CHAPTER 2

Dealing with Uncertainty in Domains of Everyday Life: Beyond a Trait View of Risk Taking

Introduction

The 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. 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 toward 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 multidomain inventory of risk taking that also measures perceptions of risks and benefits can thus help us 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. I will begin with those approaches that consider risk taking a personality trait and will follow with the way risk taking is studied in behavioral decision making.

Personality Psychology

In early personality psychology research, risk taking was typically viewed as a single personality trait similar to impulsiveness (e.g., Eysenck & Eysenck, 1977). In general, research at the time did not emphasize differential risk taking across domains but rather examined the relationship between risk taking and other personality traits in one specific domain. The single-trait view of risk taking has since been replaced by recognition of distinct risk-taking components. These studies have tried to explain the apparently multidimensional nature of risk taking by looking for risk-taking subtraits and have explored the relationship between risk taking and constructs such as sensation seeking (Zuckerman, 1979; 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 they found significant correlations between sensation seeking and risk taking in only some domains (sports) and not others (financial risk taking). Another study in this same tradition by Weber, Blais, and Betz (2002) is described in more detail below.

Behavioral Decision Making

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, that is, options with a guaranteed payoff. Risk taking is operationalized by comparing observed choices with 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 of risk aversion. Although 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 nontrivial (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, 2004) found that when outcomes were real, rather than hypothetical, respondents were more risk averse for gains and less risk seeking for losses, that is, 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 nonverifiable 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 even as far as 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 risk taking by business executives in realistic settings (MacCrimmon & Wehrung, 1986, 1990; March & Shapira, 1987). Ebbesen, Parker, and Konečni's (1977) reported discrepancies between laboratory and field studies also cautioned 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. Neither group has 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 chapter was designed to address some of these shortcomings.

The German Validation of the Domain-Specific Risk Scale

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 (2002) developed a domain-specific risk-taking (DOSPERT) scale, validated for an American population, which we have translated and validate here for a German sample.

Second, we conceptualize risk taking within a risk–return framework; that is, we see it as a tradeoff between hope and fear (see Weber, 2001 and Weber & Milliman, 1997). To model risk taking as a tradeoff between risk (fear) and expected return (hope) we first must understand and measure decision makers' perceptions of the risks and expected benefits of risky behaviors.

Weber et al.'s (2002) DOSPERT scale 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. Although Horvath and Zuckerman (1993) discussed 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 sex, culture, and membership in specific populations and examine possible explanations for these observed group differences. Previous work suggests that such differences exist. A great deal of research has examined sex differences in risk taking (e.g., Eckel & Grossman, 2002; Poppen, 1995; see Byrnes, Miller, & Schafer, 1999, for a meta-analysis) or the influence of culture (e.g. Weber & Hsee, 2000b), two topics we will address in this first section. In contrast, only little attention has been paid to the heterogeneity of risk profiles among specific populations of risk takers; we devote a separate section of this chapter to this important issue.

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 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), 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 argued 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 what way(s) a risk–return model of risk taking will explain observed domain and cultural differences in risk taking. To address these questions, we translated Weber et al.'s (2002) DOSPERT scale and administered it to two German samples.

Method

The materials used in our study were drawn from a translated final version of the DOSPERT scale of Weber et al. (2002). The 40-item scale comprises eight risky actions from each of five general content domains: recreational, health, social, ethical, and financial. For the financial domain items were then divided into four items each relating to investing and gambling, which were identified as independent and separate risk-taking domains by Weber et al. (2002), consistent with other work by March and Shapira (1987) and the work of Zaleskiewicz (2001), making six domains for our study. Henceforth we will refer to the original version of the scale as the *DOSPERT-E* (English version), our translated version of the scale as the *DOSPERT-G* (German version), the three separate judgments made by participants as response *subscales*, and the six content areas as *domains*. The 40 items of the DOSPERT-G are shown in Appendix A, and the instructions for each of the three response subscales in Appendix B. Note that the items in Appendix A are labeled according to their content domain. These labels were not seen by participants in our study. We used the method of back-translation (Brislin, 1986) for all materials used in the study (40 domain-specific risk-scale items, response-scale instructions, and 46 self-report items), with native/fluent speakers reading and translating the corresponding text parts.

