A Risk Perception Primer:
A Narrative Research Review of the Risk Perception Literature
in Behavioral Accounting and Behavioral Finance
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Comments and suggestions are always welcomed and appreciated.

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Abstract
A significant topic within the behavioral finance literature is the notion of perceived risk pertaining to novice investors (i.e. individuals, finance students) and investment professionals (i.e. financial planners, security analysts). The author provides an overview of the concepts of risk, perception, and risk perception with the financial scholar in mind. There is also a presentation on the behavioral finance concepts and themes that might influence an individual’s perception of risk for different types of financial services and investment products. The next section presents a discussion of the significant risk perception research in the social sciences namely from psychology. This research work from psychology (i.e. risk perception studies in risky situations and hazardous activities) is the behavioral foundation for a substantial amount of the current contributions within the behavioral accounting and behavioral finance literature. In particular, the work of the Decision Research scholars including Paul Slovic and his co-authors on risk perception studies that have crossed over from psychology to the disciplines of behavioral accounting and behavioral finance (i.e. behavioral risk characteristics from psychology that are applied within a financial/investment decision making context).

Within the last section of this paper, the author reveals the first of its kind thorough review of the academic research studies on perceived risk/risk perception from the disciplines of behavioral accounting since 1975 and behavioral finance since the late 1960s. This literature review incorporates 12 works from behavioral accounting and 71 endeavors from behavioral finance. In addition, the behavioral finance literature review section also includes approximately 10 narrative research reviews from risk perception studies in behavioral economics. A major facet of this paper was to bring together all the previous studies in the risk perception literature for the purpose of conducting a study based on the academic foundation of the main themes, research approaches, and findings from this collection of studies.

Keywords: risk perception, perceived risk, financial risk indicators, behavioral risk characteristics, objective risk, subjective risk, behavioral accounting, standard finance, behavioral finance, psychology, financial psychology

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1.0 Introduction: What is Risk?

Whether the activity is driving a car or investing in the stock market, everyday we are exposed to all forms of risk. Risk can have different meanings to different individuals. Among experts (i.e. academics or professionals) and society (i.e. novices or the public) there is no absolute or formally established meaning of risk. Since scholars do not have the same opinion about how to define risk nor measure risk, a wide range of descriptions and measurements have developed over time according to a sample of works by Slovic (1964a), Payne (1973a), and Weber (1988). The dissertation research of this author has revealed that various research studies have utilized more than 150 unique accounting, financial, and investment measurements from the areas of behavioral accounting and behavioral finance that have been investigated and continue to be considered potential risk indicators (Ricciardi 2004). Rohrmann and Renn (2000) provided the following perspective of risk:

There is no commonly accepted definition for the term risk – neither in the sciences nor in public understanding. In disciplines such as engineering, physics, pharmacology, toxicology or epidemiology, formal definitions based on the probability and physical measurements or corresponding utilities of negative outcomes are preferred; quantification of probabilities and outcomes lie at the core of this approach. In the social sciences, the ‘meaning’ of risk is a key issue, and qualitative aspects of risk are seen as crucial facets of the concept. (p. 13).

While risk is a topic applied collectively and universally across a vast array of circumstances, it does not represent the same meaning across various disciplines, organizations, or individuals. Boardman (1999) made the point that games of chance as a benchmark for risk has intrigued and challenged scientists, statisticians, essayists, historians, economists, behavioralists and philosophers since the ancient times of the Greeks. For instance, an investment professional may consider risk as the potential of losing a client, while the client may consider risk as the possibility of losing their principal or a portion of it, or just not earning as much as with some safe investment.

The phrase “risk” clearly has a comprehensive presence in a wide range of the current literature on financial, economic, societal, and technological issues. The basic definition of risk generally carries a “negative connotation” such as the possibility of harm, loss, destruction, or an undesirable event. Thus, to place oneself “at risk” implies to partake either voluntarily or involuntarily in an activity or activities that might result in harm, loss, or an undesirable event. The definition of risk usually differs in regards to the specific activity, situation, or circumstance. Brehmer writes, “how risk is judged depends upon the context in which the judgments take place” (1987, p.36). For instance, risk assessments about hazardous activities (i.e. nuclear power) might evoke concerns over imminent hazard or danger. While, in another circumstance such as investing in a stock mutual fund risk might be considered a decision tailored to realize or failure to reach a potential investment objective. Renn (1998) focused on the human element of risk, when he stated “risks refer to the possibility that human actions or events lead to consequences that affect aspects of what humans value” (p.51). The human element of risk is highly significant if you assume on a micro-level that the decision maker is one of the most important aspects of defining and understanding risk instead of merely within a macro-level such as all the participants in the financial markets as a whole.

Risk incorporates a systematic set of prospects and statistical chances that include gains (upside risk) and losses (downside risk). Lane and Quack (1999) provide the following perspective of risk:

A dictionary definition of risk is that of a state in which the number of possible future events exceeds the number of actually occurring events, and some measure.
of probability can be attached to them. Risk is thus seen to differ from uncertainty where the probabilities are unknown. Such a definition is beholden to mathematically inspired decision theory, and the ‘rational actor’ model, and does not sufficiently consider the complexity of risk in business. (p. 989)

The technical definition of risk is usually described as follows: “the word risk refers to situations in which a decision is made whose consequences depend on the outcomes of future events having known probabilities” (Lopes, 1987, p. 255). However, many decisions carry a partial element of risk that possess an unknown and an unpredictable result or consequence that was neither considered or expected, since risk involves a component of “uncertainty.” Irrespective of the form of loss, risk is considered the product of the consequence of an event and its probability of occurring.

Risk = Consequence x Probability of Occurrence

To illustrate, whether you are considering the possibility of rain canceling a major league baseball game, or the probability of losing money on a stock mutual fund, the same two components (probability and consequence) interact together. Specifically, risk is identified as “a probability that obeys all the mathematical rules of combination and can thus be handled statistically” (Royal Society, 1997, p. 3).

Another viewpoint of risk expressed by Kaplan and Garrick (1981) in the following manner:

Risk = Uncertainty + Damage

This perspective demonstrates that risk involves a factor of uncertainty and a potential loss that might be incurred. In essence, risk is the potential for recognition of unwanted, undesirable consequences to human life, health, wealth, or the environment. The assessment of risk is typically based on the expected value of the conditional probability of the event occurring times the consequence of the event given that it has transpired. Tversky and Fox stated, “much of the study of decision making is concerned with the assessment of these values and the manner in which they are—or should be—combined” (1995, p. 269).

An additional perspective on risk is reproduced in Elmiger and Kim (2003), the definition of risk is translated from Chinese characters meaning:

Risk = Danger + Opportunity

This equation demonstrates risk as a combination of potential loss and gain. This point of view on risk reveals the relationship between danger and opportunity in which “the trade-off that every investor has to make between the higher rewards that potentially come with the opportunity and the higher risk that has to be borne as a consequence of the danger” (Elmiger and Kim, 2003, p. 28).

From the area of finance, Markowitz (1952) first proposed that investment portfolios could be evaluated in terms of their expected return and the riskiness of that return. Over the years, the standard definition of risk that developed within academic finance was based on complex statistics and mathematics, in which risks are narrowed to purely objective measurements and figures. Haslem (2003) provided an extended application of the widely accepted view of academic finance:

Risk is the other side of return. Returns comprise two elements, the periodic payment of interest or dividends (yield) and change in asset values over a period of time (capital gains/losses). The capital asset pricing model (CAPM) posits that return and risk are positively related – higher return carries higher risk. (p.167)
It’s the belief of this author that investor risk is a situational, multi-dimensional judgment process that is dependent on the specific characteristics of the financial product or investment service. Thus, this paper provides an extensive discussion of the multi-dimensional objective and subjective aspects of risk that incorporate a wide collection of the financial and behavioral risk indicators based on this author’s extensive narrative literature review in psychology, behavioral accounting, and behavioral finance.

1.1 Differing Meanings of Risk

Even though Krimsky and Plough (1988) highlight that the topic of risk can be established as far back as to the Babylonians of 3200 B.C., today it is still exceptionally difficult to pinpoint a straightforward definition of risk. David Garland (2002), provides an interesting overview:

Today's accounts of risk are remarkable for their multiplicity and for the variety of senses they give to the term. Risk is a calculation. Risk is a commodity. Risk is a capital. Risk is a technique of government. Risk is objective and scientifically knowable. Risk is subjective and socially constructed. Risk is a problem, a threat, a source of insecurity. Risk is a pleasure, a thrill, a source of profit and freedom. Risk is the means whereby we colonize and control the future. ‘Risk society’ is our late modern world spinning out of control. (p.1)

There has been an abundance of research studies, both experimental and theoretical on the topic of risk, which reveals distinctive types of definitions of risk and risk-taking behavior based on situational factors and viewpoints across various disciplines. Many studies from psychology and management frequently define risk as a circumstance in which, the consequences of a judgment and the probabilities connected with the consequences are known entities or “measurable uncertainty” as expressed by Baird and Thomas (1985). Risk from a strategic management perspective has been described as “often taken (among other things) as manager’s subjective judgment of the personal or organizational consequences that may result from a specific decision or action” (Bettis, 1983, p. 413). Different personal beliefs of scholars appear to influence the classification of risk-taking behavior fostered in their studies. While other meanings of risk may invoke different perspectives depending on an individual’s expertise, background or life experiences.

Whereas, Vlek and Stallen (1980) in their paper “Rational and Personal Aspects of Risk” provide six groupings of risk definitions: 1) the probability of loss; 2) the size of credible loss; 3) the expected loss; 4) the variance of the probability distribution of all possible consequences or a risky activity; 5) the semi-variance of the distribution of all outcomes or consequences; and 6) a weighted linear combination of the expected value and the variance of the distribution of all potential consequences. These six classifications of risk only reveal the objective nature of risk (i.e. the measurable aspects of risk in terms of profitability or loss) and neglect the subjective factors of risk. Starr, Rudman, and Whipple (1982) express risk in terms of four different types of assessments of risk-taking including: 1) real risk; 2) statistical risk; 3) predicted risk and 4) perceived risk. Whereas, Bowman (1982) described the topic of risk as a “concept relevant before the occasion (i.e., ex-ante), it essentially must be measured in actual empirical work after the occasion (i.e., ex-post)” (p. 34). While, Yates (1990) and Yates and Stone (1992) consider risk taking in a decision-making context within specific “risk dimensions” or “risk indicators” including: loss, the magnitude of the loss, below target-returns, and the uncertainty attached to the loss. Trimpop (1994) conducted an extensive review of the risk research literature and developed the following definition:

Risk taking is any consciously, or non-consciously controlled behavior with a perceived uncertainty about its outcome, and/or about its possible benefits or costs for the physical, economic or psycho-social well-being of oneself or others. (p. 9)
Classical decision theory makes the assumption that individuals behave rationally and make optimal decisions when confronted with judgments regarding risk and uncertainty. Typically, scholars from the social sciences (i.e. psychology) support the notion of a “subjective component of risk” rather than just an “objective risk assessment.” Much of the academic research in academic finance disregards the subjective notion of risk (i.e. behavioral aspect), instead supporting objective representation of numerical data, statistical measures, and distribution of possible outcomes.

1.2 The Meaning of Risk: A Financial Perspective of Two Schools of Thought

Risk is a very important topic of investing since understanding what it is and how it is measured is vital whether developing a business plan or an investment strategy. “Still of controversy is what constitutes risk and how it should be measured” (Blume, 1971, p. 1). This observation by Blume over thirty years ago still holds true today among financial scholars and investment professionals. Frankfurter, McGoun, and Chiang (2002) have commented, “academic research in finance we find two approaches to risk, the ‘traditional’ approach using historical relative frequency distributions and the emerging ‘behavioral’ approach the concerns the findings from psychological experiments” (p. 457).

1.2.1 The Standard Finance View and the Ongoing Debate

Shah (1997) provided the following summary of the main topics concerned with financial and investment risk within academic finance including:

1) Individual preferences and attitudes towards risk of the decision maker are classified into three main groupings including: risk averse, risk neutral, and risk seeker.

2) The main assumptions of Modern Portfolio Theory are risk as variance of return, risk reduction through diversification, the importance of beta risk, and the Capital Asset Pricing Model.

3) The significance of option volatility and the risk of derivative securities.

4) The tools of financial risk management including: hedging strategies, bond duration, volatility, and portfolio insurance.

5) The variety of different categories of asset risk based on the type of financial instrument including: interest rate risk, credit risk, and bankruptcy risk.

Risk is intrinsic in every business decision made by executives of corporations (known as business risk) and the investors of those firms (referred to as investment risk). In business and finance terms, risk definitions are usually concerned with mathematical measurements that include terms such as “probability” and “variance.” Certain factors, more than others, contribute to explaining or help explain why an investment declines in value such as liquidity risk, interest rate risk, inflation risk, default risk, and political risk. The standard finance literature treats risk as a one-dimensional concept and the measurement of risk as objective in nature.

Bernoulli in 1738 published his historic paper “Exposition of a New Theory on the Measurement of Risk” argued that investors do exclusively value financial assets based on the expected return. Since Bernoulli’s celebrated examination, this other aspect of asset pricing has become known as investment risk (Gooding 1976). Modern portfolio theory defines risk as a variation of return, rather than a danger, hazard or the probability of failure. According to standard finance, risk is evaluated and measured based upon variations of actual returns of an investment from its expected return. In standard finance, the basic definition of risk pertains to both “sides of the coin” namely an upside risk in which returns are higher than expected as well as a downside risk in which the probability of earning less than the expected return (i.e. the greater the chance of low or negative returns, the riskier the investment). The two main measures of this type are 1) standard deviation,
which measures the volatility of the return from the average return and 2) the beta coefficient, which measures the volatility of the return relative to the return on the market as a whole (i.e. S&P 500 stock index). Levy and Sarnat (1972) provide a basic description of how standard finance approaches the issue of risk:

Subsequently, various economists have tried to evaluate investments with the aid of two (or more) indicators based on the distribution of returns. Generally one index reflects the profitability of the investment while the other is based on the dispersion of the distribution of returns and reflects the investment’s risk. The most common profitability index used is the expected return, that is the mean of the probability distribution of returns; the risk index is usually based on the variance of the distribution, its range, and so on. (p. 303)

According to modern portfolio theorists, as mentioned earlier, the great trade-off in investing is between risk and return. The main premise is risky investments must offer at least hope of a higher return than risk-free investments or extremely safe financial instruments. Standard financial decision-making makes the assumption that individuals implement extensive analysis to determine whether to accept the likelihood of success, associated with a specific reward (expected return). Standard finance is based on rational decision-making, which makes the premise that higher risk (i.e. lower odds of success) will be rewarded with higher reward (return) known as the risk-return tradeoff. Adam Smith noted this positive association between risk and profits when he wrote, “the ordinary rate of profit varies more or less with the certainty or uncertainty of returns…the ordinary rate of profit always rises more or less with the risk” (1976, p. 213). The standard finance literature makes the assumption that within efficient stock markets, investment risk should best be understood and measured in the framework of diversified portfolios when compared with the overall market this type of risk is known as market risk in works by Markowitz (1952), Markowitz (1959, 1991), Sharpe (1963), and Sharpe (1964).

The Nobel Prize was awarded in 1990 to Markowitz for the formation of modern portfolio theory and Sharpe for the development of the Capital Asset Pricing Model (Ricciardi and Simon, October 2000). The theoretical basis for investigating the relationship between risk and return was developed in a context known as the Capital Asset Pricing Model (CAPM) in studies by Sharpe (1964), Lintner (1965b) and Mossin (1966). This model is based on a theory and approach for measuring any financial decision where investment funds are allocated with the objective of earning future profits. In effect, “The CAPM is a mathematical model that attempts to explain how securities should be priced, based on their relative riskiness in combination with the return on risk-free assets” (Ricciardi and Simon, October, 2000, p.3). Sharpe published his paper “Capital Asset Prices: A Theory of Market Equilibrium” on the Capital Asset Pricing Model (CAPM) based on the previous work of Markowitz (1952, 1959).

Sharpe extended Markowitz’s work with the development of the risk-free asset that helped create portfolio theory and the CAPM. The model was created to describe the behavior of financial security prices and to provide a method whereby investors can evaluate the influence of a possible security investment on their portfolio’s risk and return. In general, investment risk is considered in two separate components: 1) systematic risk inherent in the financial markets such as economic conditions and government policy changes and 2) non-systematic risk based on certain company factors such as financial structure (i.e. leverage) and market value measures (i.e. P/E ratios). Since non-systematic risk is associated with individual firms (stocks) it can usually be diversified away within large portfolios of holdings, thus in theory it is possible to decrease non-systematic risk to essentially zero because of sufficient portfolio diversification. In its simplest forms, the CAPM is a far-reaching theory of risk and return tradeoffs within a perfect marketplace. Because of the issue of portfolio diversification, the CAPM makes the assumption
that all investors own a portfolio, in part, of the collection of overall market securities. This model encompasses the notion of beta, which evaluates the risk and the relationship between the movements in a firm’s stock price and the cumulative market value of the stock market as alluded by (Ricciardi and Simon, October, 2000).

The term “beta” is most often associated from the field of statistics in which it describes the slope of any regression line. Within the context of modern portfolio theory, the appropriate measure of risk is beta, also known as systematic risk, which is concerned only with market-related type risk. Beta is a comparative measure of risk that reveals the volatility of a stock or portfolio relative to a market benchmark. In other words, beta can be defined as the relative change in the return of a stock, given a change in the market’s return. Another way to interpret beta in relation to volatility: it’s a risk measure of variance of a stock value of a long-term investment horizon. Beta within the framework of the CAPM plays three important factors: 1) A method for forecasting a portfolio’s exposure to systematic (market risk); 2) A risk measure of realized exposure to total market risk; and 3) A technique for forecasting expected returns. Many financial scholars define beta as the appropriate measure of risk for a single financial security over the years in works by Blume (1971), Babcock (1972), Crowell (1973), Sharpe (1981), Carvell and Strebel (1984), McLaney (1985), Sharpe (1990), Black (1993), Jagannathan and McGrattan (1995), Grundy and Malkiel (1996), Leusner, Akhavein, and Swamy (1996), and Sharpe (2000).

Studies questioning the reliability of beta as a risk measure have been established in the late 1960s and early 1970s with the emergence of beta and the development of the CAPM. Arditti (1967) found that variance and the skewness of the probability distribution of returns were somewhat sound measurements of risk but beta was not. For instance, Levy (1971) made the point even though betas are relatively accurate and predictable over a long-term time horizon for large holdings of financial securities; they are, rather unpredictable for individual financial instruments (i.e. betas for individual stocks change over time). This is another issue that reveals problems with utilizing historic betas in forecasting risk into the future. In essence, Levy (1971) questioned the soundness of employing historic betas for individual financial securities in building portfolios held in the future.

Over the last thirty years, the validity of historical betas to capture “accurate betas” has been the focus of intensive debate among financial academics in numerous academic studies by Black, Jensen & Scholes (1972), Fama and MacBeth (1973), Roll (1977), Wallace (1980), Lakonishok and Shapiro (1986), Markowitz (1990), Frankfurter (1993), Wagner (1994), Malkiel and Xu (1997), Daniel, Hirshleifer and Teoh (2001) and Bloomfield and Michaely (2002). In particular during the 1990s, the criticism of beta and the CAPM within the financial literature has intensified with the emergence of behavioral finance. For instance, there has been the discussion of Behavioral Capital Asset Pricing Theory by Shefrin and Statman (1994), Shefrin and Statman (2000), and Shefrin (2003) and Behavioral Asset Pricing Model by Ramiah & Davidson (2003). The significant paper by McGoun “The CAPM: A Nobel Failure” in 1993 revealed the shortcomings and dissatisfaction of this asset pricing model.

