ABSTRACT - In this paper we explore the concept and measurement of a general opposed to domain-specific risk aversion construct. We review the literature on risk aversion and perceived risk, focusing on issues of concept meaning and measurement, and discuss problems with current measures of risk aversion for research application. An exploratory empirical investigation is reported in which we (1), develop a scale to measure general risk aversion and (2), explore its relationships with intentions to engage in various behaviors vis a vis other similar measures used in the past. The paper concludes with a discussion of the implications of our findings and suggestions for future research.
Exploring the Concept and Measurement of General Risk Aversion
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ABSTRACT
In this paper we explore the concept and measurement of a general—as opposed to domain-specific—risk aversion construct. We review the literature on risk aversion and perceived risk, focusing on issues of concept meaning and measurement, and discuss problems with current measures of risk aversion for research application. An exploratory empirical investigation is reported in which we (1), develop a scale to measure general risk aversion and (2), explore its relationships with intentions to engage in various behaviors via a vis other similar measures used in the past. The paper concludes with a discussion of the implications of our findings and suggestions for future research.

INTRODUCTION
Individuals differ with respect to the amount of risk they are willing to incur in a given situation. As an individual difference variable, this basic predisposition or attitude toward risk has been called “risk aversion” (e.g., Qualls and Puto 1989); it is a key concept not just in marketing but in economics and finance (Xiao, et al. 2001), and researchers have maintained a long interest in how it affects various behaviors. These behaviors include, for example, brand choice (e.g., Tellis and Gaeth 1990), information search (e.g., Moorthy, Ratchford, and Talukdar 1997), preference for gambles (e.g., Kahaneman and Tversky 1979), decision framing of organizational buyers (Qualls and Puto 1989), executive decision making (e.g., MacCrimmon and Wehrung 1984; MacCrimmon and Wehrung 1990), financial portfolio management (e.g., Schooley and Worden 1996; Xiao, et al. 2001), purchase of insurance (e.g., Williams 1966), and even the distance from which people choose to toss a ring onto a pole (McClelland 1961), among others.

Despite the amount of interest and research attention devoted to risk aversion, there are several issues to confront regarding its conceptualization and measurement. First, there remains the question of whether or not a general risk aversion exists: are people generally averse to all types of risk, regardless of domain? The literature on perceived risk (e.g., Bauer 1960; Jacoby and Kaplan 1972) suggests that this question is open to speculation. As others have noted (e.g., Kogan and Wallach 1964), confirmation that a general risk aversion construct exists—one that dispositionally affects behaviors across a variety of situations—would be an important finding. Second, if there is such a construct as a general risk aversion, it would be in the research community’s best interest to be able to measure it with some consistency. Because different studies use different methods to categorize people on the basis of risk aversion, it is difficult to compare findings between studies. Further, the methods used often may not be reliable or valid, leading to obvious difficulties (e.g., Type II errors, “file drawer” studies).

In this paper we attempt to address the above issues by exploring the concept and measurement of a general risk aversion. The paper is organized as follows. First we review the literatures on risk aversion and perceived risk to develop a rationale for such a construct, focusing primarily on issues of measurement. Next we develop a scale for measuring general risk aversion and in a later exploratory study, investigate its predictiveness across a variety of behaviors compared to other currently-used risk aversion measures. Finally, we discuss the implications of our findings for consumer research and suggest directions for future research.

LITERATURE REVIEW

Risk Aversion
The concept of risk aversion evolved from discussions of risky choice by early decision theorists, mostly working with economic applications (cf. Kahneman and Tversky 1979). According to expected utility theory, an individual’s preferences for gambles involving a continuous attribute X (e.g., dollar payoffs) can be modeled by a utility function, \( u(x) \), which reveals the individual to be risk averse if \( u(x) \) is strictly concave, risk seeking if \( u(x) \) is strictly convex, and risk neutral if \( u(x) \) is linear (Fischer, et al. 1986; Miller 1975). A person who is risk averse prefers a riskless outcome \( (x) \) to any risky outcome with expected value \( (x) \). Risk aversion has been defined as a decision maker’s “preference for a guaranteed outcome over a probabilistic one having an equal expected value” (Qualls and Puto 1989, p. 180). Thus, it has been conceived as an individual difference or predisposition, an attitude toward taking risks that is relatively invariant across situations (cf. Qualls and Puto 1989). Typically, consumers’ level of risk aversion (i.e., attitude toward risk) has been measured in one of three ways. In the first method, subjects’ risk aversion is inferred from their responses to various choice dilemmas (e.g., Ghosh and Ray 1997; Kogan and Wallach 1964). The second way is to infer subjects’ risk aversion from their choice outcomes on lotteries or gambles (e.g., Ghosh and Ray 1997; Qualls and Puto 1989). The third way is to use a self-report scale that measures risk aversion specific to the domain in question, e.g., buying a new car (Moorthy, Ratchford, and Talukdar 1997).1 There are problems with each of these approaches, which we now discuss.