Participants

The DOSPERT-G (40 items, evaluated on each of three response subscales) was administered to 451 students at the Free University of Berlin, Germany, as well as to 101 laboratory participants at the Max Planck Institute for Human Development in Berlin, Germany. Twenty of the paper-and-pencil survey packages 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 laboratory samples, respectively. The mean age of the entire sample was 24.5 years (*SD* = 4.66); the sample was somewhat biased toward females (65.2%). University participants were given a nominal reward and course credit, if applicable, upon completion of the survey package, whereas laboratory participants were paid according to the outcome of an additional task, as described below.

Materials

Items from the six domains were randomly interspersed and appeared in a different random order for each of the three response subscales. The risk behavior subscale asked participants for the likelihood with which they would engage in each described activity if given the opportunity. The risk perception subscale asked them to indicate how risky they perceived each activity to be. The expected benefit subscale 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 perception of risk, and greater expected benefits, respectively. The subscales were administered on three separate occasions, with different response instructions. The presentation order of the three response subscales was counterbalanced across participants.

The laboratory 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 Weber et al.'s (2002) self-report inventory of real risky behavior frequencies, consisting of 27 items in German (see Appendix C). Second, laboratory participants were given a nonhypothetical 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 10 cards. They were instructed to indicate 5 cards, in any combination from the two decks, which were selected and held by the experimenter. The experimenter then shuffled and presented the 5 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 euros, whereas the other deck (the "risky" deck, presented as Deck B) contained 5 cards worth 20 euros and 5 cards worth nothing. The instructions provided participants with full information about the composition of the two decks and gave them the expected value (10 euros) of the "risky" deck. Also, the instructions stated explicitly that by choosing all 5 cards from the "safe" deck they would be guaranteed a payment of 10 euros 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 euros was 1/5, the chance of winning 10 euros 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 subscales.

Procedure

Survey administration differed slightly between the university and laboratory 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 who 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. Instructions were given to work through the survey questions sequentially, without returning to previous questions. Participants worked at their own pace and handed the completed survey in to the experimenter, received payment, and were dismissed.

The laboratory 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, participants 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 subscales did not significantly differ between the university and laboratory participants and thus the samples were combined and analyzed together.

Scale Properties

Reliability statistics for the six domains of the DOSPERT-G are shown in Table 2.1, in particular Cronbach's alpha and mean item–total correlations (i.e. the mean value of the correlations between a given item and its respective domain-subscale mean). For all three subscales, the values of Cronbach's alpha are acceptable but moderate: Responses on the gambling domain were most reliable, and responses on the social domain were least reliable. The average item–total correlations in Table 2.1 indicate similar domain differences in reliability, with the gambling domain possessing the strongest item–total correlations for the risk behavior (.80), risk perception (.83), and expected benefit (.81) subscales, and the social domain the weakest (.49 for risk behavior; .54 for risk perception; .51 for expected benefit).

Table 2.1 Domain-subscale-specific Cronbach's alpha and mean item–total correlations for risk behavior, risk perception, and expected benefit subscales

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.

A principal components analysis (PCA), using a Varimax rotation with Kaiser normalization, was performed on the 40 items of the DOSPERT-G risk behavior subscale to examine whether the empirical factor structure would follow our a priori classification of six content domains. As shown in Table 2.2, 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, which loaded higher on the ethical factor than the health factor. This is attributed to the ambiguity of the question—a similar discrepancy for this item occurred on the original DOSPERT-E (Weber et al., 2002).

The same PCA procedure was performed on the 40 items of the risk perception subscale, 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 subscale, 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 subscale, and the least from the health domain (5.87%). These results indicate that risk taking as well as perceptions of risks and benefits shows distinct patterns that differ for the 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 2.3 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.

Table 2.2 Factor loading of 40 items of the risk behavior subscale

	Factor					
Item	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.

Table 2.3 Pearson correlations among domains for risk behavior subscale

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.