The seminal paper by Fama and French (1992) presented the most detrimental information against the validity beta and the CAPM. The authors conducted a cross-sectional study and reported that beta cannot explain the variance of average returns of stocks over the period 1936-1990. They found that firm size and book-to-market equity are statistically related to expected returns. The authors revealed that the cross-sectional association between stock returns and market betas are close to zero (there appeared to be no relationship between the 2 factors). In its place, their findings show that the natural logarithm (ln) of the market value of equity of a firm, ln(ME), considers the ability of the company’s beta to explain the return. The authors found the two highly accepted factors that justified stock returns (i.e. the leverage ratio and the earnings-price ratio), provided low
explanatory power when the natural logarithm of the ratio of book equity to market equity, \( \ln(BE/ME) \), was incorporated in the equation with \( \ln(ME) \). The authors surmise that the natural logarithm of the market value of equity of a firm, \( \ln(ME) \) and the natural logarithm of the ratio of book equity to market equity, \( \ln(BE/ME) \) are proxy variables for the fundamental risk factors in common stock returns. In effect, the size of a company seems to be a much better measurement of risk than beta of the CAPM. In summary,

Renowned researchers Eugene Fama and Ken French have done extensive research in this area and found factors describing “value” and “size” to be the most significant factors, outside of market risk, for explaining the realized returns of publicly traded stocks. (Womack and Zhang, 2003, p. 8)

1.2.2 The Financial Perspective of Risk: The Basic Viewpoint of Standard Finance Scholars--Risk is Objective

Standard finance has provided academics with an abundance of literature on objective risk measures namely historical risk (i.e. beta, standard deviation), various measures of risk (i.e. credit risk, liquidity risk), and a choice of academic models (i.e. Capital Asset Pricing Model, Arbitrage Pricing Model, Multi-Factor Models, Proxy Models). Objective risk is quantitative in nature, which is based on past occurrences of an event and incorporated into a numerical assessment in order to estimate risk for a specific type of financial security, situation or decision. Standard finance scholars emphasize this perspective of risk as the most effective investment methods for financially managing a wide range of financial securities. Objective measures of risk are based on either a number of observations or calculations, with a focus on long-term data over a specific time period, and sophisticated statistical calculations to measure risk for specific financial instruments. In comparison to subjective risk, objective risk is more precisely observable and therefore measurable. For instance, tossing a pair of dice is an objective risk because the odds are easily calculable and identifiable. Even though the outcome of the dice toss has a degree of uncertainty, an individual can make a decision regarding objective risk since it’s based on academic theory, experimentation, or common sense. Moore (1968) described objective risk as:

The term risk commonly denotes only those future events in which probabilities of alternative possible outcomes are known. Objective probability is a measure of the relative frequency of alternative events, and is strictly applicable only to those events which are repetitive in nature, and so possess a frequency distribution from which observations can be drawn and statistical inferences can be made. When a large number of observations are available, the most probable frequency generated by chance closely approximates the objective probability of an event. (p. 33)

On the other hand, behavioral finance scholars have a different perspective of risk, since it has been revealed constantly that the objective aspect of risk within decision-making and a person’s understanding of it, known as subjective (perceived) risk, are not inevitably the same. Fundamentally, “quantitative measures such as beta, standard deviation, semivariance, mean absolute deviation, skewness, and kurtosis have been identified as different dimensions of risk perceived by investors” (Modani, Cooley, and Roenfeldt, 1983, p. 33). When individuals focus on objective risk they have in mind risk that have been confirmed scientifically utilizing the best obtainable knowledge and data, on the other hand perceived risk is rooted in subjective factors (Garland 2002).

1.2.3 The Behavioral Finance Viewpoint of Risk

For the purpose of this paper, the author defines behavioral finance as an interdisciplinary field, developing theoretical basis, know-how, and research methods from the diverse decision-making sciences of psychology and behavioral economics. A substantial component of the behavioral
finance literature examines the decision making process of all types of investors (i.e. experts, novices, investment professionals, students) in terms of specific themes or concepts (i.e. prospect theory, over-confidence, loss aversion). Behavioral finance scholars take a different viewpoint of risk and decision-making when compared to standard finance academics. Sortino (2001) wrote “recent research in the behavioral finance area claims that investors do not seek the highest return for a given level of risk, as portfolio theory assumes…. Rather than maximize the expected return, they want to maximize a ‘satisfying’ strategy” (p.13).

Psychologists from the branches of cognitive and experimental psychology have made the argument for many years that the basic assumptions of classical decision theory are incorrect since individuals often act in a less than a fully rational manner but many of their errors are predictable. In particular, the seminal work by Kahneman & Tversky (1979) advocated a new theory pertaining to risk-taking behavior known as prospect theory. In effect, under the assumptions of prospect theory there are departures from rationality (i.e. classical decision theory) in terms of judgments and choice. Olsen noted prospect theory “gives weight to the cognitive limitations of human decision makers” (1997, p.63). Prospect theory holds that there are persistent biases driven by behavioral factors that influence individual’s choices under risky conditions for a specific situation or circumstance. It assumes that people are loss averse in which they are more concerned with losses than by gains and as a result a person will assign more significance to avoiding loss than to achieving gain. This theory asserts that there are continual biases motivated by emotional (affective) and cognitive factors (mental processes) that influence a person’s choices under specific situations as pointed out in Edwards (1995), Ricciardi and Simon (2000), and Ricciardi (2003). In effect, the work on prospect theory “revolutionized the field of financial economics by proposing that behavioural biases in general, and prospect theory in particular are better explanations of how decisions are made in risky situations” (Naughton, 2002, p. 110).

The field of psychology supports the notion of behavioral decision theory in which the concepts of bounded rationality, cognitive limitations, and heuristics are the theoretical foundation. Individuals usually make judgments concerning a problem that is not clearly defined, has limited knowledge of possible outcomes and their consequences, and chooses a satisfactory outcome (also known as satisficing) based a sample of works by Simon in 1947, 1956, and 1997. Behavioral finance is based on the notion of bounded rationality, in which a person utilizes a modified version of rational choice that takes into account the limitations of knowledge, cognitive issues and emotional factors. Bajeux-Besnainou and Ogunc provided this perspective:

‘Satisficing’ is an optimization methodology that involves emotions, adaptive learning and cognitive biases. Simon calls for individuals to ‘satisfice’, that is, to optimize until it is close enough in the traditional sense of optimization. By contrast, the traditional way of optimizing is a maximization of a utility function subject to budget constraints, as in the classic economics framework. (2003, p.119)

Singer and Singer (1985) describe the difference between two sets of decision makers: “economists seek to explain the aggregate behavior of markets, psychologists try to describe and explain actual behavior of individuals” (1985, p. 113) Even scholars from behavioral finance do not necessary focus on the individual decision maker for instance, De Bondt and Thaler (1994, 1995), focus their review on financial decision-making on markets and firms rather than on the individual (i.e. the professional investor). Skubic and McGoun (2000) offer the following criticism of standard finance, “for a discipline having individual choice as one of its fundamental tenets, finance surprisingly pays little attention to the individual” (p.3). Mear and Firth (1988) provide a different perspective of risk in the following passage:
One alternative to Beta as a measure of risk is the use of the subjective risk perceptions of investment professionals. This measure of risk can be operationalized by taking a linear average of the subjective risk perceptions of a group of investment advisors and portfolio managers. In some ways this method of deriving risk estimates is similar to the assessments made by Moodies, Standard and Poors, and others, in grading bonds, and to assessments made by investment committees/teams who evaluate investments. (p. 336)

Over the years, an emerging topic in the finance and investments literature has been the study and application of the area of risk perception in works by Green and Maheshwari (1969), Gooding (1975), Oster (1976), Laughhunn, Payne and Crum (1980), McInish and Srivatava (1984), Maital, Filer, and Simon (1986), and De Bondt (1993). Since 1995, there have been an increasing number of research studies on risk perception specifically in different types of financial securities by noted behavioral finance scholars within the United States and Europe in works by Shapira (1995), Olsen (1997), Weber, and Milliman (1997), MacGregor, Slovic, Berry, and Evensky (1999), Ganzach (2000), Gosczynska and Guewa-Lesny (2000a), Olsen and Troughton (2000), Shefrin (2001), and Olsen and Cox (2001). Olsen (2001) describes the research work in the area of risk perception:

- Risk is multi-attribute in nature. It involves such elements as feelings of control, dread, and knowledge.
- Risk perceptions are influenced by social and cultural factors such as trust, fairness, and democratic values.
- Risk always contains an emotional or affective dimension. (p. 159)

Additional factors that support the notion of risk as a multi-dimensional process are the potential for a large loss (catastrophic loss in dollar terms), the effects of heuristics, the possibility for below-target returns (i.e. downside risk in percentage terms), and the concern of catastrophic losses (i.e. the notion of large losses in dollar terms based on the assumptions of loss aversion and prospect theory) account for the explanations of investors’ risk perceptions.

In regards to the decision-making process, standard financial theory makes the assumption that investors behave rationally and that under most conditions of risk, people make financial decisions based on their own approach towards risk and to the actual degree of risk. However, several academic studies have shown that this investment decision-making process is not yet thoroughly significant to describe financial decision behavior. Behavioral finance assumes a vital aspect of the investment decision-making is the subjective aspect of perceived risk by the investors rather than exclusively the “objective risk” emphasized by standard finance scholars. Thus, by recognizing the subjective nature of an individual’s own perception of risk as a supplement to the traditional measures of objective risk broadens the understanding and improves the overall area of risk judgment (measurement). Finance scholars as well as investment professionals recognize that how individuals perceive risk might influence stock prices. According to Farrelly and Reichenstein (1984), “it is individuals’ perception of, and ultimately their reaction to, risk that affects stock price” (p. 6). In other words, actual risk is not the only aspect: how investors perceive and react to that risk is also a significant factor.

Cooley (1977) suggested over twenty-five years ago that risk research should concentrate on the individual decision maker (i.e. an expert professional, an individual investor) in order to gain better understanding into the valuation process. The later part of this paper reveals the significant literature in behavioral accounting and behavioral finance based on laboratory experiments and mailed surveys that documents the wide range of behavioral risk characteristics and financial risk.
indicators that influence an individual’s perception of risk. Lastly, an observation by Frankfurter, McGoun, and Chiang (2002) provides an interesting closing quote:

Behavioral finance has looked at risk in greater depth and found that attitudes toward risk are not logical…. Real individuals usually have to address risk in situations that they have never encountered before and will never encounter again, for which statistical techniques are largely irrelevant…. There is clearly much more to risk than finance has begun to consider, and much of it involves how people form images of the events of which they are expected to assess the risk. (p. 456)

1.2.4 The Psychology of Risk: The Viewpoint of the Behavioral Finance Scholars--Risk has a Subjective Component

Aside from objective measures of risk, behavioral finance scholars have a different viewpoint of risk. An abundance of research studies conducted by Kahneman, Slovic and Tversky (1982), Kahneman and Tversky (2000) and Slovic (2000) divulges a wide range of cognitive biases that transform objective prospects into subjective factors. “The objective odds are either lowered or heightened depending on the person’s experiences, inclinations toward risk taking, and the particular circumstances surrounding a given situation” (Roszkowski, 2001, p.244). Selto and Cooper describe perceived (or subjective) risk “as the perception of the attributes of objective risk, which perception may be imperfect and which may be affected by many attributes of the choice” (1990, p. 229-230).

Risk, by definition, contains important subjective factors not usually considered or evaluated by financial academics. In other words, standard finance does not recognize the “subjective risk factors” within the decision making process of assessing the risk for different forms of financial instruments and investment services. The role of subjective risk influences the decision making process of investors by shaping their perceptions and reactions. “Perceived risk is an ex ante measure which may be based on past returns, fundamental analysis, present hunches, and all other information that portfolio managers and analysts believe to be germane” (McDonald and Stehle, 1975, p. 15). (See Figure 2: For the association of objective and subjective risk measures pertaining to investment decisions.) Paul Slovic provides the following description of risk:

Risk is inherently subjective. In this view, risk does not exist ‘out there’, independent of our minds and cultures, waiting to be measured. Instead, human beings have invented the concept risk to help them understand and cope with the dangers and uncertainties of life. Although these dangers are real, there is no such thing as real risk or objective risk. Even the simplest, most straightforward risk assessments are based on theoretical models, whose structure is subjective and assumption-laden and whose inputs are dependent upon judgment. (2000, p. xxxvi)

MacCrimmon and Wehrung (1986) make the argument that each time the aspects of a risky decision are not clearly known or measurable, an individual’s perception must be subjective since the factors involved are not well defined. Still, when risk factors are well known, an individual’s perception is still subjective because of the personal quality of determining the likelihood of losses and exposure to loss. In some cases, subjective risk measurements have even outperformed objective risk variables (Farrelly and Reichenstein 1984).
1.3 Alternative Measures of Financial and Investment Risk

The academic literature provides a wide range of financial, accounting, and investment risk measurements over the years from the areas of standard finance, behavioral finance, and behavioral accounting (Ricciardi 2004). Even though standard deviation and variance have had a wide acceptance as a financial risk measure for many years, scholars have varied in the application of this statistical technique. For instance, several authors have defined the standard deviation of expected returns as their risk measurement, as in works by Tobin (1958), Hirshleifer (1961), and Cohen and Elton (1967). Others such as Lintner (1965b) measure variance as a security’s dollar return, Sharpe (1966) defines variance as the security’s rate of return, and Modigliani and Pogue (1974) utilize the variance of the distribution of expected returns. Other non-traditional risk measures of variance include: Bierman (1968) describes risk as the earnings available for the common shareholders, Van Horne (1966) and Capstaff (1991) as the notion of an earnings covariance, Turnbull (1977) characterizes the measure of risk as the variance of expected future net cash flows, Lerner and Carleton (1966) proposed measuring the variance of the dividend growth rate and Selva (1995) suggested expected growth in earnings (i.e. variability in earnings) as a risk measure.

A wide range of other definitions of financial and investment risk appear in publications for the financial academic or investment professionals. Crowell (1973) supports the notion of beta, however, recommends that investors have financial knowledge of fundamental analysis, technical analysis, price-earnings ratios, and economics in order to be familiar with other measurements of risk. Bernstein (1996) gives credit to Francis Galton for developing the notion of risk known as regression to the mean as the inclination for outliers to move toward the mean overtime from a historical perspective. In simplest terms, things have a tendency of moving towards the middle over time. If the historical return for common stocks is 12% per year since the 1920s, however, the 1990s yielded average returns of 18% annually; eventually investment performance will return to their historical average of 12% on an annual basis over a long-term investment horizon. Warwick (2000) suggests alpha as a measurement risk (also known as the cohort statistic of beta), which measures the return (risk adjusted return) attributed to non-market risk (i.e. the return based on the investment skills and performance of the individual or expert investor).

Many scholars have proposed that the higher moments of a distribution in particular skewness and possibility kurtosis should be considered as measurements of risk, see works by Hirshleifer (1961), Arditti (1967), Moore (1968), Alderfer and Bierman (1970), Payne (1973a), McEnally (1974) and Howe and Beedles (1984). As a remainder, skewness often results in situations when a natural boundary exists. Right-skewed distributions will have a positive skewness value; left-skewed distributions will have a negative skewness value. The skewness value will range from negative 3 to positive 3. Alderfer and Bierman (1970) for a sample of a group of students, found a majority of the subjects selected the investment option that had a “lower mean and higher
variance but large positive skewness and no chance of loss. Subjects preferred high positive skewness (or small chance of a larger gain) and were willing to give up a little expected value and safety to get it” (p. 345-346). (Many investors prefer positively skewed distributions since this supports the idea of controlling/limiting large losses and offering downside protection.) In fact, some investors reveal utility functions that highly value positive skewness and investors rejecting investments based on even a small possibility of a large loss (i.e. negative skewness). The notion of negative skewness has been considered as a leading risk indicator by scholars in the determination of the riskiness of an asset based on studies by Baumol (1963) and Levy and Sarnat (1972). Whereas, kurtosis (also known as fourth moment of a distribution) describes the relative flatness or peakedness for a given distribution compared to a normal distribution. Since the unconditional normal distribution has a kurtosis equivalent to 3, excess kurtosis is defined as $K_x-3$ in earlier studies by Simonson (1972), Hettenhouse and Puglisi (1975), Cooley (1977) and Blandon and Ward (1979).

Slovic (1967) and Slovic and Lichtenstein (1968) defined risk in terms of the probability of loss and the amount of loss. Whereas, others consider the probability of loss as a measurement of risk as in studies by Machol and Lerner (1969) and Gooding (1976) or the chance of a stock falling below a prevailing price in Bart (1978). Miller (1977, 2001) argued that risk has an association with a “divergence of opinion” in which under circumstances of uncertainty, potential investors in a stock develop different judgments of expected return and risk. Other scholars define risk in terms of concern for below-target returns in Libby and Fishburn (1977) and Laughhunn, Payne and Crum (1980) as well as a ruinous loss (i.e. the potential for a large loss) in Laughhunn, Payne and Crum (1980). While, Steil (1993) suggested risk measurements in terms of two components within a foreign exchange market context: 1) realizing target returns and 2) eliminating the potential for very large losses. Olsen (1997) found investment experts define and measure risk in terms of below-target returns and the potential for a large loss.

As a result of these earlier works based on the concepts of skewness, kurtosis, and concern for below-target returns these types of proxies for risk have evolved into measurements for downside risk that have started to emerge over the last few years. For example, the Sortino Ratio, which is the ratio of excess return (actual return less the goal) to downside deviation in papers by Sortino and Price (1994) and Sortino and Satchell (2001). Olsen and Troughton (2000) found that a large sample of financial professionals identified risk as the chance of incurring a large loss (i.e. downside risk). Unser (2000) defined risk in terms of downside risk in which he utilized the concept of Lower Partial Moments (LPMs). LPMs “reflect the popular negative meaning of risk since they only take negative deviations from a reference point to measure risk” (Unser, 2000, p. 253).

Another perspective from the academic literature investigates if potential gains or upside risk is an indicator of risk measurement, though not in percentage terms such as standard deviation or variance. Instead the seminal work on prospect theory by Kahneman and Tversky (1979) revealed that individuals process information in dollars terms in which, subjects weighted negative outcomes (losses) substantially more than positive ones (gains). Luce and Weber (1986) argue that their model of risk assessment is a collection of the probabilities of losing, winning, and receiving nothing as well as expected gains and losses in dollar terms. Their model reveals that symmetric changes in bad and good results do not influence risk judgments uniformly and confirm the results found based on their work supports the tenets of prospect theory. Proponents of upside risk or potential gains as a risk measurement disagree whether expected return (gains) and perceived risk are positively correlated (according to supporters of standard finance) in works by Markowitz (1952) and Sharpe (1964) or negatively related (as per scholars of behavioral finance) in studies by Alhakami and Slovic (1994), Ganzach (2000), and Shefrin (2001).
This emerging topic of attention and examination concerning the premise of an inverse (negative) relationship between perceived risk and expected return (i.e. perceived return, perceived gain) in a sample of inquiries including: psychology in the area of hazardous activities in studies by Alhakami and Slovic (1994) and Finucane, Alhakami, Slovic, and Johnson (2000), behavioral finance in works by Ganzach (2000), Diacon and Ennew (2001); Shefrin (2001), Bloomfield and Michaely (2002) and behavioral accounting in the working paper by Koonce, McAnally, and Mercer (2001). Interestingly, this phenomenon has been investigated within the field of strategic management since the early 1980s. Bowman (1980) found with the utilization of accounting data from Value Line that 10 of 11 industries considered that business risk (variance of return on equity) and average return are negatively associated across firms from various industries. In effect, this seminal work has become known as Bowman’s paradox in which corporate managers undertake higher risk at the same time that they anticipate lower returns. Bowman (1982) results demonstrated financially trouble companies took more risk. The higher the financial difficulty, the lower the rate of return, the higher the ensuing risk taking by the firm management.

Widespread risk measures from the accounting aside from variance of returns also entail dispersions of cash flows and earnings (Lipe, 1998). Different types of accounting information have been considered by both standard accounting and behavioral accounting scholars that classify risk in terms of a specific accounting risk measure or financial ratio such as a debt ratio, sales growth, or dividend payout. There is an extensive history within the accounting literature in which scholars attempt to utilize accounting information (accounting risk measures) as predictors of risk within academic studies by Ball and Brown (1969), Beaver, Kettler and Scholes (1970), Schiedler (1981), and Ciancanelli, Coulson, and Thomson (2001). Many of these studies provided evidence that accounting measures of risk (i.e. financial ratios) are a component of the market price based risk measure (i.e. beta or variance of returns). In some cases, the accounting risk measures have even accounted for a greater amount of an investor’s perception of risk than the traditional market risk measures (Lipe, 1998).