Problems With Current Measurement Approaches
Choice Dilemmas. The first method, which relies on inferring attitudes toward risk based on choices in dilemmas, is subject to a number of deficiencies that may limit its general application in consumer research. First, measures of this type do not explicitly address such important issues as construct validation (e.g., logical analysis, construct definition, internal structure analysis), nor issues of reliability such as internal consistency. Consider, for example, perhaps the most popular instrument in use for measuring risk aversion, the Choice Dilemma Questionnaire (CDQ, Kogan and Wallach 1964).2 The CDQ uses a series of 12 scenarios in which a central figure is deciding between two courses of action, and subjects are instructed to imagine themselves giving this central figure advice on how to proceed. Responses are obtained for the level of probability needed before the more attractive (yet probabilistic) alternative would be recommended, and these responses are summed to form an overall score.

1 Although not for purposes of measuring the construct, some research has inferred consumer’s risk aversion from use of price cue in choice under varying information conditions (e.g., Tellis and Gaeth 1990).

2 An alternative to the CDQ is the 16-page “Risk In-Basket” questionnaire developed by MacCrimmon and Wehrung (1984) for studying executive decision making. Its scenarios are tailored to the type of respondents (e.g., patent violation lawsuit, joint venture, union dispute), thus are not suited for broad consumer research use.
Among social psychologists studying the "risky shift" phenomenon the CDQ became the most widely used instrument for measuring risk aversion (see Kogan and Wallach 1967a; Wallach and Mabli 1970; Willems and Clark, III 1969). It is still in use, but for other purposes, such as studying decisions made under varying levels of risk and ambiguity (e.g., Ghosh and Ray 1997). Regarding issues of construct definition and unidimensionality, the original authors of the instrument have stated that their conceptualization of the construct (and hence, their choice of operationalization, the CDQ) is "deterrence of failure" (Wallach and Kogan 1961). Conceived thusly, they argue—and evidence shows—that the CDQ index obtained is sensitive to the perceived magnitude of losses incurred in each situation (size of failure), in addition to any general attitude toward risk arising from uncertainty. The instrument measures two sources of variance for the single construct, which violates the unidimensionality criteria. When the CDQ is used, researchers do not report evidence of its validity and reliability, but simply refer to the original authors’ works (e.g., Kogan and Wallach 1964). Several later studies have shown the CDQ to be prone to misinterpretation by subjects (Willems and Clark, III 1969), multidimensional (Clark, III and Willems 1969), and unreliable in its entirety for many studies (cf. Wallach and Mabli 1970), yet it remains in use.

Further, the scenarios may require tailoring to each group being studied. Two examples will suffice to illustrate these points and are listed in the Appendix (see the Appendix). In the first (A-1), the original asks subjects to advise "Mr. D," the captain of the college football team, on which play to call that will decide the outcome of the game; in the second (A-2), the original asks subjects to advise "Mr. F" about which university to attend for a PhD program. There are several problems with these scenarios. First, subjects with knowledge of college football may be confused by the parameters of the first dilemma: it is not the team captain, but the coach (or perhaps quarterback) who would call the play; and modern NCAA rules allow for overtime in the case of a tie. Second, note the confusing language and sentence construction of each scenario (e.g., the use of option “X” and option “Y,” the periphrastic sentences). In our empirical study we attempted to correct these deficiencies by revising the scenarios so they appear more modern and more clear (see B-1 and B-2 in the Appendix); nonetheless, the problems outlined above still apply (and see results, below). Finally, the CDQ is very lengthy (12 dilemmas, each an entire paragraph), requiring much time and cognitive effort on the part of respondents, possibly resulting in fatigue.

Gambles. Despite the ease with which they lend themselves to experimental investigation (Kogan and Wallach 1967b) and their ability to provide standardized comparisons across subjects (MacCrimmon and Wehrung 1984), there are several problems with using batteries of lotteries or gambles to ascertain risk aversion. Besides being criticized as unrealistic, thus potentially failing to elicit typical decision behaviors (MacCrimmon and Wehrung 1984), lotteries may measure an aversion to risk that may be specific only to a particular domain. The gambles used typically implicate gains or losses of money (e.g., Kahneman and Tversky 1979) or life (e.g., Elliott and Archibald 1989). These domains arguably are related to the facets of financial or physical risk (cf. Jacoby and Kaplan 1972; Kaplan, Szybillo, and Jacoby 1974). It is unclear whether such measures relate more generally to situations or choice contexts involving other facets of risk, such as social risk. Furthermore, using such instruments to determine risk aversion may be problematical for certain research applications or when using certain groups as subjects. Using batteries of gambles, while considerably shorter than the choice dilemmas, may be unreliable (hence, invalid) for some subjects who lack the ability or motivation to calculate expected values of the probabilistic choices. For example, it may be that subjects lower in need for cognition (Cacioppo and Petty 1982; see also Cacioppo, et al. 1996) opt for the choices which do not require mental calculus (i.e., the “sure” bets in items C-2 and C-3 in the Appendix). Further, whether or not subjects opt to “buy” a gamble may reflect the influence of other unintended factors, such as their current financial situation. While this may make some more or less risk averse, it may only be in the specific domain of finances, and not a general risk aversion.