Of the 36 correlations between the six domain scores and the respective self-report items, 12 were significant. Of these 12, the 6 correlations between self-reported behavioral frequency and the respective domain subscale score were the highest, with an average correlation of r = .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 item scores. 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 scores on DOSPERT-E gambling items—and only those items—and risk taking in laboratory gambling tasks that involved simpler, pairwise choices.

Sex and Cultural Differences in Risk Taking and Perceived Risks and Benefits

Table 2.4 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 domains. For comparison, we also show the corresponding means for the American respondents of Weber et al. (2002). For all but the social domain, German males were significantly more likely to engage in the risky behaviors, perceived 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 the other domains. The differences between the social domain and each of the other domains were significant for each response subscale, $p < .05$ 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 was significant for all response subscales, $p < .05$ with Bonferroni correction. The social domain showed the most consistency across participants, with the lowest variance on all three subscales.

Table 2.4 Means and standard deviations (in parentheses) for risk behavior, risk perception, and expected benefits, by gender

	German data (*N*=532)		U.S. data (*N*=357)	
Domain	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)

Note. Male and female means are significantly different, $p<.05$, with Bonferroni correction, except where noted by (ns). U.S. data for risk behaviors and risk perceptions come from Weber et al. (2002), Study 3. *U.S. data for expected benefit come from Weber et al. (2002), Study 2, which used a 50-item scale without investment and gambling domains and a smaller sample size (58 males, 61 females); direct comparisons with the German data warrant caution.

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 perceived risks in the health domain as less severe (by 0.22 and 0.39, respectively) and engaged 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 expected benefit and risk perception across respondents. The coefficients and adjusted R^2 of these analyses are shown in Table 2.5. 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 the baseline propensity to engage in those behaviors when perceived risks and perceived benefits are zero. Table 2.5 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 when they are compared with the corresponding coefficients from Weber et al. (2002, Study 2, Exhibit 7). 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; although the impact of the perceived risk is similar in the two cultures (i.e., as indicated by the regression coefficients), the perceived magnitude of risk is larger for Americans (see Table 2.4).

Separate regressions of risk behavior on expected benefits and perceived risks shed light on the sources of sex differences in risk taking as well. Table 2.4 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) than females perceived them to be. Table 2.4 indicates that, just as in the U.S. data, sex 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 toward 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 (gambling, health, recreational, and ethical) and somewhat smaller in the remaining two (investment and social risk) but do not show very large differences in either direction.

Table 2.5 Coefficients and R^2 of regression of risk behavior subscale mean on expected benefit subscale mean and risk perception subscale mean, by domain

	Regression coefficients, entire sample (*N*=532)			
Domain	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
	Regression coefficients, females (*N*=347)			
Domain	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
	Regression coefficients, males (*N*=185)			
Domain	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

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 laboratory setting, with the second subscale administration occurring after a period of 2 weeks. Sixty participants, recruited in the same manner as before, took part in the laboratory study. Test–retest reliability for each of the three subscales and the six domains was computed for all participants (N = 60). The data obtained for the risk behavior subscale 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 in a similar ordering, emerged for the expected benefits subscale, 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 subscale, 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 is such a tool, based on evidence of reliability, convergent validity, and test–retest reliability. Furthermore, our results replicate many, if not most, of the findings in the U.S. sample studied by Weber et al. (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 2.3). However, these differences in risk taking were almost completely explained by differences in the perceived levels of risk and benefit associated with activities (Table 2.5). Perceived-risk attitude, that is, 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 participants in Weber et al. (2002), male respondents were found to be more risk taking than females in all but the social domain (Table 2.4). The risk–return regression analyses shed some light on sex differences and went 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 to what degree perceived risks and benefits explain risk-taking behavior. Specifically, a linear regression (Table 2.5) 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 benefit personality psychologists working with German populations and 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 Weber et al. (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. In the ethical domain, it could be that the perception of risks is similar, but that the expected benefit of taking such 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—obviously cannot 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 we 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 toward (perceived) risk. Finally, examining cultural differences in the perceptions and attitudes within each separate domain may shed light on the particular ways in which the social environment influences risk taking.