These first few sections have presented the reader with an in-depth overview of the past and present literature on risk from various perspectives across different disciplines. In particular, this discussion revealed the viewpoints of both academic schools in academic finance (standard vs. behavioral finance) towards the assessment and measurement of risk. The next section provides a comprehensive examination of some major issues concerning risk perception. In particular, an overview of perception, the relationships between key behavioral finance concepts and perceived risk, and the significant role of risk perception studies from psychology and the social sciences.
2.0 Risk Perception: An Overview of the Topic

Numerous reviews and books have been published over the years pertaining to the overall area of risk-taking behavior and the specific topic of perceived risk/risk perception. Those interested in a wider review of the literature from a behavioral perspective (i.e. social sciences) or business viewpoint namely, accounting and management should consult the works mentioned in Table 1: Academic Publications: A Timeline of Literature Reviews and Surveys on Risk Perception and Risk Taking Behavior. Whereas, Table 2: A Timeline of Seminal Books on Risk Perception and Risk Taking Behavior provides a chronological list of books on risk perception and risk-taking behavior from the social sciences, marketing, business, and management. From the disciplines of behavioral accounting, behavioral finance, and investments there has been no comprehensive literature review conducted pertaining to the subject of risk perception or perceived risk. (Note: The author of this paper conducted an extensive search from numerous sources and was unsuccessful in discovering such a review.) Thus, this paper provides the first of its kind thorough review of the academic research studies on perceived risk since the late 1960s and early 1970s from the areas of behavioral accounting and behavioral finance.

2.1 What is Risk Perception?

Since the 1960s, the topic of perceived risk has been employed to explain consumers’ behavior. In essence, within the framework of consumer behavior, perceived risk is the risk a consumer believes exists in the purchase of goods or services from a particular merchant, whether or not a risk actually exists. The concept of “perceived risk” has a strong foundation in the area of consumer behavior that is rather analogous to the discipline of behavior finance (i.e. there are similarities regarding the decision-making process of consumers and investors). In 1960, Bauer a noted consumer behavioralist introduced the notion of “perceived risk” when he provided this perspective:

Consumer behavior involves risk in the sense that any action of a consumer will produce consequences which he cannot anticipate with anything approximating certainty, and some of which are likely to be unpleasant. At the very least, any one purchase competes for the consumer’s financial resources with a vast array of alternate uses of that money…Unfortunate consumer decisions have cost men frustration and blisters, their self-esteem and the esteem of others, their wives, their jobs, and even their lives…It is inconceivable that the consumer can consider more than a few of the possible consequences of his actions, and it is seldom that he can anticipate even these few consequences with a high degree of certainty. When it comes to the purchase of large ticket items the perception of risk can become traumatic. (p. 24)

Cox and Rich (1964) provided a more precise definition of perceived risk; it’s a function of consequences (the dollar at risk from the purchase decision) and uncertainty (the person’s feeling of subjective uncertainty that he or she could “gain” or “lose” from the transaction). Stone and Gronhaug (1993), make the argument that the marketing discipline mainly focuses on investigating the potential negative outcomes of perceived risk. This focus on the negative side of risk is similar to the area of behavioral finance in which scholars examine downside risk, the potential for below target returns, or the possibility of catastrophic loss. In addition, Jacoby and Kaplan (1972) and Tarpey and Peter (1975) developed six components or dimensions of perceived risk including: financial, product performance, social, psychological, physical, and time/convenience loss. Tarpey and Peter (1975) were not solely concerned with the consumers’ judgments as related to perceived risk (in which consumers minimize risk). They investigated two additional aspects: 1) perceived risk, in which the consumer makes purchase decisions which maximizes perceived gain and 2) net perceived return in which the decision maker’s consists both
risk and return. These two components are analogous to the tenets of modern portfolio theory in standard finance (i.e. the risk and return relationship of the efficient frontier) by Markowitz (1952), Sharpe (1963), and Sharpe (1964).

Human judgments, impressions and opinions are fashioned by our backgrounds, personal understanding, and professional experiences. There are a substantial number of factors that influence a person’s risk perception and there has been an ever-growing body of research that has attempted to define risk, categorize its attributes and comprehend (understand) these various issues and their specific effects (Slovic, 1988). In some academic circles, it has been acknowledged that perceived risk might be of more significance that actual risk within the decision making process. Risk perception studies have been conducted across a wide range of academic fields, with the leading ones being from the social sciences, primarily from psychology. “These groups were interdisciplinary, but the leading academic involvement has been psychological and the methodology mainly ‘psychometrics.’ Other disciplines to be involved in the field have been economics, sociology and anthropology” (Lee, 1999, p. 9) Also, perceived risk has had a broad application across various business fields including: consumer behavior, marketing, behavioral finance, and standard finance. These academic disciplines attempt to examine how a person’s feelings, values, and attitudes influence their reactions to risk, along with the influences of cultural factors, and issues of group behavior. Individuals frequently misperceive risk linked with a specific activity because they lack certain information. Without accurate information, or with misinformation, people may make an incorrect judgment or decision.

All of these different issues demonstrate that a person may possess more than one viewpoint regarding the acceptability or possibility of a risky activity depending upon which factor a person identifies at a certain period of time. So it is understandable that we cannot simply define risk perception to a single statistical probability of objective risk (i.e. statistical variance) or a purely behavioral perspective (i.e. the principles of heuristics or mental shortcuts); instead the notion of perceived risk is best utilized with an approach that is interdisciplinary and multi-dimensional in nature for a given situation, activity, or event (Ricciardi 2003, 2004). When an individual makes judgments pertaining to a financial security it incorporates both a collection of financial risk measurements and behavioral risk indicators (Ricciardi 2004). Weber (2003, in press) has offered the following perspective of risk perception:

First, perceived risk appears to be subjective and, in its subjectivity, casual. That is, people’s behavior is mediated by the perceptions of risk. Secondly, risk perception, like all other perception, is relative. We seem to be hardwired for relative rather than absolute evaluation. Relative judgments require comparisons, so many of our judgments are comparative in nature even in situations where economic rationality would ask for absolute judgment. Closer attention to the regularities between objective events and subjective sensation and perception well documented within the discipline of psychophysics may provide additional insights for the modeling of economic judgments and choice.

Risk is a distinct attribute for each individual for the reason that what is perceived by one person as a major risk may be perceived by another as a minor risk. Risk is a normal aspect of everyone’s daily lives; there is no such thing as a judgment with “zero risk” or without a “degree of uncertainty.” Risk perception is the way people “see” or “feel” regarding a potential danger or hazard. The concept of risk perception attempts to explain the evaluation of a risk situation (event) on the basis of instinctive and complex decision-making, personal knowledge, and acquired information from outside environment (i.e. different media sources). Sitkin and Weingart (1995) define risk perception as “an individual’s assessment of how risky a situation is
in terms of probabilistic estimates of the degree of situational uncertainty, how controllable that uncertainty is, and confidence in those estimates” (p. 1575). Whereas, Falconer (2002) provided this perspective:

Although we use the term risk perception to mean how people react to various risks, in fact it is probably truer to state that people react to hazards rather that the more nebulous concept of risk. These reactions have a number of dimensions and are not simply reactions to physical hazard itself, but they are shaped by the value systems held by individuals and groups. (p. 1)

The prevalent technical jargon from the risk perception literature emphasizes the terminology risk, hazard, danger, damage, catastrophic or injury as the basis for a definition of the overall concept of perceived risk. Risk perception seems to encompass both a component of hazard and risk; the concept appears to entail an overall awareness, experience or understanding of the hazards or dangers, the chances, or possible outcomes of a specific event or activity. MacCrimmon and Wehrung (1986) from the field of management define perceived risk into 3 main groupings: 1) the amount of the loss, 2) the possibility of loss, and 3) the exposure to loss. Perceived risk is a person’s opinion (viewpoint) of the likelihood of risk (the potential of exposure to loss, danger or harm) associated with engaging in a specific activity. Renn (1990) provided a key summary of findings in which perceived risk is a function of the following:

1. intuitive heuristics, such as availability, anchoring, overconfidence, and others;
2. perceived average losses over time;
3. situational characteristics of the risk or the consequences of the risk event;
4. associations with the risk sources;
5. credibility and trust in risk-handling institutions and agencies;
6. media coverage (social amplification of risk-related information);
7. judgment of others (reference groups); and
8. personal experiences with risk (familiarity). (p. 4)
Table 1: Academic Publications:  
A Timeline of Literature Reviews and Surveys  
On Risk Perception and Risk Taking Behavior

<table>
<thead>
<tr>
<th>Year</th>
<th>Author(s)</th>
<th>Title</th>
<th>Academic Journal</th>
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<tbody>
<tr>
<td>1964</td>
<td>Paul Slovic</td>
<td>Assessment of Risk Taking Behavior</td>
<td>Psychological Bulletin</td>
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<td>1973</td>
<td>John Payne</td>
<td>Alternative Approaches to Decision Making under Risk: Moments vs. Risk Dimensions</td>
<td>Psychological Bulletin</td>
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<tr>
<td>1980</td>
<td>Chauney Starr, Chris Whipple</td>
<td>A Perspective on Health and Safety Risk Analysis</td>
<td>Management Science</td>
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<td>1980</td>
<td>Charles Vlek, Peter-Jan Stallen</td>
<td>Rational and Personal Aspects of Risk</td>
<td>Acta Psychologica</td>
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<td>1983</td>
<td>Vincent Covello</td>
<td>The Perception of Technological Risks: A Literature Review</td>
<td>Technological Forecasting and Social Change</td>
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<tr>
<td>1983</td>
<td>Lola Lopes</td>
<td>Some Thoughts on the Psychological Concept of Risk</td>
<td>Journal of Experimental Psychology; Human Perception and Performance</td>
</tr>
<tr>
<td>1986</td>
<td>Peter Dickson, Joseph Giglierano</td>
<td>Missing the Boat and Sinking Boat: A Conceptual Model of Entrepreneurial Risk</td>
<td>Journal of Marketing</td>
</tr>
<tr>
<td>1987</td>
<td>Lola Lopes</td>
<td>Between Hope and Fear: The Psychology of Risk</td>
<td>Advances in Experimental Social Psychology</td>
</tr>
<tr>
<td>1987</td>
<td>James March Zur Shapira</td>
<td>Managerial Perspectives on Risk and Risk Taking</td>
<td>Management Science</td>
</tr>
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<td>1988</td>
<td>Phipps Arabie</td>
<td>Some Current Models for the Perception and Judgment of Risk</td>
<td>Organizational Behavior and Human Decision Processes</td>
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<td>1988</td>
<td>Paul Slovic, Sarah Lichtenstein, Baruch Fischhoff</td>
<td>Decision Making</td>
<td>Handbook of Experimental Psychology</td>
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<tr>
<td>Year</td>
<td>Author (s)</td>
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<td>Academic Journal</td>
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<td>1990</td>
<td>Frank Selto, Jean Cooper</td>
<td>Control of Risk Attitude in Experimental Accounting Research</td>
<td>Journal of Accounting Literature</td>
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<tr>
<td>1993</td>
<td>Daniel Kahneman, Dan Lovallo</td>
<td>Timid Choices and Bold Forecasts: A Cognitive Perspective on Risk Taking</td>
<td>Management Science</td>
</tr>
<tr>
<td>2000</td>
<td>Joanna Sokowska, Andrew Pohorille</td>
<td>Models of Risk and Choice: Challenge or Danger</td>
<td>Acta Psychologica</td>
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<tr>
<td>2001</td>
<td>Penny Ciancanelli, Andrea Coulson, Ian Thomson</td>
<td>No Accounting for Risk</td>
<td>Working Paper</td>
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<td>2001</td>
<td>A. E. Wahlberg</td>
<td>The Theoretical Features of Some Current Approaches to Risk Perception</td>
<td>Journal of Risk Research</td>
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<tr>
<td>Year</td>
<td>Author(s)</td>
<td>Title of Book</td>
<td>Description of Subject Matter</td>
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<tr>
<td>1967</td>
<td>Donald Cox</td>
<td>Risk Taking and Information in Consumer Behavior</td>
<td>Classic book from marketing pertaining to the area of perceived risk.</td>
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<td>1982</td>
<td>Daniel Kahneman, Paul Slovic, Amos Tversky</td>
<td>Judgment Under Uncertainty: Heuristics and Biases</td>
<td>Many of the topics and principles of this book in behavioral finance and decision-making pertain to the multi-dimensional aspects of perceived risk.</td>
</tr>
<tr>
<td>1983</td>
<td>Vincent Covello, W. Gary Flamm, Joseph V. Rodricks, Robert Tardiff</td>
<td>The Analysis of Actual Versus Perceived Risks</td>
<td>Collection of research studies on perceived from non-financial areas such as nuclear power and smoking.</td>
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<td>1987</td>
<td>W.T. Singleton, Jan Hovden</td>
<td>Risk and Decisions</td>
<td>Book of readings and research studies pertaining to decision-making on risky activities.</td>
</tr>
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<td>1996</td>
<td>Peter Bernstein</td>
<td>Against the Gods: The Remarkable Story of Risk</td>
<td>The author provides an extensive historical perspective of risk.</td>
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<td>1999</td>
<td>Bernd Rohrmann</td>
<td>Risk Perception Research: Review and Documentation</td>
<td>An extensive review of perceived risk from the social sciences.</td>
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<td>Year</td>
<td>Author(s)</td>
<td>Title</td>
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<td>1999</td>
<td>Glenn Koller</td>
<td>Risk Assessment and Decision Making in Business and Industry</td>
<td>This publication contains and explains the various research techniques of risk assessment.</td>
</tr>
<tr>
<td>2000</td>
<td>Glenn Koller</td>
<td>Risk Modeling for Determining Value and Decision Making</td>
<td>This follow-up work applies risk modeling within a wide range of contexts.</td>
</tr>
<tr>
<td>2000</td>
<td>Paul Slovic</td>
<td>The Perception of Risk</td>
<td>Collection of research studies and essays on risk perception regarding hazardous activities.</td>
</tr>
<tr>
<td>2002</td>
<td>Gerd Gigerenzer</td>
<td>Calculated Risks: How to Know When Numbers Deceive You</td>
<td>This book provides an interesting viewpoint of risk and uncertainty for real world circumstances.</td>
</tr>
<tr>
<td>2002</td>
<td>David Ropeik, George Gray</td>
<td>Risk: A Practical Guide for Deciding What’s Really Safe and What’s Really Dangerous in the World Around You</td>
<td>This reading provides an overview of 50 hazardous activities across 3 main categories: 1) home, work, and transportation; 2) the environment; 3) medicine.</td>
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</table>
2.2 What is Perception?

Most of the academic studies on risk or investor perception fail to express a working or introductory definition of the phrase perception or neglect to address the issue of perception in any manner. Whereas, other works by Chiang and Vennkatech (1988), Epstein and Pava, (1994), Epstein and Pava, (1995) and Pinegar and Ravichandran (2003) provide the phase perception in the title and forget to even mention the term again in the overall paper. Unfortunately, this is rather misleading to the reader in regards to the true subject matter of the work. Even though much of the research on perception is basic knowledge in the behavioral sciences, it has been essentially disregarded or not adopted for application by scholars in finance. The only financial scholar that has provided an extensive discussion of perception from a behavioral perspective was Gooding (1973) on the subject of investor perception. While only a few economists have addressed the notion of perception in a substantial manner in works by Schwartz (1987), Schwartz (1998), and Weber (2003, in press).

With the notion of perception implies that there is a component of subjective risk, which is not recognized by most academics from the disciplines of accounting, economics, or finance. Webster’s dictionary defines perception as “the act of perceiving or the ability to perceive; mental grasp of objects, qualities, etc. by means of the senses; awareness; comprehension.” A psychological definition of perception is the “process by which the brain organizes and interprets sensory information” (Wade and Tavris, 1996). The field of organizational behavior offers the following perspectives on perception:

1) The key to understanding perception is to recognize that it is a unique interpretation of the situation, not an exact recording of it. In short, perception is a very complex cognitive process that yields a unique picture of the world, a picture that may be quite different from reality. (Luthans, 1998, p. 101)

2) Perception is the selection and organization of environmental stimuli to provide meaningful experiences for the perceiver. It represents the psychological process whereby people take information from the environment and make sense of their world. Perception includes an awareness of the world—events, people, objects, situations, and so on—and involves searching for, obtaining, and processing information about that world. (Hellriegel, Slocum, and Woodman, 1989, 61-62)

Perception is how we become conscious about the world and ourselves in the world. Perception is fundamental to understanding behavior since this process is the technique by which stimuli affect an individual. In other words, perception is a method by which individuals organize and interpret their sensory intuitions in order to give meaning to their environment regarding their awareness of “events” or “things” rather than simply characteristics or qualities. Perception is a search for the best explanation of sensory information an individual can arrive at based on a person’s knowledge and past experience. Sometimes during this perceptual process, illusions can be intense examples of how an individual might misconstrue information and incorrectly process this information (Gregory, 2001). Ittelson and Kilpatrick (1951) provided the following viewpoint on perception:

What is perception? Why do we see what we see, feel what we feel, hear what we hear? We act in terms of what we perceive; our acts lead to new perceptions; these lead to new acts, and so on in the incredibility complex process that constitutes life. Clearly, then an understanding of the process by which man becomes aware of himself and his world is basic to any adequate
understanding of human behavior…perception is a functional affair based on action, experience and probability. (p. 50 and 55)

While Morgan and King (1966), elaborate further with their description of perception from the field of psychology. The authors provide two distinctive definitions of perception:

1) Tough-minded behavioralists, when they use the term at all define perception as the process of discrimination among stimuli. The idea is if an individual can perceive differences among stimuli, he will be able to make responses which show others that he can discriminate among the stimuli…This definition avoids terms such as experience, and it has a certain appeal because it applies to what one can measure in an experiment. (p. 341)

2) Another definition of perception is that it refers to the world as experienced—as seen, heard, felt, smelled, and tasted. Of course we cannot put ourselves in another’s place, but we can accept another person’s verbal reports of his experience. We can also use our own experience to give us some good clues to the other person’s experience. (p.341)

The literature seems to have a wide interpretation among the different branches of psychology (i.e. debate) regarding the exact meaning of the concept of perception according to works by Allport (1955), Garner, Hake, and Eriksen (1956), Hochberg (1964), Morgan and King (1966), Schiffman (1976), Bartley (1980), Faust (1984), McBurney and Collings (1984), Cutting, (1987), Rock, (1990), Rice (1993), and Rock (1995), which is a similar predicament regarding the different interpretations of risk across various disciplines. Individuals from the area of finance and investments might want to focus on the basic characteristics of perception, including:

- An individual’s perception is based on their past experience of a similar event, situation or activity;
- People focus or pay attention to, different components (information) of the same situation;
- A major premise of perception is individuals have the ability to only process a limited number of facts and pieces of information at a time in order to make a judgment or decision concerning a certain activity, event, or situation;
- In general, it’s human nature to organize information so we can make sense of it. (We have a tendency to make new stimuli match with what we already understand and know about our environment.)
- A stimulus (impulse) that is not received by an individual person has no influence (effect) on their behavior while, the stimulus they believe to be authentic, even though factually inaccurate or unreal, will affect it;
- Perception is the process by which each individual senses reality and arrives at a specific understanding, opinion, or viewpoint;
- What an individual believes he or she perceives may not truly exist;
- A person's behavior is based on their perception of what reality is, not necessarily on reality itself; and
- Lastly, perception is an active process of decision making, which results in different people having rather different, even opposing, views of the same event, situation or activity.
One final perspective was presented by Kast and Rosenzweig (1974) that summaries the entire discussion of perception rather well:

A direct line of “truth” is often assumed, but each person really has only one point of view based on individualistic perceptions of the real world. Some considerations can be verified in order that several or many individuals can agree on a consistent set of facts. However, in most real-life situations many conditions are not verifiable and heavily value laden. Even when facts are established, their meaning or significance may vary considerably for different individuals. (p.252)

2.3 A Visual Presentation of the Perceptual Process: The Litterer Perception Formation Model

This section on perception will provide a discussion of Litterer’s simple perception formation model (1965) from the area of organizational behavior in order to provide the reader with a visual presentation and further explanation of the perceptual decision making process. This model provides a good application of the previous discussion of perception. The author does not attempt to discuss the validity of the model. (See Figure 1: The Litterer Perception Formation Model for further details.) This perception model has been described in substantial detail by Kast and Rosenzweig (1974) and Kast and Rosenzweig (1985) from the field of management and utilized by the financial scholar Gooding (1973) in an extensive research study on investor perception.