Finally, and perhaps most problematical, risk taking behavior has been shown to violate the notions of expected utility theory (e.g., Kogan and Wallach 1967b) and vary according to context effects (e.g., Fischer, et al. 1986; Payne, Laughhunn, and Crum 1980, 1984). Kogan and Wallach (1967b, p. 116-117) report a large number of studies which show that subjects often do not choose the options that offer the highest expected utility or expected value. Further, people have been shown to be risk averse when gambles are framed as gains or “speculative risk situations,” but risk seeking when gambles are framed as losses or “pure risk situations” (Williams 1966), the phenomenon which Kahneman and Tversky (1979) dubbed “the reflection effect.” Moreover, the level of outcomes (e.g., $1 payoff vs. $5,000 payoff for the same probability) may affect an individual’s preference for a gamble, depending upon the person’s internal reference point or target return governing such decisions (Payne, Laughhunn, and Crum 1980, 1984). Therefore, it is unclear exactly what level of risk aversion is being measured in negatively framed versus positively framed items in a battery of gambles. This may explain why a measure comprised of 24 “simple lotteries” failed to reliably discriminate subjects into categories of risk aversion in a recent study (Ghosh and Ray 1997). Using a measure consisting of seven gambles, Qualls and Puto (1989) classified people as “globally” risk averse (risk seeking) if they chose sure (probabilistic) outcomes regardless of the loss/gain frame, and as “context dependent” if they chose sure outcomes for gains and risky outcomes for losses. While this potentially may mitigate the classification problem, it does not entirely clarify the levels of risk aversion, especially for the latter category. Given the asymmetric preference for risk in the loss and in the gain frames it is logical to inquire how many of the seven items were loss (gain) framed.

Self-Report Measures. Besides research that has used choice-based measures of risk aversion, other research has operationalized risk aversion using scales that relate the risk involved to specific decision situations. For example, in a study examining consumer information search for automobiles, Moorthy, Ratchford, and Talukdar (1997) measured agreement on a seven-point scale to four items, such as “When I buy a car, it is not a big deal if I buy the wrong model by mistake” (p. 273). Cronbach’s alphas for the scale were 0.79 and 0.74 for the two groups of buyers used in the study (“in-process” or “already-purchased”). Although this study purportedly measured “risk aversion,” the authors themselves note that they are measuring consumers’ attitudes toward “the risks of making a wrong brand or dealer choice” (p. 273). However, as discussed below, the concept of perceived risk involves both the perceived uncertainty of outcomes and the perceived importance of negative consequences. These authors measured consumers’ attitudes toward the importance dimension for a specific situation but they did not measure attitudes toward uncertainty, an important and argu-
able more general component of perceived risk and, similarly, general risk aversion. Thus, the measure may be limited to use in this specific research context or in others similarly circumscribed. In sum, there is much research implicating the notion of risk aversion as an influence on a variety of behaviors, which demonstrates the importance of accurately assessing the construct. Prior research has produced a variety of operationalizations of risk aversion, but each of the means described is limited. These limitations may be heightened when attempting to examine a general—as opposed to domain-specific—risk aversion. We now discuss this issue in light of the perceived risk literature.

Perceived Risk. By definition, risk aversion implicates the notion of perceived risk (Bauer 1960), yet the concept of risk aversion has not been considered explicitly in terms of extant perceived risk research. Perceived risk has received much research attention in consumer behavior since Bauer’s (1960) introduction. Overall perceived risk is comprised of two components, the perceived uncertainty of outcomes, and the perceived importance of negative consequences associated with the outcomes of a choice (Bauer 1960; Ross 1975). It may be that individuals vary with respect to both components; however, it would seem more likely that a general attitude toward risk would reveal itself in the first dimension, that is, attitude toward uncertainty. Moreover, the level of consequences may differ by situation, rendering it difficult to capture a predisposition for that dimension. Conceiving risk aversion as attitude toward uncertainty is in line with definitions of risk aversion in the literature (see above, also Kogan and Wallach 1967b, p.162).