Risk-Taking Behavior in Heterogeneous Populations

In the previous section we challenged the prevailing notion that risk taking is a stable trait in which individuals show consistent risk-seeking or risk-avoiding behavior across domains and we subscribed to an alternative approach that appreciates the domain specificity of risk taking: Individuals who exhibit high levels of risk-taking behavior in one content area (e.g., bungee jumpers taking recreational risks) can exhibit moderate or low levels in other risky domains (e.g., financial). In the following study, we sought to further validate the domain-specific nature of risk taking by recognizing the heterogeneity of risk profiles among experimental samples.

Method

Our methodology diverges in an important way from previous research. Instead of using a heterogeneous group (i.e., university students) and exploring how they cluster into categories on a risk scale, we studied distinct but internally homogeneous groups composed of individuals who were chosen precisely because of their extreme risk-taking behavior.

We hypothesized that, as in previous studies, we would observe domain-specific differences in the behaviors and perceptions of risky activities. Furthermore, we hypothesized that these trends would be best elucidated by clustering our sample a priori into homogenous subsamples. These hypotheses predicted that the targeted subsample (e.g., gamblers for the gambling domain) would show greater propensity for engaging in risky behaviors within their domain, without (necessarily) exhibiting strong risk-seeking tendencies in other domains. To our knowledge, this is the first study to employ a domain-specific approach to investigate populations specifically for their behavioral tendencies. This is an important methodological advance with respect to the selection of experimental participants who are typically drawn from the same underlying population.

The current study applied this method by recruiting individuals who are known to be risk takers (e.g., skydivers, smokers, and gamblers) or risk avoiders (e.g., gym members) in one domain. Although our study might seem to resemble previous research, such as investigating stockbrokers', bankers', and lay people's risk attitudes in the financial domain (e.g. MacCrimmon & Wehrung, 1990), ours is the only study to look simultaneously at different subpopulations and different risk-taking domains. That is, not only did we examine domain-specific behaviors, but we employed "domain-specific" participants, which also provides us with another, novel way to test the validity of the DOSPERT scale (Weber et al., 2002).

Participants

Participants (N = 146, mean age 28.1 years, SD = 8.86) were recruited from the recreational domain (e.g., bungee jumpers, hang gliders, scuba divers; n = 39), the health-seeking domain (i.e., gym members; n = 24), the health-risk domain (i.e., smokers; n = 50), the gambling domain (i.e., casino gamblers; n = 19), and the investing domain (i.e., members of stock-trading clubs; n = 14).

Materials and Procedure

The full version of the German DOSPERT scale (DOSPERT-G), containing 40 items, was evaluated on each of three subscales. There were eight items each for recreational, health, social, and ethical domains; there were four items each for the gambling and investing domains. The risk behavior subscale asked participants for their likelihood of engaging in each of the risky activities represented by an item; the risk perception subscale assessed how risky they perceived these activities to be; and the expected benefit subscale asked what perceived benefit they would obtain from engaging in each activity. All judgments were made on a 5-point Likert scale, whose endpoints and midpoint were labeled: High values indicated greater likelihood of engagement in the behavior, greater perception of risk associated with the activity, and greater expected benefit for engaging in the activity. After initial phone contact with relevant clubs or institutions, paper questionnaires were given personally to participants. General instructions were given indicating only that a survey about various risky behaviors and perceptions would be given and that those participating (anonymously) would be paid (8 euros) upon completion.

Results

Mean behavioral scores for each risk domain are given in Table 2.6 and are depicted in the upper graph of Figure 2.1, separately for each subsample. Table 2.6 is organized such that domain-specific risk propensity can be viewed across columns, whereas differences dependent on subsample membership can be viewed across rows—variance across both columns and rows indicates these dependencies. We propose that the subsample is a useful level of analysis, especially when subsample clustering can be theoretically, empirically, or intuitively performed prior to analyses. Here, we report several indicators of this advantage.

