
Sensation seeking	0.28*	0.62**	0.34**	0.41**	0.50**
Intolerance of ambiguity	−0.27*	−0.25*	−0.29*	−0.29*	−0.06

Notes. ** p < .01, * p < .05.

Table 8: Fit Indices for the factor structure found in Study 1.

χ^2	*df*	χ^2/df	NNFI	CFI	IFI	RMSEA
215.86	80	2.70	0.88	0.91	0.91	0.06

Table 9: Means (and standard deviations) of risk-taking ratings by gender.

Subscale	Males	Females			
	Mean (SD)	Mean (SD)	t value	df	p
Social-investment	3.54 (0.52)	3.56 (0.50)	1.724	381	0.086
Recreational	2.88 (0.72)	2.60 (0.76)	0.535	381	0.593
Ethical	2.24 (0.73)	2.11 (0.78)	4.746	381	0.000
Gambling	2.34 (1.00)	2.28 (0.97)	−0.412	381	0.681
Health/safety	3.44 (0.75)	3.08 (0.74)	3.608	381	0.000
Total	3.01 (0.44)	2.88 (0.44)	3.02	381	0.003

sonally bear more of the consequences of their risky decisions in individualist cultures like America (Weber & Hsee, 1998). Therefore, collectivism acts as a cushion against possible losses for the members of a collective culture. If people in China are more likely to receive substantive financial help from others when they are in need, lost in social connections may mean lost in monetary help when needed. In this case, investment risk and social risk should be more closely related with each other for Chinese people. It will be interesting to design further studies to identify which one of these explanations is the main reason for the differences found in factor structure or to find other reasons that lead to the differences.

Recent research on risk-taking has identified interesting cross-cultural differences between China and the U.S. For instance, Gong, Krantz, and Weber (2012) showed that, compared with American people, Chinese people were generally more concerned with the uncertainty and immediacy of future gains. Future research connecting this result with the current finding would be of great value. For example, an interesting research questions may be: do social connections reduce Chinese people's insecurity of future gains?

Male respondents to the DOSPERT were more risk-taking in all domains except the social domain than female participants. In contrast, gender differences were found only in ethical and health/safety domains when using the DOSPERT-C. Given the item adjustment in the DOSPERT-C, we could not offer very solid explanation in terms of why such differences exist. However, China's rising gender equality over the past a few years (Howell & Mulligan, 2005) may be an underlying reason for the fewer gender differences found in China. More work should be done to examine the gender differences in different domains of risk-taking using Chinese participants.

Finally, the test-retest reliability is an important index of a measure's stability over time. That we did not collect data to assess such is a limitation for our studies and we encourage additional work to test the test-retest reliability for this scale in the future.

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