Studies have divided risk into sub-components, or facets (Brooker 1984; Jacoby and Kaplan 1972; Kaplan, Szybillo, and Jacoby 1974). Five facets (performance, financial, physical, social, and psychological risk) explained a large amount of variance (an average of 74%) in overall perceived risk measures for 12 product categories (Jacoby and Kaplan 1972). Further, different facets (e.g., performance and social risk) have different implications for consumer behavior, such as the sources consulted in acquiring information (Lutz and Reilly 1974). It is conceivable that different facets of risk vary independently of one another, and therefore, a general risk aversion may not exert influence on situations that are dominated by say, either high social risk or high functional risk. Later in the paper we explore this issue empirically.

In sum, as a personality trait, a “general risk aversion” construct has not been adequately addressed, nor sufficiently measured. Thus, it is unclear whether an overall attitude toward risk exists (cf. Qualls and Puto 1989) and if it does, how it can be measured in a meaningful way. The next section details an exploratory empirical investigation aimed at shedding a preliminary light on these issues.

EMPIRICAL STUDIES

In order to investigate the concept and measurement of a general risk aversion, we conducted a series of exploratory studies. The first step was to generate a scale for measuring general risk aversion that displayed adequate psychometric properties. Afterwards, we applied the scale in the context of several other measures, including a selection of choice dilemmas and gambles, related measures such as innovativeness (Raju 1980) and risk aversion in product use (Price and Ridgway 1983), and examined the interrelationships among them and their predictiveness against several criterion behaviors. We will begin with a discussion of scale development.

Scale Development Study. Based on the above literature review, a conceptual definition of general risk aversion was generated. We define general risk aversion as an individual’s degree of negative attitude toward risk arising from outcome uncertainty. This is in line with former treatments of the risk aversion concept (e.g., Qualls and Puto 1989), and the more general uncertainty component of perceived risk. The construct is separately defined from the magnitude of consequences, a multiplier of risk perceptions (Bauer 1960) which change from situation to situation. This definition also recognizes the negative valence of the concept: it is aversion to risk, or desire to avoid the threat potential arising from risk, which is the most appropriate way of conceiving the term (Slovic 1999). The next step was to develop a pool of items based on this definition, constructed to reflect agreement or disagreement on seven-point Likert-type scales. Twelve items were generated and judged for face validity and consistency with the conceptual definition by three marketing faculty members. This resulted in the rewording and replacement of several items judged to be inadequate, leaving a total of nine items.

As a first step, these items were administered to a convenience sample of 64 undergraduate business students. The statistical package SPSS was used to conduct an exploratory factor analysis (principal components extraction) and internal consistency reliability analysis, in order to select indicators for the scale (Pedhazur and Pedhazur-Schmelkin 1993). At first, three factors emerged, apparently because of three problematical items which had high cross-loadings between factors. We removed these items and again performed the analysis. This time principal components extracted two factors, with the first explaining 41.3 percent of the variance and the second explaining an additional 19.1 percent. As an initial criterion, all six items loaded above .4 on the first factor, whereas only two items loaded above .4 on the second factor (e.g., Saxe and Weitz 1982). Moreover, the eigenvalue for the second factor was 1.14—very close to the minimum cutoff. These factors suggest that the scale primarily was measuring one factor, and because this was a first attempt at measuring the construct, it was decided to retain all six items and administer the scale to a new sample for further analysis. Coefficient alpha for the six-item general risk aversion (GRA) scale was .72, above the acceptable value suggested by Nunnally (1978). The scale appears in the Appendix.

We next included the GRA scale in a questionnaire with several other measures of risk aversion, measures of behavioral intentions for several “risky” activities, perceived risk and purchase intentions for six product situations (for use in a later study), and measures of personality characteristics and demographics. The measures of risk aversion included a subset of three items from the CDQ (Kogan and Wallach 1964), four typical gambles used in prior work (Elliott and Archibald 1989), a measure of shopping innovativeness (Raju 1980), and a measure of risk aversion in product use (Price and Ridgway 1983). The items from the CDQ and gambles were chosen a priori to reflect the inconsistencies with these measures while maintaining a sufficiently short instrument. The final questionnaire was split into two parts and administered with a short break in between the two, in order to reduce respondent fatigue. Order of the two parts was counterbalanced in two forms randomly assigned to examine a potential order effect (there was none). Cronbach’s alpha for the new sample of 92 students (49 men, 43 women, 78% junior level) was .71, lower than the original .72, but still acceptable (Nunnally 1978).