Table 2.6 Mean scores on DOSPERT-G subscales, by subsample

	Subscale (risk-taking domain)				
Subsample	Recreational	Gambling	Investment	Health	*N*
		Behavior subscale			
All	2.87	1.82	2.61	2.79	146
Male	3.04	1.91	2.69	2.88	94
Female	2.57	1.65	2.47	2.64	52
Athletes	3.25[a]	1.54	2.69	2.82	39
Gamblers	2.66	2.99[a]	2.51	2.57	19
Investors	2.92	1.70	3.20[a]	2.54	14
Smokers	2.90	1.74	2.47	3.04[a]	50
Gym members	2.33	1.56	2.52	2.54[b]	24
		Perception subscale			
All	3.08	3.70	2.65	3.37	146
Male	2.97	3.61	2.60	3.22	94
Female	3.27	3.86	2.73	3.64	52
Athletes	3.07	3.85	2.70	3.54	39
Gamblers	2.78	3.12[b]	2.61	2.86	19
Investors	3.16	4.21	2.61	3.42	14
Smokers	2.98	3.67	2.44	3.35	50
Gym members	3.47	3.70	3.04	3.51	24
		Expected benefits subscale			
All	2.67	1.72	2.68	1.84	146
Male	2.75	1.77	2.77	1.97	94
Female	2.53	1.54	2.74	1.71	52
Athletes	3.02[a]	1.38	2.73	1.81	39
Gamblers	2.36	2.54[a]	2.26	1.89	19
Investors	2.65	1.86	3.27[a]	1.71	14
Smokers	2.75	1.57	2.94	2.04[a]	50
Gym members	2.21	1.67	2.52	1.74	24

Notes. [a]Value is significantly higher than mean across remaining four subsamples; [b]Value is significantly lower than mean across remaining four subsamples. Subsamples for these comparisons do not include All, Male, or Female.