Litterer’s model provides an illustration regarding how perceptions are produced and thus affects an individual’s behavior. There are two inputs (external factors) to this perceptual process, which are information (i.e. financial data) and past experience of the individual (i.e. the decision making process of the investor). Whereas, the model contains three “mechanisms” of perception formation that are considered internal factors (developed from within a person) which are selectivity, interpretation and closure. The notion of selectivity (selective perception) is an individual only selects specific information from an overwhelming amount of choices that is received (i.e. a method for contending with information overload). In essence, we can only concentrate on and clearly perceive only a few stimuli at a time. Other activities or situations are received less visibly, and the remaining stimuli become secondary information in which we are only partially aware of. During this stage, a person might unconsciously foresee outcomes, which are positive (i.e. high returns for their personal investment portfolio). A person may assign a higher than reasonable likelihood of a specific outcome if it is intensely attractive to he or she. Ultimately, this category of selectivity may be related to voluntary (conscious) or involuntary (unconscious) behavior since a person my not make the rational (optimal) decision and instead select from a set of less desirable choices (i.e. the idea underlying the principles of prospect theory and heuristics). On the other hand, the choices may not be “less desirable,” at least in some cases. They may be the only feasible ones available given the circumstances, lack of data or pressure of time.

The purpose of the second mechanism known as interpretation makes the assumption that the same stimulus (i.e. a specific risky activity or situation) can be understood in a different way among a number of decision makers. This process of interpretation relies on a person’s past experience and value system. This mechanism provides a structure for decoding a variety of stimuli since an individual usually has an inclination to think or act in a certain way regarding a specific situation or activity. Lastly, the closure mechanism in perception formation concerns the tendency of individuals to have a “complete picture” of any specified activity or situation. Therefore, an individual may perceive more than the information appears to reveal. When a person processes the information, he or she attaches additional information to whatever appears suitable in order to close the thought process and make it significant. “Closure and interpretation have a feedback to selectivity and hence affect the functioning of this mechanism in subsequent information processing” (Kast and Rosenzweig, 1970, p. 218).
This section has presented some important principles on the perceptual process that should hopefully provide an overall enhanced understanding of the notion of perceived risk throughout this work. This segment has attempted to demonstrate to the reader the complexity of the perceptual decision-making process from a behavioral viewpoint. The awareness of this perceptual process is connected directly to how investors process information under the assumptions of behavioral finance known as bounded rationality, heuristics, cognitive factors, and emotional issues. Thus, the next section provides an overview of how an investor processes information and the various behavioral finance issues that might influence a person’s perception of risk within the judgment process.
2.4 How Do Investors Process Information?

This section provides a discussion regarding how individuals (i.e. investors) process information in which there are two main viewpoints on this topic: 1) supporters of standard finance (i.e. the Efficient Market Hypothesis) and; 2) the alternative view of behavioral finance (i.e. the influence of heuristics and cognitive factors). In order to understand and accept the notion of perceived risk the reader should have a basic knowledge of the idea of how information is processed from a behavioral and financial perspective.

2.4.1 The Debate Over the Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (EMH) has been one of the most important theories along with Modern Portfolio Theory (MPT) within standard finance since the 1960s (Ricciardi and Simon, October 2000). The central theory behind the Efficient Market Hypothesis is that financial markets are efficient in the sense that investors within these markets process information instantaneously and the prices completely reflect all existing information (Fama 1965a and 1965b). The following is a description of each the three different types of the market efficiency:

1) The weak form. The market is efficient with respect to the history of all past market prices and information is fully reflected in securities values.

2) The semi-strong form. The market is efficient in which all publicly available information is fully reflected in securities values.

3) The strong form. The market is efficient in regards to all information is fully reflected in securities prices.

“Implicit in Fama’s hypothesis are two important ideas: first, that investors are rational; and second, that rational investors trade only on new information, not on intuition” (Nichols, 1993, p. 3). In other words, participants according to this premise act in a market in which: investors have complete information (knowledge), they are rational and they maximize expected utility. The long-lasting dialogue about the validity of this theory has resulted in numerous academic endeavors with the central focus to investigate whether the Efficient Market Hypothesis is accurate. Most new individuals investors are surprised when informed that a vast amount of substantiate research supports the Efficient Market Hypothesis in one form or another as pointed out by Ricciardi and Simon (2000) and Ricciardi and Simon (October, 2000).

The advocates of the efficient market theory argue that it is futile to practice or to apply certain investment techniques or styles since all investors' expertise and prospects are already revealed either in a specific stock price or the overall financial market. Therefore, it is unrealistic for investors to spend their valuable time and money in order to attempt to outperform the market as suggested by Ricciardi and Simon (2000) and Ricciardi and Simon (October, 2000). Many professional investment managers and behavioral finance scholars suggest that market inefficiencies (i.e. the evidence is that market anomalies such as the January Effect) do exist at certain points in time to some degree. First, the arguments for market inefficiency would allow for arbitrage opportunities (chance to find mis-priced securities and make superior returns) within the financial markets as noted in Ricciardi and Simon (2001). If some investors believe the chance to arbitrage does exist they will attempt to identify a security first so they can profit by exploiting that information by using a specific active investment style such as technical analysis or value investing.

Nevertheless, supporters of the efficient market philosophy believe current prices already reflect all knowledge (information) about a security or market. Secondly, if market inefficiencies do exist this implies investors may sometimes make irrational investment decisions or judgments.
that do not comply with the assumptions of rationality. Therefore, this would demonstrate that
individuals maybe influenced by some different types of cognitive (mental) processes and/or
affective (emotional) factors. These types of behaviors along with market inefficiencies could
result in: 1) investor perceptions might be influenced by their current risk judgments concerning a
certain financial instrument or the overall markets and 2) an investor’s failure to discover and
determine the right investment such as selecting a stock or mutual fund.

2.4.2 The Behavioral Finance Perspective: The Significance of Information Overload and
the Role of Cognitive Factors

Modern financial theory is based on the premise that individuals are rational in their approach
regarding their investment decisions. College students and financial experts are taught that
investors make investment choices on the basis on all available information (public and private)
according to the tenets of the Efficient Market Hypothesis. The assumption is individuals employ
the use of this financial analysis in a rational and systematic manner. Ultimately, the aim of this
investment approach should result in increased financial wealth. However, the question should be
asked, “Do investors process information this logically, efficiently, properly, and neatly?” David
Faust writes, “scientists, along with all other individuals, evidence cognitive limitations that lead
to frequent judgment error and that set surprisingly harsh restrictions on the capacity to manage
complex information and to make decisions” (1984, p.3).

In recent years, many individual investors, investment professionals and financial academics are
sometimes overwhelmed by the amount of available information and the numerous investment
choices especially from the advancement of information technology and the Internet. These new
forms of Internet communication include: online search engines, chat rooms, bulletin boards,
websites, and online trading. For investors, there is probably a direct link between the “cognitive
biases and mental errors associated with behavioral finance” and the topic of “information
overload.” Information overload is defined as “occurring when the information processing
demands on an individual's time to perform interactions and internal calculations exceed the
supply or capacity of time available for such processing” (Schick, 1990, p.199). In the future,
this problem of “information overload” can only be expected to get worse when you consider the
following statement regarding this upsurge of available information because of the internet
revolution:

300,000: Number of years has taken the world population to accumulate 12
exabytes of information (the equivalent of 50,000 times the volume of the
Library of Congress), according to a study by the University of California at
Berkeley.

2.5: Number of years that experts predict it will take to create the next 12
exabytes. (Macintyre, 2001, p.112)

My observation regarding the tenets of behavioral finance and information overload were recently
supported in a working paper entitled “Blinded by the Light: Information Overload and its
Consequences for Securities Regulation.” The author Paredes (2003) wrote,

Studies making up the field of behavioral finance show that investing decisions
can be influenced by various cognitive biases on the part of investors, analysts,
and others...An extensive psychology literature shows that people can become
overloaded with information and make worse decisions with more information.
In particular, studies show that when faced with complicated tasks, such as those
involving lots of information, people tend to adopt simplifying decision strategies
that require less cognitive effort but that are less accurate than more complex
decision strategies. The basic intuition of information overload is that people might make better decisions by bringing a more complex decision strategy to bear on less information than by bringing a simpler decision strategy to bear on more information. (p. 1)

Behavioral finance focuses on the issues that influence the risk judgment and final decision-making of investors, which includes factors known as cognitive bias or mental mistakes (errors) as alluded to in earlier papers by Ricciardi and Simon (2000), Ricciardi and Simon (October, 2000), and Ricciardi (2003). As human beings we utilize specific mental mechanisms for processing and problem solving regarding our decision-making known as cognitive processes. Cognitive processes are the mental skills that permit an individual to comprehend and recognize the things surrounding you. This is taken a step further regarding cognitive factors and mental errors committed by investors. Behavioral finance scholars study the understanding of how people think as well as the recognition of errors made in managing information known as heuristics by all types of investors. Researchers from the behavioral sciences have conducted studies that have shown humans are remarkably illogical regarding their money, finances, and investments. In essence, decision-making pertaining to risk frequently departs from the standard finance’s assumptions of rationality and instead adheres to the ideas associated with bounded rationality.
2.5 What Concepts from Behavioral Finance Influence an Investor’s Perception of Risk?

Numerous studies from psychology have demonstrated several factors that may influence a person’s perceived risk of specific situation or activity (See Figure 2: Issues of Risk Perception Research). According to Rohrmann (1999), the investigation of risk judgments (the principal foundation of risk research) is typically focused on issues of risk acceptance (i.e. in terms of individual vs. societal concerns), and scholars from psychology are specifically concerned with the fundamental aspects of how information is processed (i.e. the influence of heuristics and cognitive biases) as well as linked to actual behavior in risky activities. Another important area of investigation is the issue of personality traits and demographic differences among survey respondents. In addition, the results can be linked to statistical data on hazardous events, which are applied to communication programs. Recently, cultural factors in risk perception research have become a significant area of study. This section will focus the discussion on the basic concepts and themes of behavioral finance that apply to studies in risk perception namely in the area of information processing (i.e. cognitive issues and/or emotional factors) including the availability heuristic, issues of overconfidence, the principle of loss aversion, the concept of representativeness, issues of framing, the topic of anchoring, the notion of familiarity bias, the factors of perceived control, the issues of expert knowledge, the role of affect (feelings), and the influence of worry.

Figure 2: Issues of Risk Perception Research

Information Processing: Cognitive and Emotional Factors

Cognitive Structure of risk judgments

Relation to Statistical data

Individual/societal risk acceptance

Link to actual risk behavior

Cross-cultural differences

Application to risk communication

Issues of personality traits and demographic differences

2.5.1 Heuristics

When individuals are faced with a complex judgment involving a statistical probability, frequency or incomplete information, many subjects usually utilize a limited number of heuristics that reduce the decision to a simpler task (Kahneman, Slovic, and Tversky, 1982). A heuristic is a simple and general rule we employ to solve a specific category of problems especially with situations that involve a high degree of risk-taking or uncertainty. “All of us have a repertoire of these strategies based on bits of knowledge we have picked up, rules we have learned, or hypotheses that worked in the past” (Myers, 1989, p.286). These decision-making strategies known as heuristics in the formal sense are “rules of thumbs” seem to be very common in all types of situations. Heuristics can be thought of as a “cognitive tool” for reducing the time of the decision-making (judgment) process for novice investors and expert investment professionals as noted in Ricciardi and Simon (2001). In essence, “heuristics are mental shortcuts or strategies derived from our past experience that get us where we need to go quickly, but at the cost of sending us in the wrong direction” (Ricciardi and Simon, 2001, p. 19) or introducing biases that lead to over-or-undershooting. Investors utilize heuristics when given with a narrow time frame in which they have to assess difficult financial circumstances and investment choices. Eventually, theses mental processes (heuristics) may result in individuals making “investment errors” from based on their intuitive judgments as pointed out in Ricciardi and Simon (2001). Scott Plous writes,

> For example, it is easier to estimate how likely an outcome is by using a heuristic than by tallying every past occurrence of the outcome and dividing by the total number of times the outcome could have occurred. In most cases, rough approximations are sufficient (just as people often satisfice rather than optimize). (1993, p. 109)

The significance of heuristics in judgments under risk-taking or uncertainty has been a major source of research in the area of decision making over the last 25 years in works by Tversky and Kahneman, (1973), Kahneman, Slovic, and Tversky (1982) and Gilovich, Griffin, and Kahneman, (2002). Two types of biases that have an affect on a person’s perception of risk are the availability heuristic and overconfidence (Slovic, Fischhoff, and Lichtenstein, 1979).

2.5.2 The Availability Heuristic

One of the underlying principles of risk perception is the idea of the availability heuristic based on the work of Tversky and Kahneman (1973). This heuristic is utilized in order to judge the likelihood or frequency of event or occurrence. In various experiments in psychology, findings reveal individuals tend to be biased by information that is easier to recall, influenced by information that is vivid, well-publicized, or recent. The significance of the availability heuristic for providing explanation for perceived risk is apparent, for the reason that probability assessments are a fundamental aspect of risk decision-making. Individuals that employ the availability heuristic guide a person to judge the degree of risk of an activity or event as highly probable or frequent if examples of it are easy to remember or visualize. Furthermore, the availability heuristic is the inclination for individuals to form their decisions on information that is easily available to them. In essence, the main issues that involve the availability heuristic are: 1) activities that induce emotions; 2) tasks that are intensely dramatic or 3) actions that have occurred more recently have a propensity to be more accessible in our recent memory. In describing this type of heuristic, Schwartz (1998) noted:

> Biases may arise because the ease which specific instances can be recalled from memory affects judgments about the relative frequency and importance of data. This leads to overestimation of the probability of well-publicized or dramatic events… or recent events along with the underestimation of less recent,
publicized or dramatic events... A prominent example of the availability bias is the belief of most people that homicides (which are highly publicized) are more common than suicides, but, in fact, the reverse is true. (p. 64)

Another example of the application of the availability heuristic is a majority of individuals (subjects) are more likely to express or experience a high anxiety (an increase in perceived risk) over flying in an airplane than driving in an automobile. This increased anxiety or fear among the public in terms of flying in airplanes might occur because of extensive media coverage of the few major airline accidents that have occurred ultimately raises an individual’s perception of the risk. Whereas, individuals may feel safer driving in automobiles because they perceive they have personal control of the risky situation or task. This decision conflicts with the notion that flying in airplanes is safer than driving in cars if the person only examines the “statistical data.” In reality, the actual number of automobile accidents and actual deaths from driving a car is far greater than the number of airplane crashes and actual deaths from airline accidents.

2.5.3 Overconfidence

Overconfidence in decision-making is another factor that influences risk perception since there are many ways in which people tend to be overconfident about their decisions regarding risk. Within the behavioral finance literature, overconfidence is one of the most documented biases according to Daniel and Titman (2000). Confidence can be described as the “belief in oneself and one’s abilities with full conviction” whereas, “overconfidence can be taken a step further in which overconfidence takes this self-reliant behavior to an extreme” (Ricciardi and Simon, October 2000, p. 13). As humans we have an inclination to overestimate our own skills, abilities, and predictions for success as noted in papers by Ricciardi and Simon (2000), Ricciardi and Simon (October, 2000), Ricciardi and Simon (2001), and Ricciardi (2003). Myers (1989) further commented:

Our use of quick and easy heuristics when forming judgments and our bias toward seeking confirmation rather than refutation of our ideas can give rise to the overconfidence phenomenon, an overestimation of the accuracy of our current knowledge. (p.293)

Individuals are very confident in their decisions formed under the cognitive processes of heuristics and are rather inattentive regarding the exact manner in which their decision was formed. For instance, Slovic, Fischhoff, and Lichtenstein (1980) had non-expert subjects indicate the chances that they were correct in selecting the more frequent deadly events. Individuals often gave answers of 100:1 or more that their assessments were accurate. However, approximately 1 in 8 answers associated with such extreme confidence was erroneous (less than 1 in 100 would have been incorrect if the chances had been suitable). Also, this overconfident behavior extends to expert individuals (i.e. safety inspectors) in which, they ignore or underestimate the odds of a risky event or activity. When experts are required to rely on intuitive judgment, rather than on statistical data, they are prone to making the same sort of errors that the novices make. The existence of this overconfident behavior within expert decision-making occurs for several reasons including: failure to contemplate the way human mistakes influence technological systems, exhibiting overconfidence in existing scientific knowledge, inattentiveness to how technological systems perform together as a whole, and failure to predict how people respond to safety procedures (Slovic, Fischhoff, and Lichtenstein, 1980).

Another category of the overconfidence heuristic is the notion of the “It won’t happen to me” bias. In this instance, individuals tend to consider themselves invulnerable to specific risky activities or events on an individual basis, however they would readily concede to these risks on a societal level. For instance, most individuals have a tendency to believe they are better than the
average driver, more likely to live past the age of 80, and are less likely to be injured by consumer goods (Slovic, Fischhoff, and Lichtenstein, 1980).

2.5.4 Loss Aversion

“Early research, using utility-based models, suggested that investment risk could be measured by return distribution moments such as variance or skewness” (Olsen, 2000, p.50). Whereas, other aspects of the risk research literature has focused on the notion of perceived risk concerning the assumption by behavioral finance scholars that individuals are loss averse. A central assumption of prospect theory is that individuals are loss averse in which people designate more significance to losses than they allocate to gains as pointed out in earlier behavioral finance endeavors by Ricciardi and Simon (2000), Ricciardi and Simon (October, 2000) and Ricciardi (2003). The notion of loss aversion is contrary to the tenets of modern portfolio theory, since identical losses and gains are treated within an equivalent basis. In other words, according to basic statistical analysis, losses are simply “negative profits” and are thus weighted in the same manner. From an investment standpoint, during the decision-making process, many investors appear especially thin-skinned and vulnerable to losses and highly determined not to realize a financial loss. In some instances, investors exhibit a tendency or increased readiness to take risks in the desire of reducing or avoiding the entire loss as pointed in Ricciardi and Simon (2001).

A main premise of loss aversion is that people are less likely to sell stocks at a loss than they are to sell stocks that have gained in worth even if expected returns are held constant. Many academic experiments have demonstrated that for some investors that a loss bothers them twice as much in absolute terms than the pleasure from an equal gain. For example, an investor that loses $10,000 on a specific stock feels twice as much pain than if that person had a $10,000 profit (reward) on the same exact investment. Furthermore, Scott Mendintz writes “we'll do foolish things to avoid finalizing and accepting losses that have already happened-a phenomenon many of us know as throwing good money after bad. So we'll spend hundreds of dollars to fix an old car not because it makes economic sense, but because we've already spent a lot on it” (1999, p. 81). These “errors in judgment” often lead or result in an investor not selling their losing investment even though it is the correct investment decision as alluded to by Ricciardi and Simon (2000) and Ricciardi and Simon (October, 2000).