The general risk aversion scale was again submitted to several factor analyses, both the GRA scale alone and in the presence of other measures. For the six GRA items, the exploratory factor analysis (principal components, n=91) extracted only one factor, based on eigenvalues greater than one, upon which the items loaded (factor loadings ranged from .46 to .76). The single factor explained
Exploring the Concept and Measurement of General Risk Aversion

41.7 percent of the total variance of the scale items. With the goal of obtaining evidence that the GRA scale displays discriminant validity (i.e., whether the scale measured something distinct from other constructs being similarly measured), we ran numerous factor analyses on the scale in the presence of three other construct measures: ‘attentation to social comparison information’ (ATSCI, Bearden and Rose 1990), “innovativeness” (Raju 1980), “risk aversion in product use” (RAPU, Price and Ridgway 1983). For each run we used exploratory factor analysis in SPSS, with a principal components extraction. The results obtained revealed factor structures that did not conform to our expectations (i.e., two factors when two scales were tested, three when three were tested). This may have been attributable to a small sample size being used to test too many items. We discuss the potential limitations later, but for now summarize the present discussion by saying the factor analysis results were quantitatively inconclusive for determining the GRA scale’s discriminant validity, but that it displayed adequate convergent validity and unidimensionality.

Exploratory Study. After finding that the GRA scale displayed adequate unidimensionality and reliability, simple correlation analysis was used to examine several relationships. There were two primary goals to this study. The first goal was to examine the reliability and unidimensionality of the risk aversion measures used in past research, and compare it to those for the new GRA scale. The second goal was to establish evidence of the nomological validity of the general risk aversion construct, and our measure of it, by examining its relationships among other related constructs and criterion behaviors on its own, and in comparison to other risk aversion measures.

We began by examining the inter-item bivariate correlations among three CDQ items and among four choice dilemma items (the items listed in the Appendix, plus one more CDQ item related to job opportunities). These appear in Table 1. Based on the literature review, we did not expect the CDQ items to exhibit strong correlations; nor, however, did we expect them to be entirely uncorrelated. It was somewhat surprising to find that none of the correlations between CDQ items were statistically significant. Note also that the correlations themselves are not far from zero (see Table 1). Cronbach’s alpha for the three item scale was .14 (n=91); deleting the first item raised it to .26 for the two-item scale. Our literature review suggested that the correlations between the gambles would vary in magnitude depending on the size of the expected outcome. Further, the sign of the correlations would likely depend on whether the outcome was framed as a loss or as a gain. The correlations among the four gambles appear in Table 1. Here, note that some of the items are significantly correlated, but others are not (see Table 1). Also, some are positively correlated and some are negatively correlated, depending on the frame (loss or gain), as expected. Coefficient alpha for the four-item gambles scale was .25 (n=92); deleting item 3—the only loss-framed gamble—resulted in an increase of alpha to .44 for the three-scale item.

The next step in our study was to examine the inter-relationships among measures of general risk aversion (summed scales of three CDQ items, four gambles, GRA scale) and related constructs, such as innovativeness (Raju 1980) and a specific risk aversion, namely risk aversion in product use (RAPU, Price and Ridgway 1983). We expected general risk aversion to be positively related to the more specific RAPU, and negatively related to innovativeness.

Table 2 shows the results of a bivariate correlation analysis between measures of these constructs and the GRA, CDQ scale, and Gambles scales (see Table 2). The correlation between the GRA scale and the RAPU scale is in the right direction and significant (r=.31, p=.002, n=92); that between the GRA scale and innovativeness was in the right direction, but insignificant (r=.16, p=.12, n=91). On the other hand, none of the other risk aversion measures was significantly correlated with any other construct measures, including the GRA scale.

Next, we decided to investigate the ability of our scale to correlate with the likelihood of engaging in several behaviors that varied with respect to the amount and type of risk that characterized them. We expected the GRA scale to correlate with behaviors that were relatively higher-risk, and bear no relationship with behaviors that were relatively lower-risk. Using similar means as past work (e.g., Jacoby and Kaplan 1972; Kaplan, Szybillo, and Jacoby 1974) the levels of overall perceived risk associated with ten different behaviors were obtained in pre-tests. We used a q-sort methodology (n=30) to allow subjects flexibility in making judgments. Means and standard deviations for the levels of perceived risk are listed next to each behavior in Table 3 (behaviors are listed in order of decreasing perceived risk). Table 3 shows the bivariate correlations between the GRA scale, the three-item CDQ scale, the four-item Gambles scale, and the ten behaviors. Note that intentions to engage in the three highest-risk behaviors (skydiving, rock climbing, gambling) are strongly and significantly correlated with the GRA scale, while the three lowest (jogging, bicycling, singing karaoke) are not correlated (see Table 3). Further, the GRA scale predicted across a variety of behaviors that varied with respect to the type of risk face one would normally associate with it (e.g., giving a speech is high in social risk, gambling in financial risk, rock climbing in physical risk). The correlation for skiing was only marginally significant (p=.065), while that for “exceeding the speed limit by fifteen or more m.p.h.”—which was rated as relatively high risk—was not significantly correlated (p=.93). Perhaps this behavior reflects a stronger influence of other variables, such as behavioral norms related to abiding law. Further, note that the CD scale was not significantly correlated with any behavioral intentions, while the Gambles scale was marginally correlated with likelihood of engaging in skydiving (See Table 3). Interestingly, the RAPU scale was negatively correlated with several risky behaviors and one non-risky behavior (bicycling), and positively correlated with skiing, a mid-level risk activity.

