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Joseph G. Johnson[*]
Andreas Wilke[**]
Elke U. Weber[***]

Beyond a trait view of risk taking: A domain-specific scale measuring risk perceptions, expected benefits, and perceived-risk attitudes in German-speaking populations

A German-language scale assessing tendencies to engage in risky behaviors, as well as perceptions of risks and expected benefits from such behaviors, is derived from an English version and validated on 532 German participants. The scale contains 40 items in six distinct domains of risk taking: ethical, recreational, health, social, investing, and gambling. Following a risk-return model of risk taking, perceived-risk attitude is inferred by regressing risk-taking on perceived risk and expected benefits. Risk-taking as well as perceptions of risks and benefits were domain-specific, while perceived-risk attitudes were more similar across domains, thus supporting the use of a risk-return framework for interpreting risk-taking propensity. Gender and cultural comparisons are drawn, and we discuss possibilities for future cross-cultural applications of the scale.

Keywords: *risk-taking, cost-benefit analysis, domain specifity, German language*

The appropriate definition and measurement of risk propensity has long been a topic of debate among researchers in personality psychology, decision research, economics, and other fields, reflecting the perceived theoretical and practical importance of the construct (for an overview see Yates & Stone, 1992). Attempts to measure risk-taking as a stable personality trait have been thwarted by observed cross-situational inconsistency in behavior, exhibited for example by insurance-buying gamblers or skydiving wallflowers. Recent work by Weber and collaborators suggests that such apparent domain differences in risk taking might have more to do with situational, domain-related differences in the *perception* of risk than with *attitudes* towards risk (Weber & Milliman, 1997; Weber, 2001). The skydiving wallflower may well dislike risk in both his recreational and social decisions (i.e., be consistently risk-averse across both domains), but perceive the risk of skydiving to be very low (perhaps because it feels controllable) and the risk in social situations to be high (perhaps because of lack of familiarity with interpersonal negotiations or previous negative experiences). A multi-domain inventory of risk-taking that also measures

* University of Illionois, USA
** International Max Planck Research School LIFE, Max Planck Institute for Human Development, Germany
*** Columbia University, USA

ADDRESS CORRESPONDENCE to: Joseph G. Johnson, Department of Psychology, University of Illionois, 603 E. Daniel St. Champaign, IL 61820, USA. Phone: (217) 333-7712; fax: (217) 244-5876; e-mail: jjohns25@uiuc.edu

AUTHORS' NOTE
The complete DOSPERT-G used in this research, including scale items, instructions, and response scales, can be obtained at the following web address: http://www-abc.mpib-berlin.mpg.de/users/johnson/DOSPERTG.pdf.
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perceptions of risks and benefits can thus help us to develop a psychologically more sophisticated theory of risk taking and its relationship to perceived risks and benefits, and may allow us to restore some credibility to the hypothesis of risk attitude as a stable trait (Weber, 1999).

A brief review of how individual risk-taking behavior has been studied will prove instructive, starting with those approaches that consider risk-taking a personality trait. Traditionally, risk-taking was viewed as a single personality trait similar to impulsiveness (e.g., Eysenck & Eysenck, 1977). In general, early personality research did not put the major emphasis on differential risk taking across domains, but examined the relationship between risk-taking and other personality traits in one specific domain. The single-trait view of risk-taking was then replaced by recognition of distinct risk-taking components. These studies have tried to explain the apparently multi-dimensional nature of risk-taking by looking for risk-taking sub-traits and have explored the relationship between risk taking and constructs such as self-monitoring (Bell, Schoenrock, & O'Neal, 2000) and sensation-seeking (Franken, Gibson, & Rowland, 1992; Himelstein, & Thorne, 1985; Hansen, & Breivik, 2001).

Other researchers have taken a different approach, exploring the extent to which risk-taking behavior must be treated in a domain-specific manner to understand apparently inconsistent risk-propensities across domains. Horvath and Zuckerman (1993), for example, examined people's propensities to take physical, ethical, financial, substance abuse, and status loss (social) risks, as well as their appraisals of risk in those domains. They found significant correlations between risk appraisals and risk taking in all domains, but found significant correlations between sensation-seeking and risk taking in only some domains (sports) and not in others (financial risk taking). Another study in this same tradition by Weber, Blais, and Betz (2002) is described in more detail below. These studies are important in that they treat the distinction between risk *propensity* and risk *perception*.