2.5.5 Representativeness

Another important heuristic that plays a role in affecting a person’s perception of risk is known as representativeness. Behavioral finance scholars refer to a fundamental mental mechanism that we set in motion because of abstract rules known as a mental shortcut that is part of the judgment process was first introduced by Tversky and Kahneman in 1971. “Decision makers manifesting this heuristic are willing to develop broad, and sometimes very detailed generalizations about a person or phenomenon based on only a few attributes of the person or phenomenon” (Busenitz, 1999, p. 330). “Many mental shortcuts exist that make it difficult for investors to analyze new information correctly and without bias” (Ricciardi and Simon, 2001, p. 21). Representativeness reflects the belief that a member of a category (i.e. risky activity or events) ought to resemble others in the same class, and that an effect ought to resemble the cause that produced it as noted in Ricciardi and Simon (2001). In essence,

Representativeness is but one of a number of heuristics that people use to render complex problems manageable. The concept of representativeness proposes that humans have an automatic inclination to make judgments based on the similarity of items, or predict future uncertain events by taking a small portion of data and drawing a holistic conclusion. (Ricciardi and Simon, 2001, p.21)
The representativeness heuristic is based on the notion that we tend to form an opinion regarding events by how much they resemble other events with which we are familiar. In so doing, we ignore relevant facts that should be included in our decision-making process, but are not. For instance, investors frequently predict the performance of a new investment (i.e. the purchase of IBM stock) by relating it to the previous investment’s success or failure. This flawed hypothesis is that these effects should resemble their causes or all events in a category are similar underlies a substantial number of mistaken viewpoints. In some circumstances, shortcuts are beneficial, but in the case of investment decisions they tend to render the investor’s judgments unreceptive to change as pointed by Ricciardi and Simon (2001). Many investors feel that this approach to the decision-making process is so accurate as to be irrefutable. This sometimes leads the investor to arrive at a conclusion quite different from what they intended and different from the desirable and correct conclusion. Piatelli-Palmarini (1994) made the following point in which to expand the significance of this thinking, the investor also does not even realize that this thought process has brought them somewhere else. The brain assumes that situations with similar traits are, in fact, identical when in reality they may very well be quite different. To illustrate, the importance of this concept for investors, Douglas Van Eaton writes:

The effect of representativeness in investment decisions can be seen when certain shared qualities are used to classify stocks. Two companies that report poor results maybe both classified as poor companies, with bad management and unexciting prospects. This may not be true, however. A tendency to label stocks as either bad-to-own or good-to-own based on a limited number of characteristics will lead to errors when other relevant characteristics are not considered. (2000, p. 5)

In a study by Busenitz in 1999, the author attempted to determine the risk taking behavior of entrepreneurs who begin new business ventures as it relates to the area of cognitive psychology and decision-making. The author suggests that entrepreneurial risk taking can be attributed to the identify that entrepreneurs utilize heuristics and biases more than other types of business executive, which is likely to result in them to perceive a lesser amount of risk in a given decision circumstance. The authors asked 2 groups to fill out a questionnaire: entrepreneurs (124 usable responses) vs. corporate managers of large firms (95 usable responses) by measuring specific risk characteristics including: overconfidence, representativeness, risk propensity, age, and education. The findings revealed that entrepreneurs do certainly use representativeness (over generalize from a few factors or observations) more in their decision-making practices as well as are overconfident than managers from large organizations.

2.5.6 Framing

Another factor that influences a person perception of risk is the format in which a situation or choice is presented is known as framing. Framing issues occur when indistinguishable or equivalent depictions of outcomes or items result in different final decisions or inclinations. Kahneman and Tversky (1979) utilized framing effects from two significant perspectives within the decision-making process including: the environment or context of the decision and the format in which the question is framed or worded. “Framing is an assessment of level-headedness (rationality) in making choices and formulating thoughts is whether the same question, presented in two distinct but equal means, will extract the identical response” (Ricciardi and Simon, 2001, p. 23). Duchon, Ashmos, and Dunegan commented further on framing:

Decision makers evaluate negative and positive outcomes differently. Their response to losses is more extreme than their response to gains which suggests, psychologically, the displeasure of a loss is greater than the pleasure of gaining the same amount. Thus, decision makers are inclined to take risks in the face of sure losses, and not take risks in the face of sure gains. (1991, p.15)
Ricciardi and Simon (2001) utilized the following example in which the issue of framing can be useful in how individuals make decisions concerning their finances in the following manner. For example, consider the “distinctive impressions” presented by these two options:

**Selection A:** Would you invest all your money in a new business if you had a 50% chance of succeeding brilliantly?

**Selection B:** Would you invest all your money in a new business if you had a 50% chance of failing miserably?

“The success-frame in A makes it seem more appealing than the failure-framed B, although the probability of success versus failure is the same for both” (Weber, 1991, p. 96). In most instances, people choose the choice that seems less risky. The explanation this selection gives the appearance that it is more psychologically soothing and pleasing rather it being is the best option. “Research suggests that this concept proves that people tend to default to a form of mental sluggishness. We know we are biased, but we chose not to correct our heuristic perception” (Ricciardi and Simon, 2001, p. 24). Interestingly, individuals consent the circumstance as offered and make no attempt to “reformulate it” in a comparable and balanced manner according to (Piatelli-Palmarini 1994).

In effect, scholars have found that small changes in the wording of judgments can have a prominent effect on choice behavior. “Subtle differences in how risks are presented can have marked effects on how they are perceived” (Slovic, Fischhoff, and Lichtenstein, 1982, p. 483). Thus framing effects (the presentation of information) can be utilized to modify an individual’s perception of risk. For instance, in the research endeavor by Sitkin and Weingart (1995), 2nd study investigated the association between a framing problem, risk perception, and risk taking behavior. The subjects were 63 college students that were provided with a car-racing scenario in which the continued sponsorship of the venture was dependent on the successful of winning. The decision making process of related to the case study was presented with a framing problem based on potential for a gain or a potential for a loss. The risk component of this case was measured with specific risk attributes namely the probability of participation, the significance of opportunity vs. the significant of the decision, the potential loss, the potential gain, whether this is judgment is a negative or positive situation, and the likelihood of success. The findings revealed the following: 1) Situations that are framed positively are perceived as concerning higher risk than circumstances that are framed negatively. 2) The extent (degree) to which subjects make risky decisions are negatively related with their level of given risk perception.

### 2.5.7 Anchoring

Anchoring is “used to explain the strong inclination we all have to latch on to a belief, that may or may not be truthful, and use it as a reference point for upcoming decisions” (Ricciardi and Simon, 2001, p. 25). Anchoring involves a decision-making process of thought, which people use to solve intricate problems by selecting an initial reference point and adjusting slowly to a correct answer that differs from an initial conviction. For instance, “one of the most frequent anchors is a past event or trend. In attempting to project sales of a product for the coming year, a marketer often begins by looking at sales volumes for past years. This approach tends to put too much weight on past history and does not give enough weight to other factors” (Anderson, 1998, p. 94). Hammond, Keeney, and Raiffa (1998) illustrates an additional example of anchoring in the article entitled “The Hidden Traps In Decision Making”:

**How would you answer these two questions?**

Is the population of Turkey greater than 35 million?

What’s your best estimate of Turkey’s population?
Most people who reply to the 2nd question are influenced by the “population of 35 million figure” that was revealed in the 1st question even though it has no factual foundation. In 50% of the experiments the 35 million figure was utilized and in the other 50% of the cases this number was increased to 100 million. Without indecision, the responses to the 2nd question increase by many millions when the 100 million amount is utilized as the first question. These findings reveal when people make judgments their minds give inappropriate significance or overweights the importance of the initial information it obtains. Thus, first impressions, rough calculations, or statistical figures anchor subsequent thinking and choices. (Hammond, Keeney, and Raiffa 1998)

Ultimately, if you think about the last risky activity you participated in, chances are that you formed an opinion of this event immediately upon engaging in it. From now on you will proceed to view each new bit of knowledge about this risky activity (i.e. mountain climbing), based on your first impression. Perhaps the cliché that “you never get another opportunity to make a notable first impression” is more truthful and accurate than we recognized, when you contemplate this “anchoring effect” as noted by Ricciardi and Simon (2001). To further complicate this bias, even when individuals know they are anchoring, it is difficult to pull up the anchor. Massimo Piatelli-Palmarini writes, “Revising an intuitive, impulsive judgment will never be sufficient to undo the original judgment completely. Consciously or unconsciously, we always remain anchored to our original opinion, and we correct that view only starting from the same opinion” (1994, p.127).

2.5.8 Familiarity Bias

There has been wide application within the risk perception literature of the theme of familiarity bias among various fields from the social sciences and business studies. Familiarity bias is an inclination or prejudice that alters individual’s perception of risk. The phrase familiarity has been described, “to denote a degree of knowledge or experience a person has respect to a task or object” (Gigerenzer & Todd, 1999, p.57). Whittlesea (1993), provides an interesting description of the concept of familiarity from a behavioral perspective:

A feeling of familiarity is the sine qua non of remembering. Judgments about one's personal past that are not accompanied by a feeling of familiarity do not feel like remembering, but instead feel like guessing or problem solving. In contrast, a feeling of familiarity is usually sufficient to make one feel one is remembering, whether or not the feeling is accompanied by recall of the detail of a prior experience. (p. 1235)

Gilovich (1981) comments further “we form associations between existing circumstances and past situations and are influenced by what we consider to be the implications of these past events” (p. 797). When considering hazardous activities from the field of cognitive psychology, individuals are more comfortable and tolerant of risk when they are personally familiar with a specific activity or circumstance. Risks that are familiar are feared less than those that are unfamiliar, for this reason this assists in explaining why people overreact to unexpected information (news).

The notion of familiarity bias has been a prevailing area of investigation in academic studies on risk perception from the field of behavioral accounting since 1975. The issue of familiarity is the only behavioral risk characteristic that has been continually investigated by risk perception scholars within the collection of 12 research studies over the time period 1975 to 2002. While Baker and Nofsinger (2002) provided the following description of familiarity bias from a behavioral finance perspective:

People often prefer things that have some familiarity to them. Consequently, investors tend to put too much faith in familiar stocks. Because those stocks are
Within the behavioral finance literature, familiarity bias has been applied within several areas of investment decision-making including: 1) international finance and asset allocation in which investors demonstrate a preference for investing in domestic stocks (familiar assets) rather than international stocks (unfamiliar assets); 2) employee’s that invest most of their retirement savings in their company stock (familiar assets); and 3) portfolio managers have demonstrated a tendency to invest money in local companies or stocks with recognizable brand names or reputations. The review of the risk perception literature revealed the notion of familiarity was addressed or alluded to in some form in a number of studies in behavioral finance.

2.5.9 The Issue of Perceived Control

The examination into the importance of the association between control and perceived risk has been a prevalent topic in psychology since the late 1970s. Natalier (2001) offers the following perspective of control in terms of the risky activity of motorcycle riding, “when the interaction between motorcyclist, motorcycle and environment is flawless, perfect control can be achieved. Control is the ability to foresee and navigate potential hazards, thus erasing risk in a material way” (p.71). The academic literature on control offers a wide number of views of its exact definition.

The author of this paper focused on the two most important perspectives since the narrative research review of the three disciplines incorporate these two main forms of control which are: 1) locus of control (i.e. external vs. internal control) and 2) perceived control (i.e. illusion of control). There have been a number of studies from the social sciences that deal with the notion of locus of control and risk-taking behavior. A person’s locus of control explains the degree to which they perceive that they exert control over their own behavior and personal outcomes of a specific situation (Rotter 1971). External locus of control provides a person with the perception that chance or outside factors influence one’s decision or final outcome of an event. Internal locus of control is the perception or belief that a person to a great extent controls his or her own destiny (i.e. in terms of the result of a judgment or circumstance). Four studies from the behavioral finance literature review provide examples and reveal interesting findings of the application of locus of control and risk-taking behavior in an investment decision context.

Whereas, Langer (1983) provides a different perspective of the psychology of control (i.e. perceived control) as the “active belief that one has a choice among responses that are differentially effective in achieving the desired outcome” (p. 20). All types of individuals (i.e. experts, novices), to some extent, reveal a nature tendency and need to control situations that they encounter each day. Typically people profess a desire to attempt to control a certain situation with the main objective of influencing the results or outcomes in their favor. Even in instances when control of an outcome is obviously in short supply, a person perceives that one has control over the outcome of a situation known as illusion of control (Langer 1975). “People often believe that they have influence over the outcome of uncontrollable events” (Baker and Nofsinger, 2002, p.103). In effect, illusion of control makes a person believe based on their skills or diligence that he or she can influence and control the outcome of a random decision or situation (i.e. based on the belief in their expertise, skill or ability to avoid large monetary losses) (MacCrimmon and Wehrung 1986).

Within the literature on finance and investment decision-making, the notion of how control influences an investor’s perception of risk has become well-noted and established area of examination. The studies in behavioral accounting by Koonce, McAnally and Mercer (2001) and Koonce, McAnally and Mercer (2003) have utilized a host of behavioral risk characteristics which includes a control factor by Slovic and his colleagues from the hazardous activities studies in
psychology. The narrative review in behavioral finance revealed the association between the topic of control and perceived risk within the literature has been a leading area of exploration since the early 1980s. Scholars from behavioral finance have focused their work on two main categories of control: 1) the relationship between locus of control and risk-taking behavior in works by McInish (1980), McInish (1982); Maital, Filer and Simon (1986), Grable and Joo (2000) and 2) a collection of control issues and variables that include: perceived control, the feeling of control, controllability, and the illusion of control for an extensive list of 10 studies by Holtgrave and Weber (1993), Olsen (1997); Sarasvathy, Simon, and Lave (1998), Williams and Voon (1999), Houghton, Simon, Aquino, and Goldberg (2000), Goszczynska and Guewa-Lesny (2000b), Heiliar, Lonie, Power, and Sinclair (2001), Weber, Blais, and Betz (2002), Forlani (2002), and Dulebohn (2002).

2.5.10 The Significance of Expert Knowledge

Webster's Dictionary defines knowledge as the “fact or condition of knowing something with familiarity gained through experience or association.” Hayek (1945) offered this perspective of how an extensive group of decision makers (i.e. investors in the financial markets) assess information, “the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess” (p. 519). The research inquiry into the connection between psychology of knowledge and risk perception has been an established theme in psychology over the last 25 years. Lee (1999) offers a general assessment of the relationship between knowledge and perceived risk:

changing knowledge…can change risk perceptions. For example, several studies have shown that provision of information about a risk (e.g. from electromagnetic fields or radon) can increase risk perception…. On the other hand, however, even anecdotal evidence suggests that people with the same level of knowledge about risk (e.g. experts on a risk issue) may nevertheless disagree in their risk evaluation…. Scientists as well as risk managers and politicians often complain about laypeople’s lack of knowledge of science and technology and the associated risks in particular…. These knowledge gaps are often blamed for leading to unreasonable risk perception…. The reasoning assumes a simple, monotone and inverse casual relationship between knowledge and perceived risk: the smaller the knowledge, the higher the perceived risk. Empirical research, however, suggests that the relationship between knowledge and risk perception is more complex. While some studies, in particular nuclear power, established the inverse relationship, other failed to demonstrate an association. (p.7)

In effect, many of the risk perception studies from psychology reveal changes in the level of a person’s knowledge can result in an adjustment in their risk perception of a specific activity or situation.

Within the academic research from finance and investments, the significance of the level of knowledge and how this behavioral issue might influence an investment professional’s perception of risk has developed into a well-known area of analysis. The risk perception working papers in behavioral accounting by Koonce, McAnally and Mercer (2001) and Koonce, McAnally and Mercer (2003) have employed a collection of behavioral risk indicators which also comprise a knowledge characteristic by Slovic and his peers from the risky activities studies in psychology. The behavioral finance literature review showed the affiliation between the notion of knowledge/expertise and perceived risk within the academic research has been a leading area of study since the mid-1980s in a number of studies.
2.5.11 The Role of Affect (Feelings)

In 1987, Brehmer was critical that many of the academic endeavors on perceived risk mostly concentrated on cognitive issues and all but disregarded the emotional component of psychological risk. However, in recent years, this aspect of the risk perception literature has begun to reverse itself by academics including an affective aspect according to Finucane, Alhakami, Slovic, and Johnson (2000), Loewenstein, Hsee, Weber, and Welsh (2001) and Pligt (2002), Slovic, P., Finucane, M., Peters, E., and MacGregor, D. G. (2002a), Slovic, P., Finucane, M., Peters, E., and MacGregor, D. G. (2002b), and Slovic, P., Finucane, M.L., Peters, E., and MacGregor, D.G. (2004). Scholars from the different fields of behavioral decision-making at this time acknowledge that the study of the emotional responses (i.e. issues of affect) is an essential aspect of how individuals make risk judgments. The significance of emotion and affect within the social sciences is apparent in a number of books on the subject matter including: Strongman (1987), Ortony, Clore, and Collins (1988), Lewis and Haviland (1993), and Forgas (2001). Pligt (2002) commented on the progression of cognitive factors and affective responses within the risk perception literature:

Two different research traditions, one focusing on large-scale technological risks, the other on more personal risks associated with behavioral practices or hereditary factors…. For a long time both focused on cognitive approaches to help our understanding of people's perception and acceptance of risks. Cognitive approaches were also used to help explain the relation between perceived risk and behavior. Only occasionally, emotions and motivational factors were taken into account. More recently this has changed, and research now attempts to incorporate both cognition and emotion. (p. 248)

Thus, within the behavioral finance literature a growing area of investigation has been the influence of an emotional aspect into the fields of risk perception and investment decision-making known as affect in a sample of works by Lifson and Geist (1999), Williams and Voon (1999), MacGregor, Slovic, Dreman and Berry (2000), Olsen (2000), Dowling and Lucey (2003), and Finucance, Peters, and Slovic (2003). Finucance, Peters, and Slovic (2003) provided the following definition of affect as “(1) experienced as a feeling state (with or without consciousness) and (2) demarcating a positive or negative quality of a specific stimulus” (p.328).

Finucance, Peters, and Slovic (2003) make the point it is an important to recognize the differences between the concept of emotion, mood, and affect. Thus, this author provides a basic contrast between these three concepts with the investment expert in mind. An emotion is a state of consciousness (mind) connected to the arousal of feelings. In essence, an emotion is a mental condition that occurs impulsively rather than by conscious effort and is often associated by physiological changes (i.e. a specific feeling such as joy or hate). A mood (also known as feelings) refers to any of the subjective responses, pleasant or unpleasant, that a person might experience from a specific situation. In other words, a mood (feeling) is an affective state of awareness resulting from emotions. The notion of affect is the emotional complex (i.e. positive or negative feelings) associated with an idea or mental state. In essence, affect is a “feeling” revealed as a reaction to a stimulus (i.e. a collection of financial information of a stock). Finucance, Peters, and Slovic (2003) elaborate further on the affective process:

Individuals differ in the strength and speed of their positive and negative reactions, and stimuli themselves vary in the strength and speed with which they elicit positive and negative feelings. An affective reaction can be an enduring disposition strongly related to the stimulus..., but can also be a fleeting reaction or a weakly related response…. The affective quality of a stimulus may vary with
Loewenstein, Hsee, Weber, and Welsh (2001) made several points involving the association between risk and affect. The emotional aspect concerning risk frequently departs from the cognitive influences of risk perceptions. In decisions about risky activities, emotional responses (i.e., affective consequences) commonly apply primary reactions to behavior above cognitive influences and usually result in behaviors that are not adaptive. Furthermore, affective reactions usually result in behavioral outcomes that diverge from what people consider as the optimum outcome of a decision. The cognitive issues that are mentioned involve how an individual processes information and what factors influence their perception of risk for a certain decision (i.e., issues of heuristics, framing, anchoring, overconfidence. In effect, to fully understand the judgmental process of investors, scholars must consider both the affective and cognitive aspects of how investors process information and perceive risk for a given activity, situation, or circumstance.