No correlations were found between the choice-based risk aversion measures and related constructs or, between them and any criterion behaviors. This fact may indicate no relationship between the underlying constructs measured, or it may have been due to the low reliability of those measures compared to the relatively higher reliability of the GRA measure. To explore this issue we conducted a similar bivariate correlation analysis, but in this one we deleted items that lowered the item-total correlations for the scales. This boosted the level of Cronbach’s alpha for each one (from .14 to .26 for the CDQ scale, from .25 to .44 for the Gambles scale). Further, we handicapped the GRA scale by selecting three of its items that together had the lowest possible Cronbach’s alpha (items 2, 4, 6, alpha=.50). The bivariate correlations appear in Table 4. It is evident from the correlations the results do not change for any of the scales. Except for a marginal improvement in predicting likelihood to engage in skiing for the three-item Gambles scale, neither of the two “improved” scales predicts any better. On the other hand, the three-item GRA scale still was correlated with five of the original six behaviors, but fared better for skiing and worse for skydiving than it did in the original analysis.

4We present only qualitative assessment of these factor analyses; however, quantitative analyses (e.g., factor matrices, scree plots, item loadings) are available upon request from the authors.
TABLE 1
Inter-Item Bivariate Correlations

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Note—Numbers in parentheses are standard deviations of the perceived risk scores.
ap<.05

TABLE 2
Correlations Between Risk Aversion Measures and Related Constructs

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bp<.01

TABLE 3
Correlations Between Risk Aversion Measures and Behaviors

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<th>Skydiving</th>
<th>Rock Climbing</th>
<th>Gambling</th>
<th>Exceeding Speed Limit</th>
<th>Skin Diving in the Ocean</th>
<th>Skiing</th>
<th>Giving a Speech</th>
<th>Singing Karaoke</th>
<th>Bicycling</th>
<th>Jogging</th>
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<td>.457</td>
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<td>-.14</td>
<td>-.21a</td>
<td>-.06</td>
<td>-.11</td>
<td>-.10</td>
<td>-.04</td>
<td>.02</td>
<td>-.08</td>
<td>.11</td>
</tr>
<tr>
<td>Gambles</td>
<td>-.19</td>
<td>.05</td>
<td>-.11</td>
<td>.03</td>
<td>.26a</td>
<td>.01</td>
<td>-.01</td>
<td>-.13</td>
<td>-.10</td>
<td></td>
</tr>
<tr>
<td>General Risk Aversion</td>
<td>-.24a</td>
<td>-.37c</td>
<td>-.37c</td>
<td>-.01</td>
<td>-.34c</td>
<td>-.20</td>
<td>-.28b</td>
<td>-.09</td>
<td>-.14</td>
<td>-.06</td>
</tr>
<tr>
<td>Innovativeness</td>
<td>.28b</td>
<td>.24a</td>
<td>.14</td>
<td>.08</td>
<td>.15</td>
<td>.13</td>
<td>.09</td>
<td>.02</td>
<td>.25a</td>
<td>.26a</td>
</tr>
<tr>
<td>Risk Aversion in Product Usage</td>
<td>-.27b</td>
<td>-.34c</td>
<td>-.30b</td>
<td>-.07</td>
<td>-.21a</td>
<td>.34b</td>
<td>-.04</td>
<td>.06</td>
<td>-.32b</td>
<td>.04</td>
</tr>
</tbody>
</table>

Note—Numbers in parentheses are standard deviations of the perceived risk scores.
ap<.05
bp<.01
cp<.001
DISCUSSION

Limitations. One limitation of this study is that it may suffer from “self-generated validity” (Feldman and Lynch 1988), the possibility that subjects used inputs from items appearing earlier in the questionnaires in constructing their responses to later items. It may have been that subjects attempted to maintain consistency between their responses to scale items and in the criterion behaviors. We attempted to guard against this threat by counterbalancing two questionnaire forms across subjects. Additionally, all of the relationships share common method variance, which may increase the size of observed effects. Another limitation is that the relatively low number of subjects in the main study may have caused the exploratory factor analysis results to be unstable, necessitating that they be interpreted with some caution. When our general risk aversion scale was administered by itself, the results clearly indicated a unidimensional factor. When included with other scales, the results did not clearly show the expected underlying dimensions; thus, we cannot say with any certainty that our scale displays the capability of providing researchers with valid insights into esoteric constructs. Clearly, however, instruments that purport to measure any construct should be shown to be reliable and construct valid, if one is to have confidence in their use. Our results indicate that there was high correspondence between subjects’ self-reports obtained using a psychometrically adequate general risk aversion scale, and their reported likelihood of engaging in several risky behaviors. Conversely, there was no evidence that measures of risk aversion like those used in past research bore any relationships with behavioral intentions, and often were unrelated (or worse, negatively related) to other items found within the same scales.