Behavioral decision researchers in psychology and economics have studied risk-taking behavior experimentally. These studies typically provide respondents with choices between monetary gambles or between gambles and "sure" choice options, i.e., options with a guaranteed payoff. Risk-taking is operationalized by comparing observed choices to choices predicted by "risk-neutral" decision rules such as the expected value of choice options (e.g. Edwards, 1954). Preference for a sure choice option over a gamble, when the sure option pays less than the expected value of the lottery, for example, is evidence for risk aversion. While some studies in the personality research tradition (e.g., Dahlbäck, 1990; Lauriola & Lewin, 2001) have also asked participants to choose between gambles and sure choice options, choices in these studies are typically hypothetical. In behavioral decision research, in contrast, the payoffs tend to be real and often non-trivial (e.g., Eckel & Grossman, 2002). A recent meta-analysis of choices between two-outcome gambles and sure outcomes of equal expected value (Weber, Shafir, & Blais, 2003) found that when outcomes were real, rather than hypothetical, respondents were more risk-averse for gains and less risk-seeking for losses, i.e., that there was a decrease in risk-taking for both gains and losses. Observing actual, consequential behavior in the form of lottery choices thus should, in principle, provide a more valid measure of a person's risk attitude than hypothetical choices or non-verifiable self-reports of risk taking in other situations.

Unfortunately, however, risk-attitudes observed in gambling studies may generalize only to gambling behavior outside of the lab. A growing body of evidence, going back to Slovic (1964), suggests that risk taking in gambling tasks does not generalize across domains, arguing against the use of stylized lottery tasks as prototypes of all risky decisions (Goldstein & Weber, 1995). MacCrimmon and Wehrung (1985) postulated that, instead, risk attitude measures need to be multidimensional and less abstract, resulting in a stream of work that examined the risk-taking by business executives in realistic settings (MacCrimmon & Wehrung, 1986, 1990; March & Shapira, 1987). Ebbesen, Parker, and Konečni (1977) report discrepancies between laboratory and field studies, which also caution against generalizing experimental findings from abstract or impoverished choice tasks.

In summary, decision researchers, including most cognitive psychologists and economists, have continued to assume that risk attitude is a unidimensional trait that can be assessed by observing preferences for monetary gambles, with only some work acknowledging the possible domain-specificity of risk-taking behavior. Personality researchers have continued to search for personality correlates of risk taking. Both groups have not been particularly interested in modeling the processes or mechanisms that result in risk taking in different situations, in an attempt to account for the effect of outcome domain, elicitation method, or outcome framing. The research reported in this paper was designed to address some of these shortcomings.

Three major extensions on the study of risk-taking can be seen in our approach, which builds on previous work by Weber and colleagues. First, we examine the domain-specificity of risk taking.

Weber, Blais, and Betz (WBB, 2002) developed a *do*main-*spe*cific *r*isk-*t*aking (DOSPERT) scale, validated for an American population, which we have translated and validate here for a German sample. Second, risk taking is conceptualized within a risk-return framework; that is, it is seen as a tradeoff between hope and fear (see Weber, 2001 and Weber & Milliman, 1997). Modeling risk-taking as a tradeoff between risk (fear) and expected return (hope) makes it imperative to understand and measure decision makers' perceptions of the risks and expected benefits of risky behaviors. The WBB (2002) DOSPERT scale, which we translate and use in our study, measures people's stated likelihood to engage in risky behaviors as well as their perception of the risks and expected benefits of these activities, allowing us to examine the relationship between these three variables. While Horvath and Zuckerman (1993) discuss a possible relationship between risk perception and risk taking, they neither attempted to measure perceptions of risk or expected benefit, nor included these variables in their model. Finally, we look for similarities and differences in risk taking as a function of gender and culture, and examine possible explanations for observed group differences. Previous work suggests that such differences exist. A great deal of research has examined gender differences in risk-taking (e.g., Eckel & Grossman, 2002; Poppen, 1995; see Byrnes, Miller & Schafer, 1999, for a meta-analysis).

By acknowledging that risk taking has multiple determinants, involving both the perceptions of benefits and risk and a true attitudinal component that reflects a person's propensity to take on (or shy away from) an option perceived as being risky, we allow for both cognitive/affective differences in the perception of the situation and for risk attitude as a true personality trait to play a role in risk taking. Because the former variables are often domain specific (partly as a function of previous experience and familiarity with different domains of risk or perceived controllability; see Slovic, Fischhoff & Lichtenstein, 1986), their addition to the model of risk taking allows the perceived-risk attitude personality trait to be consistent across situations. We also follow the prescription of Weber and Hsee (2000a, b) – who argue that all social science theories ought to be tested cross-culturally, to understand which model variables are similar across cultures (reflecting our common biological and evolutionary history as *homo sapiens*) and which variables are subject to cultural shaping and construction. Specifically, we are interested in whether domain-specific differences in risk-taking exist in a German population, whether there are cultural differences in risk-taking between an American and a German population, and in the way(s) in which a risk-return model of risk taking will explain observed domain and culture differences in risk taking.