2.5.12 The Influence of Worry

The investigation into the significance of the topic of worry has slowly received increased attention within the risk perception literature from psychology in a sample of works by Drottz-Sjöberg and Sjöberg (1990), MacGregor (1991), Sjöberg (1998), Baron, Hershey and Kunreuther (2000), Constans (2001), and Rundmo (2002). Many of the earlier studies since the late 1970s concerning risk perception studies in psychology allude to concern or a negative feeling about risk that might influence a person’s perception of risk regarding a specific activity known as dread or dreadfulness. Worrying is a lasting concern with a past or an upcoming event. It is a category of risk assessment that makes a person feel as if he or she were reliving a past occasion or living out a future one, and the individual cannot stop these types of contemplations from happening. A behavioral definition of worry is how a person might react towards a specific situation or decision that causes anxiety or as a source of unhappiness. MacGregor (1991) offered the following overview of worry from a cognitive perspective:

One way to think about worry is a cognitive process that occurs when we are uncertain about a future event or activity. In common usage, worry is often used synonymously with terms like ‘fear’ and ‘anxiety.’ However, in a strict sense, worry is a primarily a mental activity, whereas anxiety and fear include emotional components and associated physical responses…. Worry is thinking about uncertainties, whereas anxiety includes the gut-level feeling that accompanies uncertainty. (p. 316)

Depending on the context regarding a specific situation or circumstance and the degree of worry by a person, scholars seem to identify worry (or the act of worrying) in various forms of cognitive factors and/or affective reactions in a sample of works on risk perception. Risk perception studies in the psychology literature revealed a wide range of viewpoints concerning the role of cognitive and affective factors as a component of the concept of worry in papers by: MacGregor (1991) considered worry from a cognitive perspective, Drottz-Sjöberg and Sjöberg (1990) and Constans (2001) from an emotional standpoint, Rundmo (2002) as an affective reaction, Sjöberg (1998) recognized the problems in identifying the differences between emotional and cognitive concepts, and Baron, Hershey and Kunreuther (2000) failed to address this issue. Whereas, Loewenstein, Hsee, Weber, and Welsh (2001) provide a discussion of the risk-as-feelings hypothesis, which reveals the association between cognitive and emotional influences as “behavior is then determined by the interplay between these two, often conflicting, responses to a situation” (p. 270). This demonstrates the notion of worry as containing both an affective and cognitive aspect in certain decision-making processes in connection with risk-taking behavior.
From a financial perspective, the concept of worry has practical application by everyday investors in the financial markets. The media continually supports the notion of worry in the minds of stock market investors whenever they report news that the market has declined on any given day or released bad news from various new sources such as online new stories, newspaper periodicals, and reports on business segments of television news. For instance, a headline from *BusinessWeek* in January 2002 suggested before an investor considers buying a stock of a company he or she should read this article entitled, “Investors’ New Worry: ‘Auditor Risk’” and in another news story from *U.S. News & World Report* in 1994 read “Worry Over Weird Investments.” From an academic perspective, the notion of worry has followed the usual pattern of its origins and initial investigation occurred in the risk perception literature in psychology and then, crossed over to other behavioral fields of knowledge. The narrative research review revealed that the behavioral risk indicator “worry” was dominant in a small sample of risk perception studies in works by Koonce, McAnally and Mercer (2001) and Koonce, McAnally and Mercer (2003) in behavioral accounting, the endeavor by Snelbecker, Roszkowski, and Cutler (1990) from behavioral economics, and the study by MacGregor, Slovic, Berry, and Evensky (1999) in behavioral finance.
2.6 The Behavioral Foundation of Risk Perception Studies: Hazardous Activities from the Social Sciences

From a behavioral perspective, the terminology used to describe the notion of risk has one common theme that individuals seem to make judgments: it is the distinctiveness of potential hazards instead of the financial perspective of a one-dimensional abstract theoretical concept of risk (i.e. beta or standard deviation). Martínez-Arias, Prades, Arranz, and Macias (2000) describe the research work of risk perception from the social sciences:

Understanding public perceptions of risk is increasingly considered to be important in order to make sound policy decisions. Psychologists and other social scientists have shown how individuals judge and evaluate hazards related to working conditions, private activities, technological developments, global ecological changes, and so on. The main issues are the subjective concepts underlying risk judgments, the determinants of perceived risk magnitude, and differences among societal groups or cultures. (p.1)

The initial foundation for risk perception studies are connected to the area of behavioral decision making in the 1950s regarding how individuals make judgments between gambles (Edwards 1954). During the 1960s, the research focused on examining how subjects make choices regarding statistical variances and measures in a laboratory setting (Slovic and Lichtenstein 1971), and then during the 1970s risk research involved heuristics and cognitive biases (Kahneman, Slovic, and Tversky 1982). While the first research studies on risk perception occurred during 1960s in works by Bauer (1960), Cox and Rich (1964) and Cox (1967) in the areas of consumer behavior and marketing; the field only became well-established since the mid-to-late 1970s in psychology by the Decision Research in the seminal works by Slovic, Fischhoff, and Lichtenstein (1976), Fischhoff, Slovic, Lichtenstein, Read, and Combs (1978), Slovic, Fischhoff, and Lichtenstein (1980).

Since this point of time, there has been an ever-changing and evolving area of research conducted by social scientists in the area of health issues (i.e. smoking behavior), safety concerns (i.e. seat belts in cars), environmental matters (i.e. the use of nuclear power), industrial applications (i.e. new uses of biotechnology), and cultural aspects (i.e. worldviews of adult populations). Many of the factors of risk perception have shown variances in behavior among different populations and cultures across international boundaries. Studies reveal demographic differences among certain groups such as gender bias (i.e. men vs. women), age differences (i.e. younger vs. older populations), and marital status (i.e. single vs. married individuals). Studies in risk perception have found that individuals reveal unjustifiable confidence in their decisions in works by Plous (1993) and Bazerman (1998), issues of knowledge in studies by Fischhoff, Slovic, Lichtenstein, Read, and Combs (1978) and Rao and Monroe (1988) and unwarranted beliefs in their ability to achieve (perform) under risky conditions in studies by Slovic, Fischhoff, and Lichtenstein (1980) and March and Shapira (1987).

Various studies on risk perception have demonstrated differences among novices (i.e. the general public vs. experts (i.e. physicians, toxicologists, chemists) in works by Fischhoff, Slovic, and Lichtenstein (1981), Christensen-Szalanski, Beck, Christensen-Szalanski, and Koepsell (1983), Fischhoff, Slovic, and Lichtenstein (1983), Kraus, Malmfors, and Slovic, (1992) Savadori, Lotto, and Rumiati (2002). While other current studies the have offered contrary evidence to this standard premise in studies by Wright, Pearman, and Yardley (2000), Rowe and Wright (2001). Also, the focus on an expert research sample (investment professionals) has been revealed as a dominant theme within the risk perception literature within the discipline of behavioral finance (Ricciardi 2004).
Traditionally, the concept of perceived risk has considered the subjective assessment of risk significance connected with a specific activity or event. Early studies from cognitive psychology, for instance, recognized a variety of systematic errors in risk decision-making in works by Kahneman and Tversky (1979), Tversky and Kahneman (1981) and Kahneman, Slovic and Tversky (1982). On the other hand, objective aspects of risk has been formalized as involving evaluations that are well-defined and established principles such as the probability of an activity, its potential consequences, and levels of exposure to these possible consequences. The study of risk and the public’s reactions to a wide range of hazards are well established with the largest contribution, can be attributed to the field of psychology specifically cognitive psychology.

The foundation concerning the “behavioral component” of risk perception studies in behavioral finance was developed from the earlier works on hazardous and risky activities by scholars in works by Starr, Rudman, and Whipple (1976), Fischhoff, Slovic, Lichtensten, Read and Comb (1978), Slovic, Fischhoff, and Lichtenstein, (1980), and Slovic, Fischhoff, and Lichtenstein, (1985). These research studies were commonly involved with determining how people assess a number of hazardous activities, what individuals (subjects) denote as the meaning of risk, and what aspects involve their risk perceptions across various risky activities. Some important trends and findings from this collection of studies were:

- Perceived risk is measurable and predictable as well as subjective and descriptive in nature.
- These collections of studies established the psychometric approach as well as the significance of factor analysis within the arena of risk perception studies.
- The notion of an inverse relationship between perceived risk and perceived gain (benefit).
- The risk characteristics (indicators) that have been developed in these studies has been duplicated in various risk perception studies as well as reconfirmed the basic 7-point Likert scale format for the measurement of risk variables.
- The authors have shown, that professional (expert) and novice (non-expert) subjects perceive risk differently based on the type hazard or risky activity and the degree of the riskiness (i.e. nuclear power).
- These studies from the social sciences have investigated a wide range of qualitative risk indicators (characteristics) that demonstrate the multi-dimensional aspects of perceived risk. (See Table 3: A Sampler: Behavioral Factors Affecting Perceived Risk: The Main Issues and Findings from the Social Sciences).
| **Table 3: A Sampler: Behavioral Factors Affecting Perceived Risk:**  
The Main Issues and Findings from the Social Sciences |
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<tr>
<td><strong>Familiarity:</strong> Individuals are more comfortable and tolerant of risk when they are personally familiar with the specific activity, situation, or event.</td>
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<td><strong>Controllability:</strong> People undertake more risk when they perceive they are personally in control since individuals are more likely to trust their own abilities and skills when engaging in a risky activity.</td>
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<td><strong>Media attention:</strong> The public has higher levels of anxiety regarding issues that we are sensitive to and that we believe are significant and credible. Media reporting of certain topics increases our recognition of a problem and our belief in its credibility.</td>
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<td><strong>Frequency:</strong> Our perception in the frequency (rate of occurrence) of an activity or activity affects our perceived risk. If people do not believe that the risky activity will take place, they are more likely to accept the risk.</td>
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<td><strong>Personal vs. Societal:</strong> Individuals are willing to only assume risks that concern ourselves. People apply a much higher benchmark to protect the general public from potential risk activities.</td>
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<tr>
<td><strong>Dread:</strong> People have a substantial anxiety or dread of risks whose severity we judge we cannot control. These types of risks are considered to be catastrophic, lethal, hard to prevent, unfair, threatening to future generations, and involuntary.</td>
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<tr>
<td><strong>Trust:</strong> The higher the level of trust individuals possess in the experts informing the public about the risky activity, the less anxiety (dread) the individual has regarding the specific situation.</td>
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<tr>
<td><strong>Voluntariness:</strong> Individuals reveal less anxiety or fear towards risk that we voluntarily expose ourselves to rather than a risk, which he or she is required to engage in (involuntary risk).</td>
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<td><strong>Catastrophic Potential:</strong> Individuals display a tendency to have an increased level of perceived risk for activities they may injure or kill a lot of the public immediately and violently. There is less anxiety over chronic risks since they occur over a long period of time and not all in one occasion.</td>
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<td><strong>Benefit:</strong> The more an individual perceives a benefit from a potential risky activity the more accepting and less anxiety towards that risky activity, event, or situation.</td>
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<tr>
<td><strong>Knowledge:</strong> The more individuals perceive an activity as difficult to understand (lack of knowledge) the increased anxiety or fear they have towards it.</td>
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In general, the seminal works by the Decision Research scholars utilized factor analysis to demonstrate that a wide range of risk indicators may be reduced to two main risk constructs or dimensions for a collection of the standard nine risk behavioral risk characteristics (Fischhoff, Slovic, Lichtenstein, Read and Comb 1978). The first factor developed was known as “Dread Risk” in which risks measured as possessing catastrophic potential, the severity of consequences, the risk to future generations, and the controllability of consequences. The second risk factor was classified as “Unknown Risk,” and separates out between hazardous activities that are familiar, that have been around longer, and the have immediate consequences vs. those risky actions that are unfamiliar, new, and have belated causes. Yates and Stone comment further:

> What is most interesting about Factors I (Dread Risk) and II (Unknown Risk) is that they correspond quite well with two basic constituents of the theoretical risk concept, loss significance and loss uncertainty, respectively. The analysis implies that, when people think and communicate about the riskiness of a given hazard, they really do have in mind those two constructs. (1992, p.76)
Most of the studies in this collection employ a research design for measuring a person’s perception of risk for an array of risky circumstances across a spectrum of behavioral risk indicators known as the psychometric paradigm that was developed during the late 1970s and early 1980s by the Decision Research scholars. The purpose of the psychometric method to risk was to explore and to determine which “characteristics of risk” accounted for the unexplained variance of an individual’s risk perception. The psychometric paradigm has become a well-established approach for the examination of risk perceptions from respondents and utilizes psychometric scaling methods to construct quantitative measures of various behavioral risk characteristics (i.e. control factors) and judgment attributes (i.e. overall rating for perceived risk) across a wide collection of risky and hazardous activities. A central foundation of this psychometric paradigm approach is a standard collection of 9 or 18 behavioral risk characteristics (see Table 3 which reveals a number of these behavioral risk characteristics). Within this psychometric paradigm the behavioral risk characteristics can be considered as “independent variables” whereas, the judgment or decision-making variables are “dependent variables”. Englander, Farago, Slovic, and Fischhoff (1986) describe the psychometric paradigm:

It uses psychophysical scaling and multivariate analysis techniques to produce quantitative representations (or 'cognitive maps') of risk attitudes and perceptions. Within the psychometric paradigm, people make quantitative judgments about the current and desired riskiness of diverse hazards and the desired level of regulation for each hazard. These judgments are then related to judgments about each hazard’s status on characteristics that have been hypothesized to account for risk perceptions and attitudes including both qualitative aspects (e.g. voluntariness, dread, knowledge, controllability) and quantitative ones (e.g. a number of deaths caused by a hazard in an average, or in a disastrous year). (p.56)

This approach utilizes multivariate statistical methods including: multiple regressions, factor analysis, multi-dimensional scaling, correlations and intercorrelations, in which scholars simultaneously examined the relationships between these variables with the calculation of mean values for each risky activity (hazard) across the standard collection of behavioral risk indicators across respondents revealed many of these variables were highly correlated. For example, factor analysis is employed to determine the correlations between averaged risk indicators (i.e. the traditional set of 9 or 18 behavioral characteristics) applied across a collection of hazardous activities (i.e. 30 risky activities). (As mentioned earlier, this collection of standard behavioral risk indicators with the implementation of factor analysis could be reduced to two or three main factor groupings.) The “psychometric paradigm cognitive map” allowed scholars to plot the host of risky situations and hazardous activities within a two-factor space, which can be utilized to describe and forecast risk perceptions of these specific hazards. For instance, hazardous activities such as nuclear weapons, crime, and pesticides recorded high on the “dread factor” domain and were also professed by respondents as highly risky, whereas vaccinations, driving a car, and receiving anesthetics had low average means and were rated as low risk activities.

Over the years, many of these findings and research approaches have been replicated in hundreds of studies in risk research across a wide spectrum of disciplines in the social sciences. Since the early 1990s, the seminal work of the Decision Research has started to crossover to a wider spectrum of disciplines including: behavioral finance, behavioral accounting, and behavioral economics. Many of the studies in behavioral finance concerning this research perspective has been conducted by the Decision Research scholars themselves with the extension of this work to financial decision making. Whereas, other scholars from outside this research group have also extended the work of Decision Research scholars within behavioral accounting, behavioral finance, and behavioral economics.
3.0 The Approach to the Narrative Research Review

An extensive narrative research review of the literature was conducted of the earlier studies on perceived risk in behavioral accounting and behavioral finance from academic journals, working papers, books, and dissertations (see Figure 3). The basic approach utilized for this narrative research review was a 5-part procedure:

1) **Article search**: The author searched utilizing a wide range of terms and concepts for a host of computer databases in which the database was searched by the main risk phrase within the article title, abstract, the body of the text, and reference lists (see Figure 3: Part 1A and Part 1B).

2) **Academic study location and collection**: Most papers were found on the Internet, library databases, interlibrary loan, purchasing the specific dissertation or book, and in some cases by contacting the author of the study via email (see Figure 3: Part 2).

3) **Develop a criteria for discipline assessment**: The author created an initial criteria for identifying the risk perception study as behavioral accounting or behavioral finance (see Figure 3: Part 3).

4) **Article identification and selection**: The author applied the discipline assessment criteria and separated the various studies into behavioral accounting and behavioral finance. Then, decided on a preliminary basis, which studies pertained to this research endeavor and disregarded, the remaining studies for future research (see Figure 3: Part 4, Part 4A and Part 4B).

5) **Write the narrative research review**: The author wrote an extensive narrative for each research endeavor from behavioral accounting and behavioral finance (see Figure 3: Part 5).

This 5-step approach was applied, revised, and utilized several different times as the scope of this risk perception endeavor became more concise and focused upon completion of the narrative research review of the literature.

All of the risk perception studies within this literature review were based on some method of experimental, exploratory or survey research or a combination of these approaches while employing a research design that was conducted in either five ways: 1) with a behavioral experiment; 2) an ad-hoc group (a convenience sample) at a conference, classroom or another venue; 3) a random or nonrandom sample with a mailed survey; 4) a multi-method approach (a combination of qualitative and quantitative research); or 5) a random sample with a telephone survey. The research sample for each study was either one of the following or a combination of groups such as nonexperts (i.e. students, individual investors) and experts (i.e. professors, investment professionals) or both. The next two sections provide an individual review for each of the risk perception studies in behavioral accounting and behavioral finance.
Figure 3: A Flowchart of the Important Activities of a Risk Perception Narrative Research Review in Behavioral Accounting and Behavioral Finance


Part 1B: Identified the main research sources: Internet searches (www.google.com), working papers on the Internet (www.ssrn.com), dissertations (Proquest online database), academic studies (Proquest, APA, and Uncover online database), books/reports (www.amazon.com), the literature reviews and reference lists of other scholars in risk perception since the 1960s from various disciplines.

Part 2: Then, the author identified, located, and obtained the potential risk perception academic studies in behavioral accounting and behavioral finance for this research endeavor.

Part 3: The researcher established a set of criteria or guidelines for identifying the specific studies in behavioral accounting and behavioral finance that are pertinent to this research endeavor.

Part 4: Separated the research studies in the order of a chronological timeline, then identified the categories of studies in behavioral accounting and behavioral finance, and determined the relevant/significant ones of each study for this research project.

Part 4A: Utilized risk perceptions studies that were identified as suitable for this research study. A total of 12 studies in behavioral accounting and a total of 71 in behavioral finance were selected.

Part 4B: Discarded risk perceptions studies identified as inappropriate for this research endeavor. A total of 35 studies in behavioral accounting and a total of 65 in behavioral finance were deemed irrelevant within the scope of this paper.

Part 5: The author wrote a narrative research review of each research endeavor concerning: specific details of each study, the type of research approach utilized, and the main findings for each study.
4.0 A Narrative Research Review of the Risk Perception Literature in Behavioral Accounting

Research work has been conducted and published by scholars in the area of behavioral accounting that focuses on the topic of risk perception. Behavioral accounting can be defined as “the study of the behavior of accountants or the behavior of non-accountants as they are influenced by accounting functions and reports. It cuts across financial, managerial and tax accounting research” (Hofstedt and Kinard 1970, p. 43). Since 1975 there have been several vital behavioral accounting research studies on risk perception that currently provide a strong financial foundation (i.e. utilization of financial ratios, accounting data) for the risk perception studies being conducted by behavioral finance scholars in works by McDonald and Stehle (1975), Farrelly, Ferris and Reichenstein (1985), Ferris, Hiramatsu and Kimoto (1990), Selva (1995), Lipe (1998), Ciancanelli, Coulson, and Thomson (2001), and Koonce, McAnally and Mercer (2001). (See Table 4)

Many of these earlier behavioral accounting research studies reveal that accounting-determined risk measures including: dividend payout, current ratio, asset size, asset growth, leverage, variability in earnings, and co-variability in earnings possess’ substantial explanatory power over the experts’ risk perceptions (Beaver, Kettler and Scholes 1970). In effect, these behavioral accounting studies were investigating the question, “Do accounting ratios and financial statements reveal information regarding the risk of a financial asset?” The significance of behavioral accounting is demonstrated with the financial collapse of Enron, WorldCom and the failure of accounting professionals (i.e. CPAs, auditors) to enforce the proper accounting standards for these corporations was a failure in decision-making by investors, company officials, and accounting experts (Fuerman 2002).

Many of the concepts and theories from the literature on decision-making that have crossed over and been applied within behavioral finance have also been extended to the discipline of behavioral accounting in works by Libby and Fishburn (1977), Birnberg and Shields (1989), Davis (1995), Ashton and Ashon (1999), Ciancanelli, Coulson, and Thomson (2001), and Libby, Bloomfield, and Nelson (2001). Since the mid-1970s, scholars from both business fields have shared research interests including the topics of heuristics, prospect theory, framing, and risk-taking behavior. Since the mid-1980s, the area of perceived risk has been another emerging topic within the behavioral accounting literature on investment and financial decision-making (see Figure 4 for a detailed timeline of the 12 risk perception research projects and the four stages these works were classified into). The behavioral accounting literature also includes an extensive collection of risk perception studies that incorporate the judgment process within a budgetary, auditing or tax perspective that the author decided not to include as part of this literature review.