Implications. This study provides limited, but encouraging evidence that it is possible to measure general risk aversion using a simple, self-report scale. The scale displays adequate psychometric properties and correlates well with certain risky activities. It is substantially shorter and simpler than the current methods that use dichotomous measures related to general risk aversion exist (e.g., “tolerance for ambiguity” “functional risk aversion”) but so far no measures of the general construct have appeared in the literature. One possible candidate is the “risk taking” sub-scale of the Jackson Personality Inventory (JPI, Jackson 1976). The JPI is proprietary (cost figures are available from Sigma Assessment Systems, Inc.), and as of the time of this writing, we had not received the scale materials for use, so we do not report on its psychometric properties. We do note, however, that the scale contains 20 items dichotomously measured (“true/false”) and contains an admixture of specific behavior-related items (e.g., “I would enjoy bluffing my way into an exclusive club or private party”) and assessments of overall attitudes toward risk (e.g., “I enjoy taking risks”). Given the findings of this study related to measuring a general risk aversion construct, the JPI risk taking sub-scale may suffer from problems related to its unidimensionality.5 Some past research has suggested

5Interestingly, our scale, developed independent of viewing the JPI, contains one item that is an almost verbatim match to one found on the JPI (“I avoid situations that have uncertain outcomes”). More interestingly, though, is that one of the items we were forced to drop from the GRA scale because of its poor factor analysis results appears almost verbatim in the JPI scale (“I enjoy gambling”).

TABLE 4
Comparisons Among Altered Risk Aversion Measures

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Skydiving</th>
<th>Rock Climbing</th>
<th>Gambling</th>
<th>Exceeding Speed Limit</th>
<th>Skin Diving in the Ocean</th>
<th>Sking</th>
<th>Giving a Speech</th>
<th>Singing Karaoke</th>
<th>Bicycling</th>
<th>Jogging</th>
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</thead>
<tbody>
<tr>
<td>1. GRA2</td>
<td>...</td>
<td>-1.17</td>
<td>-0.36c</td>
<td>-0.34c</td>
<td>-0.04</td>
<td>-0.35c</td>
<td>-0.23a</td>
<td>-0.27b</td>
<td>-0.08</td>
<td>-0.11</td>
<td>-0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. CDQ2</td>
<td>0.09</td>
<td>...</td>
<td>0.08</td>
<td>-0.16</td>
<td>-0.19</td>
<td>0.07</td>
<td>-0.01</td>
<td>-0.09</td>
<td>-0.06</td>
<td>0.03</td>
<td>-0.05</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>3. GAMBL2</td>
<td>-0.07</td>
<td>-0.02</td>
<td>...</td>
<td>-0.19</td>
<td>0.05</td>
<td>-0.08</td>
<td>0.05</td>
<td>0.02</td>
<td>0.33b</td>
<td>-0.03</td>
<td>0.08</td>
<td>-0.10</td>
<td>-0.04</td>
</tr>
</tbody>
</table>

ap<.05
bp<.01
cp<.001
that the risk aversion and tolerance for ambiguity constructs may be related, in that highly ambiguous situations may increase risk perceptions (Ghosh and Ray 1997; Kahn and Sarin 1988; see also Einhorn and Hogarth 1985). Ghosh and Ray (1997) had difficulty operationally separating the two and suggested that future research should address whether risk and ambiguity are part of the same construct. We echo this sentiment.

**Conclusion.** In the past, researchers have inferred consumers’ attitudes toward risk from their choices on made on different gambles (e.g., Kahneman and Tversky 1979; Qualls and Puto 1989), in different decision contexts (e.g., Ghosh and Ray 1997; Kogan and Wallach 1964; MacCrimmon and Wehrung 1984), or the brands they choose (e.g., Tellis and Gaeth 1990). Others have measured risk aversion using scales that relate it to a specific decision situation, such as making a wrong choice of car model (e.g., Moorthy, Ratchford, and Talukdar 1997). However, as discussed, each of these methods may not reliably measure general risk aversion. In this paper we provided tentative empirical evidence against using such means and made an initial attempt to provide a more standardized, psychometrically valid measure of general risk aversion. However, issues regarding the concept and measurement of general risk aversion certainly warrant further investigation.