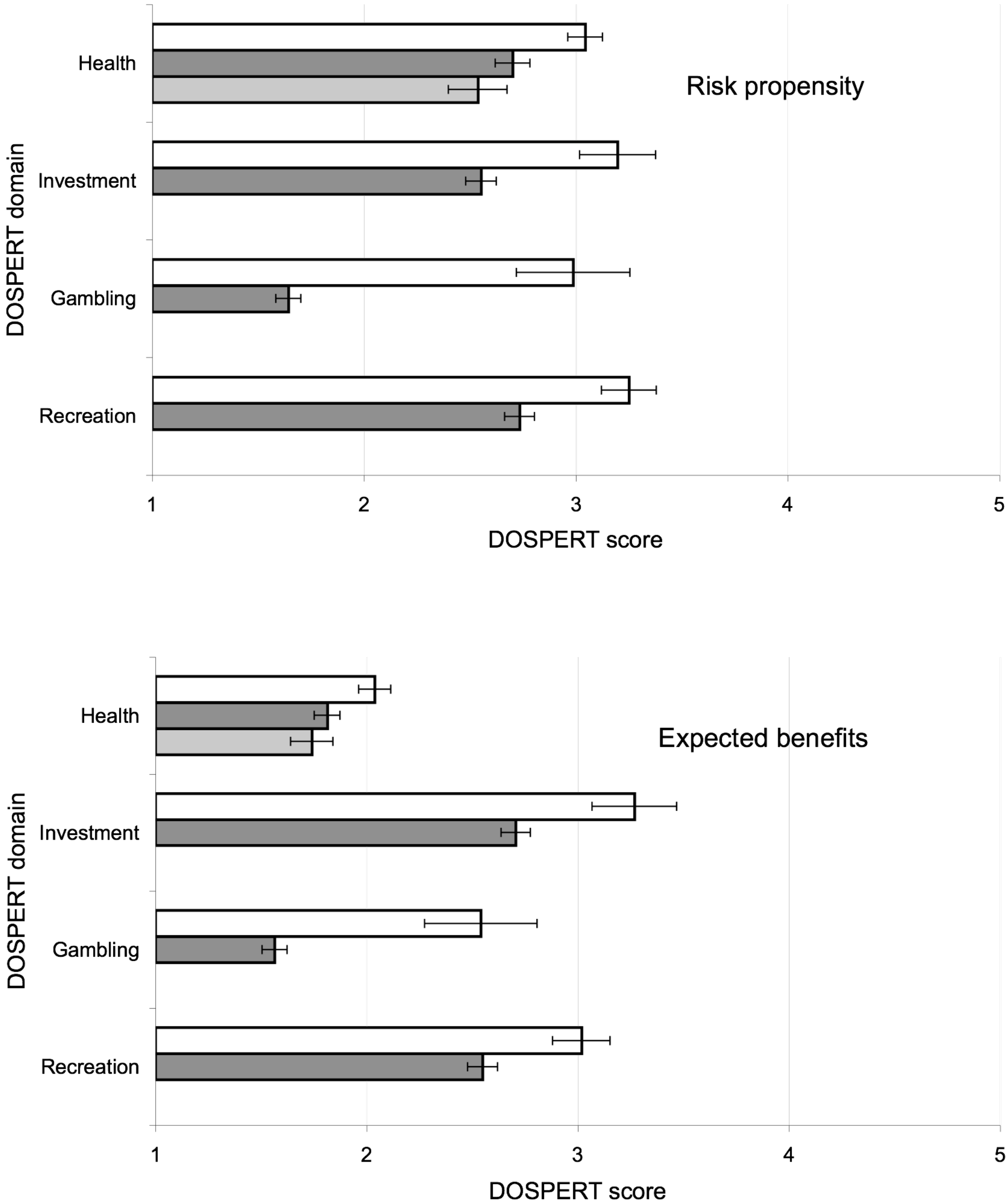

Figure 2.1 Mean DOSPERT scores by domain and subsample. Illustrates mean risk propensity (above) and mean expected benefit (below), across DOSPERT domains. White bars in each domain represent the mean of the target subsample, dark bars represent the mean of all other subsamples combined; in the health domain, the white bars represents Smokers, the light shaded bar represents Gym-goers, and the dark bar represents all remaining subsamples combined. Error bars represent standard error.

Differences in Risk-Taking and Perceived Benefits Among the Experimental Subsamples

First, we examined differences in the mean behavioral risk-taking propensity in each domain. A repeated-measures analysis of variance (ANOVA) indicates that there was a main effect of domain, F (3, 423) = 45.92, p < .01, as well as an interaction between domain and subsample, F

(12, 423) = 8.74, $p < .01$. According to our hypotheses, the interaction is due to the subsample corresponding to a particular domain exhibiting a greater risk-taking propensity; this is indeed the pattern evident in Table 2.6 and Figure 2.1 (see upper part). Specifically, the highest scores within each domain belong to the associated subsample. Furthermore, in the recreational, gambling, and investment domains, *t*-tests show that the associated subsample indeed had higher mean scores than the mean across all remaining subsamples (all *p*-values less than .01). In the health domain, *t*-tests indicate that the subsample of smokers had a higher mean score ($p < .01$), and the subsample of gym members a lower mean score ($p = .05$), than the mean across remaining subsamples. These results support the validity of the DOSPERT scale in revealing tendencies to engage in risky behaviors within specific domains.

Next, we performed similar analyses on the mean expected benefit of risk taking in each domain (lower graph of Figure 2.1). The results indicate that the differences in behavioral tendency may be explained in part by differences in the perception of expected benefit. A repeated-measures ANOVA indicates a main effect of domain on expected benefits, F (3, 423) = 75.98, $p < .01$, and an interaction between domain and subsample, F (12, 423) = 8.15, $p < .01$. The lower part of Figure 2.1 shows that, within a given domain, the appropriate subsample that possessed a greater behavioral tendency showed a similar increase in expected benefits of risky behaviors in the domain. Again, *t*-tests of the difference between the associated subsample and all remaining samples support this claim in the recreational, gambling, and investment domains ($p \leq .01$), and for the smokers in the health domain ($p = .01$). For perceived riskiness, a repeated-measures ANOVA again suggests a main effect of domain, F (3, 423) = 52.98, $p < .01$, and a domain–subsample interaction, F (12, 423) = 2.11, $p = .02$. However, planned contrasts examining differences between the target subsample and the remaining subsamples were significant only in the gambling domain when considering perceived riskiness, where gamblers had lower perceptions. Thus, it seems the benefits, rather than the costs, of engaging in risky activities better explain patterned subsample differences in behavioral propensities.