As mentioned earlier, in a seminal paper by Beaver, Kettler, and Scholes (1970) revealed that accounting measurements of risk, such as asset growth, dividend payout ratios, and earnings are reflected in market price risk measurements such as beta. “The evidence supports the contention that accounting measures of risk are impounded in the market-price based risk measure. There is a high degree of contemporaneous association between the accounting and market risk measures” (Beaver, Kettler, and Scholes, 1970, p. 679). The 12 research endeavors from 1975 to 2003 incorporated a total of 57 proxy variables from a wide range of accounting and financial measurements. This section provides a brief overview of each of these behavioral accounting studies that have been a strong theoretical foundation for a substantial number of the academic studies in behavioral finance. In terms of an interdisciplinary aspect, these business fields have been highly integrated in various aspects especially in challenging the tenets of standard academic finance. Each of the reviewed studies was grouped into a stage of research based on the time period from 1975 to 2003. A study was identified as a significant contributor within the risk perception and behavioral accounting literature if it met at least four of the following criteria (conditions):

1) The paper contained content that was an integration of psychology and accounting related to risk.
2) The author(s) of the study is (are) considered an expert scholar(s) in behavioral accounting and risk.
3) The publication frequently publishes behavioral accounting and risk related papers.
4) The study incorporated important issues concerning subject matter of risk perception including: if the study investigated specific behavioral risk characteristics, various issues associated with demographic factors or other types of socioeconomic information.
5) The concepts of risk or investor perception were incorporated within the academic study.
6) The study presented various accounting risk measures or proxy variables and utilized a survey instrument within the research design of the study.

### Table 4: Risk Perception Studies from Behavioral Accounting from 1975 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors/Number of Participants in Study</th>
<th>Specific Variables Investigated Within the Study***</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>McDonald, Stehle (225 Portfolio Managers)</td>
<td>Overall risk rating for perceived risk, <strong>familiarity factor</strong>, <strong>Merrill Lynch Beta</strong>, <strong>Non-Market Risk</strong>, Variability of returns, Market Value (company size)</td>
</tr>
<tr>
<td>1984</td>
<td>Farrelly, Reichenstein (209 Financial Analysts)</td>
<td>Overall risk rating for perceived risk, <strong>Value Line Beta</strong>, <strong>Price Stability</strong>, Earnings Predictability, <strong>Safety Rank</strong>, Growth Persistence, Timeliness Rank, <strong>Dispersion of Analysts' Earnings Forecast</strong></td>
</tr>
<tr>
<td>1985</td>
<td>Farrelly, Ferris, Reichenstein (209 Financial Analysts)</td>
<td>Value Line Beta, Dividend Payout, <strong>Current Ratio</strong>, Asset Size, Asset Growth, <strong>Leverage</strong>, <strong>Variability in Earnings</strong>, Co-variability of Earnings</td>
</tr>
<tr>
<td>1987</td>
<td>Farrelly, Levine, Reichenstein (209 Financial Analysts)</td>
<td>Overall risk rating for perceived risk, <strong>Current Ratio</strong>, Quick Ratio, <strong>Receivables Turnover</strong>, Inventory Turnover, Asset Turnover, Profit Margin, Return on Assets, <strong>Return on Equity</strong>, EPS, P/E Ratio, Dividend Payout, <strong>Debt Ratio</strong>, <strong>Book Value Per Share</strong>, Cash Flow per Share, <strong>Times Interest Earned</strong></td>
</tr>
<tr>
<td>1988</td>
<td>Mear and Firth (38 Portfolio Managers)</td>
<td>Overall risk rating for perceived risk, <strong>Net Assets</strong>, <strong>Proprietorship Ratio</strong>, <strong>Liquid Ratio</strong>, <strong>Sales Growth</strong>, Dividend Cover, Profitability, Valuation Ratio, Beta, Variance of Returns, One Industry Variable</td>
</tr>
<tr>
<td>1990</td>
<td>Ferris, Hiramatsi, Kimoto (203 Security Analysts)</td>
<td>Overall risk rating for perceived risk, Beta Current Ratio, Asset Size, <strong>Asset Growth</strong>, <strong>Leverage</strong>, <strong>Variability of Earnings</strong>, Dividend Payout</td>
</tr>
<tr>
<td>1991</td>
<td>Capstaff (322 Investment Analysts)</td>
<td>Overall risk rating for perceived risk, <strong>Accounting Beta</strong>, <strong>Current Ratio</strong>, Asset Size, Asset Growth, Leverage, Dividend Payout, <strong>Earnings Variability</strong>, Earnings Co-Variability</td>
</tr>
<tr>
<td>1995</td>
<td>Selva (146 Financial Analysts)</td>
<td>Analysts' Risk Perception, <strong>Expected Earnings Growth</strong>, Total Assets, Dividend Payout, Asset Growth, Leverage, Current Ratio, Earnings Variability, Beta, <strong>Company Size</strong></td>
</tr>
<tr>
<td>2001</td>
<td>Koonce, McAnally, Mercer (40 business students for 2 experiments)</td>
<td>The Behavioral Risk Characteristics are: <strong>Worry Factor</strong>, <strong>Voluntary Variable</strong>, <strong>Control Factor</strong>, <strong>Chance of a Catastrophic Outcome</strong>, Familiarity New or Old Risk, Time Factor (Immediate or Over Time) Knowledge by Management, Knowledge by Participant, Financial Risk Characteristics: <strong>Probability of Loss</strong>, <strong>Loss Outcome</strong>, Probability of Gain, Gain Outcome, Probability of Status Quo</td>
</tr>
<tr>
<td>2002</td>
<td>Viger, Ben-Amar, Curatola, Anandarajan (86 accounting students in 3 experiments)</td>
<td>Investment Risk (Overall rating for perceived risk), Likelihood that firm improve its profitability, Search for additional information</td>
</tr>
</tbody>
</table>

**Note:** ***The bold represents findings concerning the most significant or important risk indicators from each study.*
4.1 An Overview Description of the 12 Risk Perception Studies in Behavioral Accounting

The author of this endeavor focused on these 12 behavioral accounting risk perception studies since the central aspect of these studies pertains to the notion of financial and investment decision-making. For the studies from 1975 to 1998, the primary investment task for this collection of twelve studies to measure a respondent’s perception of risk was to provide financial information for a group of actual or hypothetical stocks (i.e. a range of one stock to a total of thirty stocks). The stocks selected are widely held within the financial markets including: mid-sized firms (S&P 500 index), large companies (i.e. Dow Jones Industrial Average) or industry-related corporations (i.e. bank stocks).

The major research design that was incorporated for 7 of these studies was a self-administered survey mailed to a random sample. All of these mailed surveys utilized some form of multivariate statistical approach such as regression analysis, correlations, intercorrelations or discriminant analysis. The most dominant method of analysis within these studies was regression analysis in which the dependent variable was the quantitative respondent data (i.e. the investor’s perception of risk, average or mean risk perception variable) regressed against the independent variables namely a collection of accounting risk proxies or financial risk indicators. (Table 5 displays the details with of each study providing the number of participants, the response rate of the survey, and the investment task). The other 5 studies utilized ad-hoc groups (i.e. a convenience sample) in either a laboratory experiment or a nonrandom sample within a classroom setting. (Table 6 shows specifics of each research endeavor including: the number of subjects and investment task.) Hypothesis testing was not a prevalent research perspective since it was only employed within two research endeavors. Most of these studies did not incorporate any behavioral risk characteristics until the work of Koonce, McAnally and Mercer (2001) based on the work of the Decision Research scholars from psychology. The only prevalent behavioral issue was the notion of familiarity bias in which an investor’s perception of risk is influenced by the name of stock (i.e. brand name of the company). Thus, scholars investigated this issue of familiarity with the implementation of a “split sample” wherein a percentage of surveys would disclose the name of the firm and the remaining surveys would have the company identity withheld. Lastly, most of the studies had respondents make a judgment or assessment concerning the overall perceived riskiness of each stock (i.e. rank the overall risk of this firm on a scale of 1-low risk
to 9-high risk). This type of approach of measuring the perceived risk of a financial instrument is prevalent within the behavioral finance literature, whereas, in psychology the rating of perceived risk is for a risky situation or hazardous activity.

**Table 5: The Details of Mailed Surveys (Random Samples) from Risk Perception Works in Behavioral Accounting**

<table>
<thead>
<tr>
<th>The Author(s) and Year(s) of the Study</th>
<th>Number of Respondents/ Investment Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>McDonald and Stehle (1975)</td>
<td>225 Portfolio Managers 56% 25 stocks</td>
</tr>
<tr>
<td>Farrelly and Reichenstein Risk</td>
<td></td>
</tr>
<tr>
<td>Capstaff (1991)</td>
<td>322 Investment Analysts 22% 25 stocks</td>
</tr>
<tr>
<td>Selva (1995) Questionnaire #1</td>
<td>52 Financial Analysts 79% 25 stocks</td>
</tr>
<tr>
<td></td>
<td>Questionnaire #2 94 Financial Analysts</td>
</tr>
<tr>
<td></td>
<td>Questionnaire #3 21 Financial Analysts</td>
</tr>
</tbody>
</table>

**Table 6: The Details of Research Designs with a Convenience Sample from Risk Perception Works in Behavioral Accounting**

<table>
<thead>
<tr>
<th>The Author(s) and Year(s) of the Study</th>
<th>Number of Subjects/ Investment Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mear and Firth (1988)</td>
<td>38 Portfolio Managers 30 stocks</td>
</tr>
<tr>
<td>Lipe (1998)</td>
<td>Experiment #1 39 Individual Investors</td>
</tr>
<tr>
<td></td>
<td>Experiment #2 55 Individual Investors</td>
</tr>
<tr>
<td>Koonce, McAnally, and Mercer (2001)</td>
<td>Study #1 40 graduate business students</td>
</tr>
<tr>
<td></td>
<td>Study #2 40 graduate business students</td>
</tr>
<tr>
<td>Viger, Ben-Amar, Curtola, and Anandarajan (2002)</td>
<td>Group #1 29 graduate accounting students</td>
</tr>
<tr>
<td></td>
<td>Group #2 29 graduate accounting students</td>
</tr>
<tr>
<td>Koonce, McAnally, and Mercer (2003)</td>
<td>Study #1 40 graduate business students</td>
</tr>
<tr>
<td></td>
<td>Study #2 100 graduate business students</td>
</tr>
</tbody>
</table>

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4.2 The Four Stages of Behavioral Accounting Risk Perception Studies

This section provides an extensive review of the literature concerning behavioral accounting risk perception studies. The review is formatted in a sequential timeline divided up into four stages of research (refer back to Figure 4). Within each phase the author provides a brief overview of the major directions, trends, and accomplishments of research during this stage of academic research along with a review of each research project disclosed in that timeline stage.

Stage 1: The Research Starting Point in Behavioral Accounting: In 1975, McDonald and Stehle published a seminal research study, which is the foundation for the work that occurred from 1984 to 1998 in behavioral accounting according to the time line (even though it’s considered a behavioral finance risk perception study). The research approach for this study had experts rate their overall perceived risk 1 (low risk) to 9 (high risk) for a stock (also known as the perceive risk judgment variable) and familiarity of each stock on a scale of 1 (unfamiliar) to 9 (extremely familiar) over a two-week time period for a group of 25 stocks. The paper provides an in-depth discussion of the relationship between perceived risk and the familiarity of a stock. The authors deliberately did not make the assumption the stock was held in a portfolio context and the definition of risk was left up to the perception of the individual respondent of the study. The results revealed that beta and non-market risk collectively explained 84% of the variation in the experts’ risk perception based on the 225 mailed surveys collected from portfolio managers. (Beta explained 15% and non-market risk accounted for 69% of the risk perception.) A total of 85% of the perceived risk for this sample of stocks was explained by the 3 variables. McDonald and Stehle (1975) elaborate further:

In sum, we suggest that the perceived risk of common stocks is well explained by three variables: historical beta or systematic risk with respect to the market; historical non-market risk or specific industry and company effects; and the perceived familiarity with the company and its stock. (p. 14)

Stage 2: The Farrelly and Reichenstein Risk Perception Studies: For the time period of 1984 to 1987, Farrelly and Reichenstein published 3 studies that investigated a wide range of accounting and financial risk measures. The study by Farrelly and Reichenstein (1984) expanded the work of McDonald and Stehle in 1975; it focused on perceived risk on an individual basis rather than a market wide perspective and the study utilized 6 financial risk characteristics from Value Line. The authors collected the responses of the study from a mailed survey to 209 financial analysts that asked their perceptions of risk for a collection of 25 stocks. The study measured perceived risk by having respondent’s rate risk perception on a scale of 1 (low) to 9 (high), and the names of the stocks were disclosed however, no financial information was provided. The authors selected companies for the survey that the respondents would be familiar with from a cross section of industries. The best proxies for the experts’ risk perception were measures that were broader than market beta: safety with an r-square of 19% (subjective factor) and price stability with an r-square of 22% (objective measure) were most closely correlated with their risk perception. Safety was a measure of total risk that price stability accounted for 80% weight, with the remaining 20% being a subjective factor (i.e. recent changes in a company’s business or the quality). The best combination of objective measures: beta and price stability explained 68% of the variation in perceived risk. The best findings of subjective risk: safety and dispersion of analysts’ forecast explained 91% of the variation in perceived risk.

For Farrelly, Ferris, and Reichenstein (1985), this study was an extension of their 1984 work with the same approach of a collection of 25 stocks and the perceived risk factor, utilized ex ante risk that’s not market-wide and the use of Value Line beta in order to compare the risk perception measure to beta. These authors utilized 7 accounting factors from the Beaver, Ketter and Scholes study (1970) including: dividend payout, asset growth, leverage, liquidity, asset size, variability
of earnings, and co-variability of earnings. The 7 accounting-oriented risk variables explained 79% (R-squared 66%) of the variation in average market risk perception among the experts surveyed. The three most significant risk measures were: leverage, variability in earnings, and current ratio (accounted for 59%). The authors conclude that these results provide support for the notion that financial reports do provide inherent proof pertaining to the perceived riskiness of corporate stocks. Whereas, Farrelly, Levine, and Reichenstein (1987), focus on the premise of a collection of 15 financial ratios might serve to explain risk perceptions for 3 different risk classes of stocks (low, medium, and high risk) in which the respondents rated each with the standard judgment perceived risk variable. The final model of the study included: seven variables: one liquidity measure (current ratio), one turnover ratio (receivables turnover), two return ratios (profit margin and return on equity), and three other ratios (the debt ratio, times interest earned and book value per share). With the companies from the 1985 study by Farelly, Ferris, and Reichenstein, found accounting-related risk factors resulted in an 82% successful rate in predicting the experts’ risk perception.

**Stage 3: An International Perspective:** For the time period 1988 to 1995, there were 4 main research studies that follow-up the work of Farrelly and Reichenstein from the mid-1980s with an international perspective. In the study by Mear and Firth (1988), utilized an experimental design and requested that each of the 38 portfolio manager subjects to rate the risk for 30 New Zealand stocks as it related to accounting ratios and measures with the standard perceived risk variable on a 9-point scale. The authors alluded to the issue of familiarity bias since each subject was provided the equivalent 10 accounting clues for each stock while withholding the names of the companies. Using the Brunswik lens model, estimates of ex ante risk on 30 stocks were regressed against 9 company-specific cues and one industry variable. The authors found that 6 accounting-determined risk measures accounted for 75% (adjusted r-square) for the subject’s risk perception including: net assets, proprietorship ratio, liquid ratio, sales growth, dividend cover and profitability. The authors concluded accounting reports such as financial statements convey, at least to some amount of relevant data for the assessment of ex ante risk.

Whereas, the study by Ferris, Hiramatsu and Kimoto (1990), was a follow-up study to Farrelly, Ferris, and Reichenstein (FFR) in 1985, incorporated data from FFR study to compare investors in the US and Japan regarding their perceptions of risk across international stock markets. A mailed survey was sent to security analysts in Japan that yielded 203 responses. The assumption was made the stock was held in a diversified portfolio, and perceived risk was measured by having respondent’s rate risk perception on a scale of 1 (low) to 10 (high). The selection of the following 6 accounting variables within the study were: dividend payout, current ratio, asset size, asset growth, leverage and variability of earnings. The two groups from Japan were classified (for the purpose of investigating the topic of familiarity) into Group A that was provided only a listing of the 25 Japanese companies and Group B received a list of six accounting risk measures for each of the 25 stocks but no information as to corporate identity. With this approach of supplying different types of information between Groups A and B allowed a direct examination of the relevance of accounting data in the formation of risk perceptions without the bias associated with corporate identity. For Group A: six of the accounting risk measures accounted for 44% of the analyst’s risk perception in Japan (the only noteworthy descriptive variable was leverage). For Group B, 6 accounting risk measures give an explanation for 92% of the variation in risk perception. The significant explanatory factors were asset growth, leverage, and variability in earnings. The lower explanatory variable when compared to the USA investors was suggested as a result of Japanese investors regarding risk perception: 1) place less emphasize and dependence on firm performance by Japanese investors because there is less importance placed on accounting risk measures 2) exhibit a higher frequency of insider trading in Japan and 3) a tendency for a higher degree of speculative trading in Japan.
The research study by Capstaff (1991) was a follow-up study to Ferris, Hiramatsu and Kimoto in 1990 and incorporated the 7 accounting variables from the Beaver, Ketter and Scholes study in 1970 and also the standard perceived risk characteristic. This study revealed that the seven accounting-related risk factors explained 61% of the risk perception of investment analysts in the United Kingdom for a total of 322 respondents. The two significant descriptive factors were earnings variability to a lesser degree current ratio. In all three countries (US, UK and Japan), accounting data does seem to convey information on risk to different levels of significance among the experts surveyed. Accounting variables explained 66% in the US, 61% in the UK and 44% in Japan of the variation in the risk perception of analysts. For the UK study, beta was added to the 7 accounting factors as an independent variable: a substantial increase occurred regarding the variance of in UK risk perceptions accounted for 83%. The 4 accounting risk characteristics that were significant in this model included: beta, earnings variability, current ratio, and asset size.

This study by Selva (1995) was based the author’s dissertation work examined whether accounting-oriented risk factors are suitable to predict the risk class of Hong Kong stocks. The risk perceptions of the 25 profitable large to medium-sized companies were obtained and the companies were then classified into 3 classes—low, medium and high based on the expert’s perceptions of risk (i.e. perceived risk variable). The author utilized 3 main hypotheses in tandem with the statistical methods regression and correlation analysis. The study incorporated 6 risk accounting characteristics: 5 of the 6 measures: company size, dividend payout ratio, asset growth, leverage and current ratio are well-documented in accounting literature and the sixth was based on expected growth in earnings. The author found that three of the accounting variables (size of the firm, earnings growth, and dividend payout) and a contextual variable (industrial sector consider low risk in Hong Kong) accounted for 77% of the experts’ risk perception.

**Stage 4: The Current State of the Literature:** The next period of studies were classified from the time period of 1998 to 2003. The two main issues during this phase were: 1) All four works utilized an experimental approach with subjects in a convenience sample (i.e. classroom setting) or laboratory environment; and 2) A major shift occurred within the behavioral accounting literature in 2001 in which scholars started to investigate a wider collection of behavioral risk characteristics namely from the work of the Decision Research in Oregon from the social sciences.

In a study by Lipe (1998) that examined in two experiments whether individual investors utilize accounting information (i.e. cash flow, earnings) vs. market variables (i.e. variance and covariance of return) when measuring risk and making investment decisions. The investment task involved the judgment of the risk and return relationship for 6 stocks among 39 subjects for experiment #1 and 3 stocks for a group of 55 subjects from experiment #2. Subjects were asked to assess each stock in terms of risk and return judgments by rating each stock by the overall riskiness or rank order each stock within a group by perceived risk. This research was an unsophisticated attempt to examine the CAPM from an individual investor viewpoint. The study revealed two significant findings: 1) In spite of the prevalent recognition of these measures within standard portfolio theory, this experimental study demonstrated inadequate support for variance and covariance as descriptive measures of risk. The subjects were able to perceive assorted levels of both variance and covariance however; investors had a tendency to employ just variance in assessing risk. People are found to assess market factors (i.e. variance and covariance of returns) in investment decisions, though when contradictory market and accounting data are presented, accounting information determines risk judgments rather than market measures.