Scale translation and development

The materials used throughout are drawn from a translated final version of the domain-specific risk-taking (DOSPERT) scale of Weber, Blais and Betz (2002). Eight items of the 40-item scale present risky actions from each of five content domains: recreational, health, social, ethical, and financial risk taking. The eight financial items split into four items each related to investing and to gambling, which were identified as independent and separate risk-taking domains by Weber et al. (2002), consistent with anecdotal data by March and Shapira (1987) and the work of Zaleskiewicz (2001). Just as the English version of the scale, the German version presented the set of 40 items in three different random orders on three separate occasions, with different response instructions. Respondents stated (a) their likelihood of engaging in the risky behavior described by each item; (b) their perception of the risk of the described behavior; and (c) their perception of the expected benefits of the behavior. Henceforth we will refer to the original version of the scale as the DOSPERT-E (Domain-specific Risk Scale, English version), our translated version of the scale as the DOSPERT-G (German version), the three separate judgments as response *scales*, and the six content areas as *domain subscales*. We used the method of back-translation (Brislin, 1986) for all materials used in the study (40 domain-specific risk scale items, 46 self-report items, and response scale instructions), with native/fluent speakers, including one author of the DOSPERT-E.

Methods

Participants

The DOSPERT-G (40 items, evaluated on each of three response scales) was administered to 451 students at the Free University of Berlin, Germany, as well as to 101 lab participants at the Max Planck Institute for Human Development in Berlin, Germany. Twenty of the paper-and-pencil survey packages thus collected were discarded for failing to meet our pre-established completeness criterion (no more than 5 missing responses on 120 items), resulting in 435 and 97 responses from the university and lab samples, respectively. The mean age of the entire sample was 24.5 (SD=4.66) and with some bias towards females (65.2%). University participants were given a nominal reward and course credit, if applicable, upon completion of the survey package, whereas lab

participants were paid according to the outcome of an additional task, as described below.

Materials

The DOSPERT-G contained the 40 items translated from the original DOSPERT-E. Items from the six domain subscales were randomly interspersed and appeared in a different random order for each of the three response scales. The *risk behavior* scale asked participants for the likelihood with which they would engage in each described activity if given the opportunity. The *risk perception* scale asked them to indicate how risky they perceived each activity to be. The *expected benefit* scale asked them to rate their perception of the benefit they would derive from engaging in each activity. All judgments were made on a 5-point scale, whose endpoints and midpoint (at least) were labeled scale-appropriately. Higher values indicated greater likelihood of engaging in the behavior, greater perceptions of risk, and greater expected benefits. The presentation order of the three response scales was counterbalanced across participants.

The lab participants completed two tasks in addition to the DOSPERT-G that were designed to assess the external validity of the scale. The first of these was WBB's (2002) self-report inventory of real risky behavior frequencies, consisting of 27 items in German. Second, lab participants were given a non-hypothetical gambling task as a measure of their financial risk-taking; in particular, their propensity to gamble. Their payoff on this task constituted the entire payment for participation in the study. The gambling task presented participants with two decks of ten cards. They were instructed to indicate five cards, in any combination from the two decks, which were selected and held by the experimenter. Afterwards, the experimenter shuffled and presented the five chosen cards, from which they selected (blindly) one card. They were told that the value shown on this final selected card would determine their payment. In one deck (the "safe" deck, presented to participants as Deck A), all of the cards had a face value of 10 Euro, whereas the other ("risky" deck, presented as Deck B) contained five cards worth 20 Euro and five cards worth nothing. The instructions provided full information about the composition of the two decks to participants and gave them the expected value (10 Euro) of the "risky" deck. Also, the instructions stated explicitly that by choosing all five cards from the "safe" deck they would be guaranteed a payment of 10 Euro, and gave an example of how to "mix" their chances of different payoffs by choosing different numbers of cards from the two decks. Specifically, it gave the example that by choosing three cards from Deck A and two cards from Deck B, the chance of winning 20 Euro was 1/5, the chance of winning 10 Euro was 3/5, and there was a 1/5 chance of winning nothing. The number of choices taken from the "risky" deck served as our measure of a person's gambling risk-taking propensity. These additional tasks were completed after the DOSPERT-G items, to insure that they did not influence the responses on the main scale.