**REFERENCES**


Jackson, D.N. (1976), *Jackson Personality Inventory*, Port Huron, MI: Sigma Assessment Systems, Inc.


Exploring the Concept and Measurement of General Risk Aversion

APPENDIX

A. Selected original items from CDQ (Kogan and Wallach 1964):

1. Mr. D is the captain of College X’s football team. College X is playing its traditional rival, College Y, in the final game of the season. The game is in its final seconds, and Mr. D’s team, College X, is behind in the score. College X has time to run one more play. Mr. D, the captain, must decide whether it would be best to settle for a tie score with a play which would be almost certain to work or, on the other hand, should he try a more complicated and risky play which could bring victory of it succeeded, but defeat if not.

Imagine that you are advising Mr. D. Listed below are several probabilities or odds that the risky play will work. Please check the lowest probability that you would consider acceptable for the risky play to be attempted.

-------- Place a check here if you think Mr. D should not attempt the risky play no matter what the probabilities.
-------- The chances are 9 in 10 that the risky play will work.
-------- The chances are 7 in 10 that the risky play will work.
-------- The chances are 5 in 10 that the risky play will work.
-------- The chances are 3 in 10 that the risky play will work.
-------- The chances are 1 in 10 that the risky play will work.

2. Mr. F is currently a college senior who is very eager to pursue graduate study in chemistry to the Doctor of Philosophy degree. He has been accepted by both University X and University Y. University X has a world-wide reputation for excellence in chemistry. While a degree from University X would signify outstanding training in this field, the standards are so very rigorous that only a fraction of the degree candidates actually receive the degree. University Y, on the other hand, has much less of reputation in chemistry, but almost everyone admitted is awarded the Doctor of Philosophy degree, though the degree has much less prestige than the corresponding degree from University X.

Imagine that you and several colleagues are advising Mr. F. Listed below are several probabilities or odds that Mr. F would be awarded a degree at University X, the one with the greater prestige. Please check the lowest probability that you would find acceptable to make it worthwhile for Mr. F to enroll in University X rather than University Y.

-------- Place a check here if you think Mr. F should not enroll in University X, no matter what the probabilities.
-------- The chances are 9 in 10 that Mr. F would receive a degree from University X.

B. Updated items from the CDQ (from Elliott and Archibald 1989)

1. Coach Douglas is the head coach of State College’s football team. State College is playing its biggest rival in the final game of the season. The game is in its final seconds, and Coach Douglas’s team, State College, has just scored a touchdown. Now, State College is behind in the score by 1 point. Coach Douglas must choose between two alternatives. On the one hand he can choose to kick an extra point (which is almost certain to work), and settle for a tie. On the other hand, he can try for the two-point conversion—a more complicated and risky play which could bring victory if it succeeds, but defeat if does not.

Imagine that you are advising Coach Douglas. Listed below are several probabilities or odds that the risky play (two-point conversion) will work.

2. Amy is currently a college senior who wants to pursue graduate study in chemistry for a Ph.D. She has been accepted by two universities. University X has a world-wide reputation for excellence in chemistry. While a degree from University X would be very highly regarded, the program is so demanding that only a fraction of the students end up graduating. University Y, on the other hand, has a much lower reputation in chemistry. The degree has much less prestige than one from University X, but almost everyone admitted is awarded a PhD degree.

Imagine that you and several colleagues are advising Amy. Listed below are several probabilities or odds that Amy would be awarded a degree at University X, the one with the greater prestige.

C. Typical gambles used to infer risk aversion:

1. You are offered a chance to buy the following gamble for 50 cents:
   50% chance of winning $1 and 50% chance of winning nothing.
   Please indicate whether or not you will buy the gamble. 1=Yes 2=No

2. You have a choice between the following two options:

   1. A sure gain of $750.
   2. 40% chance to gain $2000 and 60% chance to gain nothing.
   Please indicate which option you will choose.
APPENDIX
(Continued)

3. You have a choice between the following two options:
1. A sure loss of $1500.
2. 80% chance to lose $2000 and 20% chance to lose nothing.
Please indicate which option you will choose.

4. You are offered the chance to buy the following gamble for $3000:
50% chance of winning $6000 and 50% chance of winning nothing.
Please indicate whether or not you will buy the gamble. 1=Yes 2=No

D. General Risk Aversion Scale (From 1= “Strongly Agree” to 7= “Strongly Disagree”)
1. I do not feel comfortable about taking chances.
2. I prefer situations that have foreseeable outcomes.
3. Before I make a decision, I like to be absolutely sure how things will turn out.
4. I avoid situations that have uncertain outcomes.
5. I feel comfortable improvising in new situations.
6. I feel nervous when I have to make decisions in uncertain situations.