Relationship Between Risk Taking and Perceived Risks and Benefits

We performed several regression analyses to explore this claim further, as well as to identify the contribution of subsample membership in predicting behavioral propensities. Specifically, for each domain, we predicted behavioral scores first with a linear model including the perception and expected benefit scores as predictors (see Weber et al., 2002 for details), and second by including these predictors plus variables reflecting subsample membership. In the first set of models, the standardized coefficients for perceived risk were all negative, and those for expected benefits all positive, suggesting the intuitive impact on risk-taking propensity (see also Weber et al., 2002). More precisely, the magnitude (absolute value) of the coefficients was much larger for expected benefits (mean beta across domains of 0.62) than for perceived risk (mean of 0.16), suggesting the former, indeed, to be more important in determining risk propensity. The models that additionally included the predictors coded for subsample membership accounted for the most variance, with adjusted R^2 values ranging from 0.36 (health) to 0.61 (recreational).

Predicting Risk Propensity by Subsample Membership

A final indicator of the utility of focusing on subsamples is the variance in Table 2.6 that can be explained by subsample predictions, relative to other methods. Specifically, if we predict an individual's behavioral score by using the overall mean across all subsamples and domains (2.63), we obtain a sum of squared errors (SSE) of 473.66. Using the overall mean ignores the context (risk domain) and individual differences (subsample membership), using only the mean of all respondents across all scale items—such as a single measure of risk taking. By using the subsample means from Table 2.6 to predict individual scores in each domain, we obtain an increase in explained variance, SSE = 307.55, R^2 = 0.34, adjusted R^2 = 0.24. However, sex, a ubiquitous subsample variable in studies of risk taking, does not produce similar improvement, SSE = 349.54, R^2 = 0.25, adjusted R^2 = 0.21.

The data of the current study are best summarized in two ways—across subsamples within a domain, and across domains within a subsample. First, consider the latter (differences across columns of Table 2.6, within each row), indicating domain specificity of risk propensities, perceptions, and expected benefits. Second, consider the differences across rows in Table 2.6, which show the differences across subsamples. Of particular interest is the fact that, for propensities and expected benefits, values for the associated subsample are greatest in each domain (e.g., extreme athletes in the recreational domain). Theoretically, these results support a domain-specific approach to studying risk within a "cost–benefit" framework. Methodologically, the results demonstrate the advantage of using domain-specific measurements, and of using subsamples as a compromise between aggregate and individual levels of analysis. Admittedly, these analyses provide only a first glimpse of the utility of this approach in one area (risk taking); more stringent tests in this and other tasks are imperative.

Discussion

Although employing new methodology can at times be risky, our study does have several broad and exciting ramifications. It illustrates the utility of investigating heterogeneous clusters of risk takers, instead of college students, to further our understanding of the psychological processes that determine and motivate risky behavior, as well as their effects on the experimental results. The level of analysis we utilize here also avoids the pitfalls associated with aggregating data across participants from different underlying populations and simultaneously avoids the dependencies and low power that plague individual analyses.

The current results suggest that taking risks is largely mediated by the perceived benefit of the activity, and to a lesser extent by the perceived risk. Skydivers, for example, view skydiving as far more beneficial (and somewhat less dangerous) in comparison to individuals from the other subsamples. Needless to say, our data do not allow one to explain risk-taking behavior solely on account of the perceived benefit and/or riskiness, since people might have many other motivations to participate in various activities (such as monetary reward, belonging to a group, etc.). Other studies using the DOSPERT scale have found that perceptions of risk, rather than benefits, are a better predictor of risky behaviors among university students (Weber et al., 2002). Furthermore, expected benefit can serve as an important component in explaining risk-taking behavior, such as willingness to smoke (Sloan, Smith, & Taylor, 2003) or engage in unprotected sex (Kershaw, Ethier, Niccolai, Lewis, & Ickovics, 2003). Additional work is necessary to determine the relative impact of the costs and benefits in risk-taking behavior. The current study has shown how such work can be done in a domain-specific manner —by targeting the subsamples of interest.