Procedure

Survey administration differed slightly between the university and lab participants. For the university participants, the final 25 minutes of a course lecture were reserved for participation in the study. General instructions were given, indicating only that a survey about various risky behaviors would be given and those who did not wish to participate were free to leave, but that those that wished to remain and complete the survey would receive a chocolate bar and course credit, if applicable. Furthermore, participants were told that they could leave at any time without penalty. Instruction was given to proceed forward through the survey, without looking back. Participants worked at their own pace and handed the completed survey in to the experimenter, received payment, and were dismissed.

The lab participants were recruited from a database maintained by the Center for Adaptive Behavior and Cognition (ABC) Research Group of the Max Planck Institute for Human Development. Upon agreeing to participate, they made individual appointments with the experimenter and completed the DOSPERT-G, self-report items, and gambling task in a single session. Informed consent was obtained from participants prior to the tasks, and payment (contingent on their choices in the gambling task) was delivered at the end of the session.

Results

Demographic information and responses on all three response scales did not significantly differ between the university sample and the lab participants and thus were combined and analyzed together.

Scale properties

Reliability statistics for the six domain subscales of the DOSPERT-G are shown in Table 1, in particular Cronbach's alpha and average item-total correlations. For all three response scales, the values of Cronbach's alpha are acceptable but moderate: responses on the gambling domain were most reliable, while responses on the social domain were least reliable. The average item-total correlations in Table 1 – the mean value of the correlations between a given item and its respective domain-subscale mean –

Table 1
Domain subscale specific Cronbach's alpha and mean item-subscale-total correlations for risk behavior, risk perception, and expected benefit scales

Domain	Alpha			Item-total correlation		
	behavior	perception	benefit	behavior	perception	benefit
Investment	0.79	0.71	0.79	0.78	0.74	0.78
Gambling	0.82	0.85	0.83	0.80	0.83	0.81
Health	0.65	0.67	0.65	0.54	0.55	0.54
Recreational	0.74	0.72	0.73	0.60	0.59	0.59
Ethical	0.74	0.68	0.78	0.60	0.56	0.63
Social	0.51	0.63	0.56	0.49	0.54	0.51

Note: Sample size from 520 to 529 participants per domain with pairwise deletion.

indicate similar domain differences in reliability, with the gambling domain possessing the strongest item-total correlations for the risk behavior (0.80), risk perception (0.83), and expected benefit (0.81) response scales, and the social domain the weakest (0.49 for risk behavior; 0.54 for risk perception; 0.51 for expected benefit).

A principal components analysis (PCA) was performed on the 40 items of the DOSPERT-G risk behavior scale, to examine whether the empirical factor structure would follow our *a priori* classification of six content domains.[1] As shown in Table 2, all items except one loaded correctly onto the hypothesized domains, when using a six factor solution. Items are assigned to the factor on which they show the highest loading. The one item that did not load correctly concerned the purchase of illegal drugs for one's own use and loaded higher on the ethical factor than the health factor. This is not surprising considering the ambiguity of the question – a similar discrepancy for this item occurred on the original DOSPERT-E (WBB, 2002).

The same PCA procedure was performed on the 40 items of the risk perception scale, where the six-factor solution accounted for 42% of the response variance, with the recreational and gambling domains accounting for the most (8.11%), and the investment domain accounting for the least (5.85%). For the expected benefit scale, the six-factor PCA solution accounted for just over 43% of the variance, with the most explained variance coming from the ethical domain (9.23%), as in the risk behavior scale, and the least from the health domain (5.87%). These results indicate risk-taking as well as perceptions of risks and benefits show distinct patterns that differ for six content domains represented by the 40 items of the DOSPERT-G. The similarity between degrees of risk-taking in different domains was assessed by correlating the risk behavior scores across respondents for pairs of domains. Table 3 shows the correlations for each pair of domain subscales. The generally low values of these correlations suggest that risk-taking does not easily generalize across domains, reiterating the need for a domain-specific measurement instrument.

Of the 36 correlations between the six domain subscale scores and the respective self-report items, twelve were significant. Of these twelve, the six correlations between self-reported behavioral frequency and the respective domain subscale score were the highest, with an average correlation of $r=0.40$. This provides an indication of the convergent validity of the DOSPERT-G. However, the number of risky choices in the gambling task did not significantly correlate with the DOSPERT-G gambling items. On one hand, this illustrates the caution necessary in generalizing from experimental gambling tasks to risk-taking in other domains, a problem discussed in the introduction. On the other hand, it could very well be that our gambling task was too complicated, since other research (C. Eckel & R. Wilson, February 27, 2003, personal communication) has indeed found correlations between DOSPERT-E gambling items – and only those items – and risk-taking in laboratory gambling tasks that involved simpler, pairwise choices.

Gender and cultural differences in risk taking and perceived risks and benefits

Table 4 shows the means and standard deviations of risk behavior, risk perception, and expected benefits ratings, separately for male and female respondents and for each of the six domain subscales. For comparison purposes, we also show the corresponding means for the American respondents of WBB (2002). For all but the social domain, German males were significantly more likely to engage in the risky behaviors, perceived

[1] Varimax rotation with Kaiser normalization was performed in SPSS for the results reported. Oblique rotation (Oblimin in SPSS) was also explored but the results were essentially the same. Principal axis factoring, using the same rotation methods, provided the same factor structure, although with marginally different loadings and slightly lower explained variance.

Table 2
Factor loading of 40 items of the risk behavior scale

Item	Factor 1	2	3	4	5	6
Explained variance	8.15	8.01	6.85	6.83	6.15	5.75
Ethical						
B13	**0.69**	0.11	0.01	0.00	0.09	–0.10
B05	**0.63**	0.02	0.09	–0.03	0.09	–0.07
B14	**0.61**	–0.03	0.28	0.21	0.13	–0.09
B09	**0.60**	0.00	0.17	0.06	–0.02	0.07
B25	**0.57**	0.08	0.06	0.02	0.26	–0.07
B28	**0.57**	0.27	0.09	–0.03	–0.06	0.11
B20	**0.44**	0.15	0.00	–0.03	0.08	0.23
B12	**0.41**	–0.02	0.08	0.02	0.38	0.07
Recreational						
B21	0.06	**0.73**	0.03	0.14	0.12	0.06
B31	0.08	**0.67**	0.10	0.15	0.10	–0.02
B02	0.15	**0.66**	–0.09	–0.22	–0.08	0.14
B15	0.27	**0.56**	–0.10	–0.19	0.01	0.09
B06	0.12	**0.54**	0.13	0.10	0.06	–0.14
B38	–0.07	**0.49**	0.04	0.28	0.21	0.08
B17	0.04	**0.47**	0.12	0.06	0.21	–0.07
B37	–0.05	**0.44**	0.04	0.16	0.34	0.06
Gambling						
B11	0.13	0.09	**0.81**	0.12	0.11	0.09
B03	0.14	0.05	**0.80**	0.10	–0.06	–0.07
B22	0.08	0.09	**0.79**	0.20	0.05	0.07
B33	0.07	0.03	**0.70**	0.00	0.18	–0.06
Investment						
B24	0.01	0.03	0.09	**0.84**	–0.03	0.04
B07	0.05	0.10	0.07	**0.79**	0.03	–0.09
B30	0.00	0.08	0.05	**0.78**	0.10	–0.01
B18	0.08	0.09	0.33	**0.55**	0.11	–0.01
Health						
B36	–0.06	0.09	–0.04	0.03	**0.61**	–0.06
B29	0.16	0.02	0.11	–0.05	**0.60**	0.04
B40	0.03	0.03	0.06	0.06	**0.55**	0.10
B32	0.17	0.27	0.00	0.00	**0.51**	–0.13
B27	0.19	0.11	0.08	–0.09	**0.46**	–0.07
B39	0.13	0.30	0.04	–0.09	**0.40**	0.12
B08	0.17	0.08	0.05	–0.03	**0.36**	0.27
B04	0.43	0.31	0.04	–0.12	0.26	0.19
Social						
B01	–0.03	–0.07	0.01	–0.11	–0.04	**0.70**
B16	–0.01	0.10	–0.02	–0.03	0.01	**0.69**
B35	–0.03	0.14	0.04	–0.03	0.05	**0.56**
B10	0.12	0.03	–0.02	0.07	0.05	**0.53**
B26	0.23	0.17	–0.16	–0.16	0.02	**0.36**
B19	0.20	0.03	–0.14	0.20	–0.15	**0.36**
B34	–0.05	–0.05	0.03	–0.02	–0.01	**0.24**
B23	–0.08	–0.12	0.04	0.09	0.10	**0.22**

Note: Bold font indicates highest loading matches intended domain. Explained variance is after rotation, in percent.

the risk of these behaviors to be lower, and expected the benefit of engaging in these behaviors to be higher, when compared to German females. In the social domain, male and female respondents did not differ significantly in their behaviors or perceptions, although they did differ in the benefit expected from engaging in socially-risky behaviors, with women expecting greater benefits. On average, both males and females were most likely to take social risks (M=3.71 and 3.72, respectively), expected the greatest benefit from these behaviors (M=3.37 and 3.52, respectively) and perceived behaviors in this domain as the least risky (M=2.15 and 2.13, respectively), compared to

Table 3
Pearson correlations among domains for risk behavior scale

Domain	Gambling	Health	Recreational	Ethical	Social
Investment	0.30	0.01	0.16	0.08	–0.01
Gambling	–	0.22	0.17	0.26	0.01
Health		–	0.42	0.44	0.12
Recreational			–	0.31	0.14
Ethical				–	0.12

Note: Based on a sample size of 532 participants.

other domains. The differences between the social domain and each of the other domains were significant for each response scale, $p<.05$ with Bonferroni correction for multiple tests. In contrast, both males and females perceived the gambling domain as the most risky ($M=3.66$ and 3.76, respectively) and least beneficial ($M=1.75$ and 1.53, respectively), and were least likely to engage in gambling behavior ($M=1.71$ and 1.53, respectively). Again, each of the mean differences were significant for all response scales, $p<.05$ with Bonferroni correction. The social domain showed the most consistency across participants, with the lowest variance on all three scales.

When comparing these results to the data obtained from the American student population, the most noticeable differences are in the health and ethical domains. German males and females perceive risks in the health domain as less severe (by 0.22 and 0.39, respectively) and engage in them more readily (by 0.29 and 0.41, respectively) than their American counterparts. The same is true for German males and females when considering risk perceptions (0.58 and 0.64 less, respectively) and behaviors (0.76 and 0.78 more, respectively) in the ethical domain. All eight of these mean differences are significant at the .01 level (Bonferroni corrected).

Relationship between risk taking and perceived risks and benefits

To examine possible explanations of our observed domain, gender, and cultural differences in risk taking, we regressed risk behavior on

Table 4
Means (M) and standard deviations (SD) for risk behavior, risk perception, and expected benefits, by gender

Domain	German Data (N=532)		US Data (N=357)	
	males (N=185)	females (N=347)	males (N=146)	females (N=211)
		Risk behavior		
Investment	2.63 (0.89)	2.31 (0.85)	2.75 (1.08)	2.38 (0.86)
Gambling	1.71 (0.76)	1.52 (0.69)	1.82 (1.01)	1.48 (0.75)
Health	2.74 (0.66)	2.45 (0.63)	2.45 (0.77)	2.04 (0.71)
Recreational	2.68 (0.77)	2.44 (0.70)	2.80 (0.88)	2.49 (0.82)
Ethical	2.74 (0.68)	2.53 (0.63)	1.98 (0.68)	1.75 (0.61)
Social	3.71 (0.47)	3.72 (0.46) (ns)	3.54 (0.62)	3.71 (0.56)
		Risk perception		
Investment	2.46 (0.72)	2.79 (0.72)	2.43 (0.73)	2.69 (0.69)
Gambling	3.66 (0.99)	3.76 (0.84) (ns)	4.00 (0.96)	4.08 (0.84) (ns)
Health	3.30 (0.57)	3.59 (0.56)	3.52 (0.63)	3.98 (0.60)
Recreational	3.04 (0.58)	3.28 (0.59)	3.05 (0.72)	3.39 (0.65)
Ethical	2.97 (0.54)	3.11 (0.54)	3.55 (0.71)	3.75 (0.69)
Social	2.15 (0.49)	2.13 (0.48) (ns)	1.99 (0.50)	1.97 (0.55) (ns)
		Expected benefit		
Investment	2.84 (0.91)	2.60 (0.84)	–*	–*
Gambling	1.75 (0.80)	1.53 (0.66)	–*	–*
Health	2.06 (0.59)	1.80 (0.51)	1.75 (0.53)*	1.42 (0.35)*
Recreational	2.67 (0.73)	2.52 (0.66)	3.13 (0.91)*	2.77 (0.61)* (ns)
Ethical	3.09 (0.72)	2.85 (0.72)	2.32 (0.68)*	1.84 (0.53)*
Social	3.37 (0.53)	3.52 (0.54)	2.96 (0.69)*	2.97 (0.46)* (ns)

Notes: Male and female means are significantly different, $p<.05$, with Bonferroni correction, except where noted by (ns). US data for risk behaviors and risk perceptions come from Weber, et al. (2002), Study Three.

* US data for expected benefit come from Weber, et al. (2002), Study Two, which used a 50-item scale without separate investment and gambling domains and a smaller sample size (58 males, 61 females); direct comparisons with the German Data warrant caution.

expected benefit and risk perception across respondents. The coefficients and adjusted R^2 of these analyses are shown in Table 5. The proportion of explained variance ranged from 58% in the recreational domain to 34% in the social domain. In each domain, the intercept term can be interpreted as showing how much baseline risk is attributed to behaviors in the domain, i.e., the degree of likelihood of behavior when perceived risks and benefits are zero. Table 5 indicates that our respondents had a higher baseline likelihood of engaging in health and social risk behaviors than in other risk behaviors. The perceived benefit coefficient shows how much expected benefit *increases* the likelihood of engaging in the associated behavior, as can be inferred from the positive sign on these coefficients across domains. Similarly, the perceived risk coefficient shows how much perceived risk *decreases* the likelihood of engaging in the associated behavior, reflected by negative values across domains. These coefficients represent the *impact* of the expected benefit or perceived risk on behavior and get multiplied with the judged *magnitude* of perceived benefit and risk associated with a given activity to determine risk-taking behavior.

The risk-return regressions can also add insight into the source of the cultural differences in risk taking discussed above, by comparison with the corresponding coefficients from WBB (2002, Study 2, Exhibit 7)[2]. Consider the differences in ethically-risky behaviors, where the German population was more willing to take ethical risks. Because the coefficients for the effect of perceived risk on risk taking are not substantially different for the American (–0.21) and German (–0.25) populations, the observed cultural differences in risk taking are likely due to the difference in the impact of expected benefits on risk taking (0.32 and 0.57, respectively), with the Germans giving greater weight to expected benefits in this domain. In addition, differences in ethical risk taking are due to the greater perception of risk in the American sample (Table 4); although the impact of the perceived risk is similar in the two cultures, the perceived magnitude of risk is larger for Americans.

Separate regressions of risk behavior on expected benefits and perceived risks shed light on the sources of gender differences in risk taking as well. Table 4 showed that German (and American) males perceived most risks to be smaller and most benefits to be larger (with the exception of social risks, where the opposite was true). Table 4 indicates that, just as in the US data, gender differences are far stronger for the perceptions of risks and benefits than for the effects of perceived risks and benefits on behavior (i.e., for the regression coefficients, which express attitudes towards risk and benefits). Especially for expected benefits, regression coefficients are very similar in size for males and females. Regression coefficients for the effect of perceived risk on behavior are somewhat larger for females in four of the domains, and somewhat smaller in two of the domains (investment and social risk), but don't show very large differences in either direction[3].

Test-retest reliability

Finally, we examined the test-retest reliability of our translated instrument and administered the complete DOSPERT-G (plus 10 new items for pre-testing) twice, in a lab setting, with the second scale administration occurring after a period of two weeks. Sixty participants, recruited in the same manner as before, took part in the laboratory study. Test-retest reliability for each of the three response scales and the six domain subscales was computed for all participants (N=60). The data obtained for the risk behavior scale showed good correlations between the two administrations in the health, ethical, and recreational domains (.73, .76, and .77, respectively) and respectable correlations for the social, gambling, and investment domains (.69, .69, and .66, respectively). Lower correlations, although a similar ordering, emerged for the expected benefits scale, where the poorest correlations were in the social, gambling, and investment domains (.64, .56, and .48, respectively), but good correlations were obtained for the health (.73), ethical (.71), and recreational (.69) domains. Finally, for the risk perception scale, there were again lower values on the social and investment domains (.56 and .59, respectively), but higher values for the health, ethical, recreational, and gambling domains (.62, .62, .68, and .71, respectively).

Discussion

The primary goal of this study was to develop and validate a German language scale that allows for the assessment of domain-specific risk propensity. Our results suggest that the DOSPERT-G seems to provide such a tool, based on evidence of reliability, convergent validity, and

[2] It should be noted that the Weber, et al. (2002) regressions were performed on a 50-item version of the DOSPERT-E given to a smaller sample. Also, the regressions were computed separately for each respondent, with only 10 data points, and the resulting coefficients were averaged across respondents. These differences warrant using caution in direct comparison.

[3] By transforming the standardized regression coefficients to Fisher z-scores, significance testing showed no statistical differences in the parameter estimates of German males and females, when using Bonferonni correction for multiple tests.

Table 5
Coefficients and R^2 of regression of risk behavior scale mean on expected benefit scale mean and risk perception scale mean, by domain

Domain	Regression coefficients, entire sample (N=532)			
	intercept	perceived benefit	perceived risk	R^2
Investment	1.17	0.63	–0.16	0.47
Gambling	1.60	0.48	–0.21	0.37
Health	2.81	0.56	–0.38	0.45
Recreational	1.54	0.69	–0.25	0.58
Ethical	1.69	0.57	–0.25	0.54
Social	2.76	0.43	–0.25	0.34
Domain	Regression coefficients, females (N=347)			
	intercept	perceived benefit	perceived risk	R^2
Investment	0.92	0.66	–0.11	0.48
Gambling	1.72	0.46	–0.24	0.36
Health	3.10	0.55	–0.46	0.49
Recreational	1.68	0.66	–0.28	0.57
Ethical	1.73	0.57	–0.26	0.57
Social	2.60	0.45	–0.21	0.34
Domain	Regression coefficients, males (N=185)			
	intercept	perceived benefit	perceived risk	R^2
Investment	1.41	0.59	–0.18	0.41
Gambling	1.50	0.49	–0.18	0.37
Health	2.34	0.56	–0.23	0.35
Recreational	1.24	0.73	–0.17	0.58
Ethical	1.61	0.57	–0.21	0.47
Social	3.06	0.40	–0.32	0.36

test-retest reliability. Furthermore, our results replicate many, if not most, of the findings in the US sample studied by WBB (2002): risk behavior (apparent risk taking) varied for a given respondent across the six content domains. Domain-specific risk taking in one domain showed very little relationship to risk taking in other domains (Table 3). However, those differences in risk-taking were almost completely explained by differences in the perceived levels of risk and benefit associated with activities (Table 5). Perceived-risk attitude, i.e., the tradeoff coefficient in the risk-return regression that indicates how much risk taking is influenced/reduced for each unit of perceived risk, did not show strong differences across domains, making it a candidate for a stable personality trait.

Also similar to WBB (2002), male respondents were found to be more risk-taking in all domains but the domain of social risk (Table 4). The risk-return regression analyses shed some light on gender differences and go beyond validation of the survey in offering a first description of the risk-taking propensities of a German sample in financial (gambling and investing), health, recreational, ethical, and social domains. Furthermore, by specifying predictive models for domain-specific differences in risky behavior, we can examine the relative influence of perceived risks and benefits in explaining risk-taking behavior. Specifically, a linear regression (Table 5) using risk perception and expected benefit as predictor variables was able to explain up to 58% of the respondent and domain variance in the likelihood of engaging in risky behaviors. This DOSPERT-G scale could not only benefit personality psychologists working with German populations but has many other potential applications. By offering a tool that can assess components that contribute to risk propensity (perceived risk, expected benefit, and perceived-risk attitude) in six content domains for German populations, our study extends basic research and provides a psychometric service. The German version of the scale allows for additional cross-cultural comparisons of risk propensity and its contributing variables.

An initial comparison of American and German populations is possible with our data and those of WBB (2002). German respondents were more willing to engage in health and ethical risks, and perceived behaviors in these two domains as less risky, compared to their American peers. Perhaps the socialized medical care system in Germany does not discourage taking health risks to the extent that the capitalist system in America does. It could be that the perception of, e.g., ethical risks is similar, but that the expected benefit of taking ethical risks is greater for Germans (as

supported by comparing regression coefficients obtained here to those in Weber, et al., 2002), and thus behavioral tendencies are greater as well. Although direct causal evidence – such as a supposition that the different penal systems may produce the aforementioned difference in expected benefits from ethical risks – can obviously not be determined by correlational studies, the scale introduced here provides a means for more direct studies of such cultural differences.

The results of the current study seem sufficient to support continued use of the DOSPERT-G, although improvement is always welcome and may be necessary for confident scale use in discerning smaller differences. Perhaps items developed specifically for a German population – rather than developed for an American population and translated from English – would be more effective in tapping the same dimensions. This could provide an alternative to the DOSPERT-G when there is no concern for scale homogeneity for comparison across cultures. We find the possibility of an eventual universal domain-specific risk scale exciting, and consider this the ultimate extension of this line of research. Perhaps a core set of items could be used to compare different cultures, and additional, culturally-specific auxiliary items could be appended for use within a particular culture.

Risk-taking is a widely-studied personality trait that is considered important in a range of applications. Some research correlates a general risk-taking propensity with other personality traits; other research attempts to isolate different types of risk-taking; still other research attempts to operationalize risk taking in laboratory studies. We have shown how considering another approach can be useful, and have provided a tool for making further cross-cultural comparisons possible. Specifically, we believe risk-taking should be studied at a domain-specific level, and that risk-taking can be explained as a function of the anticipated risks and benefits of the behavior as well as attitude towards (perceived) risk. Perhaps, bilingual German populations could even provide a means for comparison of the DOSPERT-G with other domain-specific personality (risk) scales (Horvath & Zuckerman, 1993; Zaleskiewicz, 2001), since the latter have not been translated into German, to our knowledge. Finally, examining cultural differences in the perceptions and attitudes within each separate domain may shed some light on the particular ways in which the social environment influences risk taking.

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