In Viger, Ben-Amar, Curtola, and Anandarajan (2002), the purpose of this study was to investigate the role in the presentation of financial information regarding the “going-concern uncertainty provision” provided in accounting footnotes, which is disclosed in Canada vs. other developing countries. The authors investigated 3 main risk variables including: overall perceived risk for the
company, the likelihood that company would improve its profitability, and the search for additional information. The main hypothesis the authors investigated pertaining to risk perception was:

H2: In the presence of going concern uncertainties, given full disclosure in the notes to the financial statements, investors' perception of risk will be significantly higher when the reference to the contingency is in the form of a modified relative to an unmodified report. (Viger, Ben-Amar, Curtola, and Anandarajan, 2002, p. 9)

Two additional hypotheses examined the issues of improving the profitability of the firm and investors need for additional information. The authors utilized a total of 86 accounting undergraduate students among 3 groups (2 experimental groups and 1 control group) providing each subject with a case study of one hypothetical company. The findings revealed that based on the standard provided in Canada, the addition of the explanatory paragraph in the financial statement describing the “going-concern uncertainty provision” influences the perceived risk connected with the firm as well as considerably decreases the perceived likelihood that the firm can improve its profitability.

In recent years, there has been an integration of utilizing the specific behavioral risk characteristics from the field of psychology that involve risky activities (i.e. the work of the Decision Research) within an accounting environment in two works by Koonce and her co-authors. In the first study Koonce, McAnally and Mercer (2001) investigated the financial data on risk in an accounting setting in which the authors implemented two laboratory studies with 40 graduate business students for each experiment. In both studies, the subjects assessed the riskiness of a series of 19 non-derivative and derivative financial items, subjects were told to assume they had substantial ownership in the stock of the company, each item was material to the firm, and to assess the overall riskiness of each of the firm. The main findings of this study were:

- The findings demonstrate the investors that make risk judgments of financial instruments do consider the more established risk dimensions such as probabilities and outcomes. Nevertheless, in contrast to the notion that risk is comparable to variance, the respondents place greater significance on loss probabilities and outcomes than these participants do on gain probabilities and outcomes.
- Individuals in the study believe gains (returns) and risk to be positively associated: this outcome is inconsistent with other studies in behavioral finance and hazardous activities that demonstrate an inverse association between these two factors.
- Subjects consider other aspects to their risk judgments dimensions that have not been evidently documented in financial and accounting models of risk (i.e. behavioral risk characteristics such as familiarity bias). Particularly, respondents making risk judgments also contemplate the degree to which they worry about the financial securities, the potential for catastrophic outcomes, management's as well as their own knowledge, the extent to which the investment is voluntary, and management's control over the financial instruments.
- Lastly, these individuals believe derivatives to be riskier than non-derivatives instruments.

The Koonce, McAnally and Mercer (2003) working paper a revised adaptation of the earlier work by the same authors in 2001. The authors develop a new model of risk perception that incorporates both behavioral risk characteristics and the standard decision theory (i.e. statistical probabilities and expected value) pertaining to losses and gains. A central premise is that the perception of financial statement users might be better understood and explained by incorporating behavioral risk characteristics such as worry and control. Another purpose of this study is to examine how users of financial statements perceive risk for 19 financial items for various levels
of risk within two experimental studies. For study 1, the main sample was 40 finance students that filled out an extensive questionnaire of items. The findings of the integrated model revealed the following risk indicators to be statistically significant including the behavioral risk characteristics: worry, catastrophic potential, known by management, voluntary and control, whereas, the financial risk indicators were: loss outcome, loss probability, gain outcome. For study 2, with 100 business student subjects revealed similar findings within the risk model expect the gain probability factor was not statistically significant. The authors wrote, “Our results indicate strong empirical support for an integrated model of risk perception that includes both behavioral factors and traditional probability and outcome measures” (Koonce, McAnally and Mercer 2003). The authors advocate that an investor’s perception of risk is complicated and a multifaceted process that most past risk models fail to recognize and capture.

5.0 A Narrative Research Review of the Risk Perception Literature in Behavioral Finance

Long before social scientists started to investigate risk-taking behaviors, statisticians were interested in studying gambling behaviors. Social scientists began to borrow the concepts associated with gambling behavior and applied them in experiments concerning decisions under risk and uncertainty. Unfortunately, many of these earlier studies within psychology utilized the research methodologies developed by statisticians, which were primarily mathematical in nature based on academic gambling studies. Gambling studies allowed for an exact mathematical calculation to be utilized evaluating a subject's judgment of a precise monetary value for any specific gamble by multiplying the chance of the probable gain or loss. However, these gambling experiments have a major shortcoming limited to their objective nature of risk and do not necessarily represent the risk-taking activities that individuals are faced with on a daily basis. In particular, results from these gambling studies in psychology continually demonstrated subjects did not appear to make their judgments based on statistics such as variance or standard deviation. The decision-making process involving risk seems to be more complex and a multi-dimensional endeavor with subjective (qualitative) aspects and objective (quantitative) components.

The initial research on risk-taking behavior has origins from experimental psychology in particular, the research pertaining to experiments in gambling behavior during the 1960s and early to mid-1970s. Pollatesk and Tversky (1970) describe the initial method to how scholars utilized gambling techniques (i.e. games of chance) within the context of perceived risk:

The various approaches to study of risk share three basic assumptions. 1. Risk is regarded as a property of options, (e.g. gambles, courses of action) that affects choices among them. 2. Options can be meaningfully ordered with respect to their riskiness. 3. The risk of option is related in some way to the dispersion, or the variance, of its outcomes... Beyond these basic assumptions, however, no general agreement concerning the nature of risk has been reached. Although various assumptions about the perception of risk have been introduced, they have not been derived from more basic principles, and they have typically been limited to restrictive contexts. (p. 541)

The main theme of this early research on the “perception of risk taking” for games of chance (lotteries) focused on how subjects make judgments among different gambling options especially the combination of variance and expected value of the gambling task in a sample of dissertations by Lichtenstein (1962), Slovic (1964b), Tversky (1965), and Payne (1973b) and academic studies by Coombs and Pruitt (1960), Slovic (1962), Slovic (1967), Beach and Scoop (1968), Lathrop (1970), Coombs and Huang (1970), Payne and Braunstein (1971), Lichtenstein and Slovic (1973), and Payne (1975). Many of these early gambling experiments contributed to the later emerging topics in the field such as the concepts of prospect theory, loss aversion, and the area of risk perception studies pertaining to psychology, behavioral accounting, and behavioral finance.
### Figure 5: A Timeline of 71 Significant Research Endeavors in Risk Perception from Behavioral Finance

(Academic journals, books, dissertations and working papers)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Studies Each Year</th>
<th>The Author(s) of Each Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>1</td>
<td>(1) Green &amp; Maheshwari</td>
</tr>
<tr>
<td>1970</td>
<td>2</td>
<td>(2) Alderfer &amp; Bierman; Deets &amp; Hoyt</td>
</tr>
<tr>
<td>1973</td>
<td>1</td>
<td>(1) Gooding</td>
</tr>
<tr>
<td>1975</td>
<td>1</td>
<td>(1) Gooding</td>
</tr>
<tr>
<td>1976</td>
<td>4</td>
<td>(4) Baker &amp; Haslem; Gooding; Falk &amp; Matulich; Oster</td>
</tr>
<tr>
<td>1977</td>
<td>2</td>
<td>(2) Cooley; Baker, Hargrove, &amp; Haslem</td>
</tr>
<tr>
<td>1978</td>
<td>3</td>
<td>(3) Bart; Gooding; Wofford &amp; Preddy</td>
</tr>
<tr>
<td>1979</td>
<td>1</td>
<td>(1) Blandon &amp; Ward</td>
</tr>
<tr>
<td>1980</td>
<td>4</td>
<td>(4) Henderson &amp; Nutt; McInnish; Laughhunn, Payne, &amp; Crum; Payne, Laughhunn, and Crum</td>
</tr>
<tr>
<td>1981</td>
<td>2</td>
<td>(2) Bart &amp; Masse; Dickson</td>
</tr>
<tr>
<td>1982</td>
<td>1</td>
<td>(1) McInnish</td>
</tr>
<tr>
<td>1984</td>
<td>1</td>
<td>(1) McInnish &amp; Srivatava</td>
</tr>
<tr>
<td>1985</td>
<td>2</td>
<td>(2) Blaylock; McConnell, Gibson, &amp; Haslem</td>
</tr>
<tr>
<td>1986</td>
<td>1</td>
<td>(1) Maial, Filer, &amp; Simon</td>
</tr>
<tr>
<td>1987</td>
<td>1</td>
<td>(1) Scortino, Huston, &amp; Spencer</td>
</tr>
<tr>
<td>1989</td>
<td>2</td>
<td>(2) Evans, Holcomb, &amp; Chittenden; LeBaron, Farrelly, &amp; Gula</td>
</tr>
<tr>
<td>1990</td>
<td>3</td>
<td>(3) Antonides; Roszkowski &amp; Snelbecker; Snelbecker, Roszkowski, &amp; Cutler</td>
</tr>
<tr>
<td>1993</td>
<td>3</td>
<td>(3) De Bondt; Holtgrave &amp; Weber; Steil</td>
</tr>
<tr>
<td>1994</td>
<td>1</td>
<td>(1) Cassidy &amp; Lamb</td>
</tr>
<tr>
<td>1995</td>
<td>3</td>
<td>(3) Shapira; Levy &amp; Lazarovich-Porat; Sullivan &amp; Kida</td>
</tr>
<tr>
<td>1997</td>
<td>4</td>
<td>(4) Levy; Olsen; Weber &amp; Milliman; Schlomer</td>
</tr>
<tr>
<td>1998</td>
<td>4</td>
<td>(4) Weber &amp; Hsee; Baker; Marston &amp; Craven; Sarasvathy, Simon, &amp; Lave</td>
</tr>
<tr>
<td>1999</td>
<td>3</td>
<td>(3) Grable &amp; Lytton; MacGregor, Slovic, Berry, &amp; Evensky; Williams &amp; Voon</td>
</tr>
<tr>
<td>2000</td>
<td>11</td>
<td>(11) Goszczynska &amp; Guewa-Lesny, Goszczynska &amp; Guewa-Lesny Olsen &amp; Troughton; Unser; Forlani and Mullins; Grable &amp; Joo Houghton, Simon, Aquino, &amp; Goldberg; Worzala, Sirmans, &amp; Zietz Siebenmorgen &amp; Weber; Siebenmorgen, Weber, &amp; Weber; Ganzach</td>
</tr>
<tr>
<td>2001</td>
<td>5</td>
<td>(5) Heilar, Lonie, Power, &amp; Sinclair; Olsen &amp; Cox; Muradoglu; Shefrin; Diacon &amp; Ennew</td>
</tr>
<tr>
<td>2002</td>
<td>5</td>
<td>(5) Diacon; Bloomfield &amp; Michaely; Weber, Blais, &amp; Betz; Forlani; Dulebohn</td>
</tr>
</tbody>
</table>
This section provides a systematic narrative research review of the literature of 71 behavioral finance risk perception research endeavors (published and unpublished works) from 1969 to 2002 (refer back to Figure 5 for a detailed timeline). These behavioral finance studies incorporate an extensive array of financial proxy variables for a total of 125 risk measurements. A study was identified as a significant contributor within the risk perception and behavioral finance literature if it met at least four of the following criteria (conditions):

1) The paper contained content that was an integration of psychology and finance/investments related to risk.
2) The author(s) of the study is (are) considered to be expert scholar(s) in behavioral finance and risk.
3) The publication frequently publishes behavioral finance and risk related papers.
4) The study incorporated important issues concerning subject matter of risk perception including:
   if the study investigated specific behavioral risk characteristics, various issues associated with demographic factors or other types of socioeconomic information.
5) The concepts of risk or investor perception were incorporated within the academic study.
6) The study presented various finance or investment risk measures or proxy variables and utilized a survey instrument within the research design of the study.

5.1 An Overview Description of the 71 Risk Perception Studies in Behavioral Finance

There are many interesting aspects to this compilation of research studies since the timeline incorporates over 30 years of academic research. For instance, many of these studies have encompassed a wide range of investment tasks or financial decision making procedures to assess an individual’s perception of risk that including: 1) an actual or hypothetical sample of stocks (i.e. this selection of stocks covered a range of 3 stocks to a total of 85 stocks); 2) a collection of different asset classes or financial types of securities (i.e. bonds, stocks, mutual funds); 3) the disclosure of various types of financial market indices; 4) the presentation of probability distributions vs. time series graphs; 5) laboratory experiments based on stock market game simulations; 6) exercises related to gambling behavior or games of chance (i.e. choices between pairs of gambles); 7) an assortment of hypothetical investment or financial case studies developed and customized for the expert decision maker; and 8) problem solving tasks in which subjects have to make judgments between a potential gain or loss.

This collection of research endeavors produced 71 actual works, however some of these works include more than one experiment or study. Thus, the total number of experiments and studies contained in these projects was approximately 84 individual research designs. These research studies employed either an experimental (behavioral) research method, a survey research method or a variation of these two approaches. The research design methods were categorized into five main sampling groupings (see Graph 1): 1) A mailed survey with a random sample; 2) A mailed survey with a nonrandom sample; 3) A convenience sample (ad-hoc approach) or 4) A multi-method research approach. 5) A telephone survey with a random sample.

In terms of the questionnaires that were mailed to a random sample of potential respondents the most common method was a stratified sample. The next kind of sampling technique utilized was nonprobability sampling for the research design concerning a mailed survey with a nonrandom sample and a convenience sample. The convenience sample or ad-hoc perspective grouping included all research methods that were not mailed such as experiments in a classroom setting or corporate offices, surveys given out at a conference or workshop, and the disbursement of a questionnaire by a senior management to others within an organization. Another research design category was a multi-method approach, which is identified as a combination of qualitative research (i.e. the notion of interviewing a small group of experts) and quantitative research (i.e. based on the
The last format of testing was documented as a telephone survey with a random sample. The two main methods for testing the research instruments (see Graph 1) were 1) 47 research designs utilized a convenience sample and 2) 36 individual studies utilized a mailed survey of which 21 were random samples.

**Graph 1: The Five Main Categories of Research Sampling for the Behavioral Finance Risk Perception Studies**

<table>
<thead>
<tr>
<th>The Number of Research Studies for Each Sampling Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailed Survey (Random Sample)</td>
</tr>
<tr>
<td>Mailed Survey (Nonrandom Sample)</td>
</tr>
<tr>
<td>Convenience Sample</td>
</tr>
<tr>
<td>Multi-method Research Approach</td>
</tr>
<tr>
<td>Telephone Survey (Random Sample)</td>
</tr>
</tbody>
</table>

21  15  47  6  1

**Note:** The sample groupings for the multi-method approach overlap (or are double counted) within the mailed survey (random sample), mailed survey (nonrandom sample) and convenience sample since a few studies are classified in more than one sampling category.
Another important aspect of these studies was the type of research group incorporated within each endeavor (see Graph 2). The nonexpert groups (i.e. unsophisticated investors) of individual investors and college students accounted for 47 percent of the research sample. The individual investors were usually tested by means of a mailed questionnaire because they were clients of investment companies or owners of a company’s stock. The university students are usually tested within a classroom setting for a finance or an investments class so the researcher had access to easy an ad-hoc sample. For instance, in the behavioral sciences a student sample is widely accepted if the point of the research is to conduct exploratory or experimental research. In finance, student subjects are a valid sample for testing a questionnaire within a pilot study framework. The other significant group of study was knowledgeable professionals or experts that made up 39 percent of the total research population. The viewpoint within academic finance is an expert group is a better representative sample since these types of investors have real world knowledge and years of investment experience. A review of the literature supports this trend of using only an expert sample in works by Chan (1982), Johnson (1988), Ericsson and Smith (1991) and Mieg (2001) with the assumption of obtaining a large random sample size within your research design. The last major component utilized a comparative analysis between novice investors (i.e. individuals and college students) vs. investments experts, which made up 14 percent of this sample.

**Note:** The expert group incorporated a wide range of academic and professionals including: finance professors, portfolio managers, corporate managers, financial planners, financial analysts, stockbrokers, countertrade managers among others.
Within academic finance, sample size is an important issue for survey research to have validity and acceptability among scholars (see Graph 3). The author systematically reviewed each research study concerning the exact sample size and then, classified each into a specific grouping. A total of 40 (17 plus 23) experiments and surveys had less than 100 subjects/participants as the sample size. Many of these studies occurred within a university environment with finance students or at company headquarters such as a Wall Street firm that employed investment professionals. The next largest two categories were 27 studies (12 plus 17) that had a sample size of 200 respondents or more in which a large percentage of the studies were either a mailed survey with a random or nonrandom sample. In particular, many of these studies had mailings from 1,000 to 3,000 surveys sent out to participants in order to ensure that a high sample size (response rate) was achieved. The last significant range of sample sizes was from 100 to 199 respondents with a total of 14 (7 plus 7) research studies. This sample category was a combination of convenience samples at a conference or workshop, mailed surveys based on a random sample on two expert groups within a study or a mailed nonrandom sample for a comparative study between novice vs. expert investors.

The next important aspect to consider regarding these studies was the mailed surveys with a random sample namely the response rates and the total number of respondents from each study (see Graph 4). This arrangement of studies provided a sample of 26 mailed surveys with a random sample approach and corresponding response rates. The range of response rates for the 26 academic works was from 13% to 88%. Approximately fifty percent of surveys resulted in a response rate in the range of 13 percent to 29 percent. Another 20 percent of surveys yielded a response rate of 30% to 40%. The remaining 30 percent of surveys produced a response rate within a range of 50% to 80%. All of these 26 mailed random samples involved either expert or individual investors or a combination of these two groups. In terms of actual respondents from a range of 100 to 400 completed surveys the range of response rates was 13% to 40% equivalent to 38 percent (10 of 26) of this sample of risk perception studies (see Graph 4 the light colored bar for each study represents this sample of 10 studies). In terms of the nonrandom mailed questionnaires that accounted for 15 studies (only 12 published response rates) in which 10 of the 12 had response rates in the range of 20% to 50%. (Note: The nonrandom mailed surveys were not disclosed within a graphic format.) Either way scholars utilized many different survey research methods for attempting to increase response rates for their studies whether a random or nonrandom sample was part of the research design.
Graph 4: The Details of Mailed Surveys With Random Samples
From the Time Period of 1975 to 2002

<table>
<thead>
<tr>
<th>Research Work</th>
<th>Response Rates (%)</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gooding (1975) Q1</td>
<td>34%</td>
<td>105 professors, portfolio managers, individuals</td>
</tr>
<tr>
<td>Gooding (1975) Q2</td>
<td>27%</td>
<td>168 professors, portfolio managers, individuals</td>
</tr>
<tr>
<td>Gooding (1976) Group 1</td>
<td>29%</td>
<td>28 portfolio managers</td>
</tr>
<tr>
<td>Gooding (1976) Group 2</td>
<td>28%</td>
<td>27 individual investors</td>
</tr>
<tr>
<td>Baker, Haslem (1976)</td>
<td></td>
<td>851 individual clients</td>
</tr>
<tr>
<td>Falk, Matulich (1976) Group 1</td>
<td></td>
<td>75%</td>
</tr>
<tr>
<td>Falk, Matulich (1976) Group 2</td>
<td></td>
<td>88%</td>
</tr>
<tr>
<td>Baker, Hargrove, and Haslem (1977)</td>
<td>19%</td>
<td>136 portfolio managers</td>
</tr>
<tr>
<td>Gooding (1978)</td>
<td></td>
<td>267 international business investors</td>
</tr>
<tr>
<td>McInish (1982)</td>
<td>33%</td>
<td>75 stockholders</td>
</tr>
<tr>
<td>McInish, Srivastava (1984)</td>
<td>32%</td>
<td>394 mutual fund shareholders</td>
</tr>
<tr>
<td>McConnell, Haslem, Gibson (1985)</td>
<td></td>
<td>75%</td>
</tr>
<tr>
<td>De Bondt (1993)</td>
<td>15%</td>
<td>112 independent insurance agents</td>
</tr>
<tr>
<td>Cassidy and Lamb (1994)</td>
<td></td>
<td>61%</td>
</tr>
<tr>
<td>Sullivan, Kida (1995)</td>
<td></td>
<td>75 corporate managers</td>
</tr>
<tr>
<td>Olsen (1997) Group 1</td>
<td>25%</td>
<td>630 portfolio managers</td>
</tr>
<tr>
<td>Olsen (1997) Group 2</td>
<td>40%</td>
<td>740 wealthy individuals</td>
</tr>
<tr>
<td>Scholmer (1997)</td>
<td>18%</td>
<td>74 countertrade managers</td>
</tr>
<tr>
<td>Grable, Lytton (1999)</td>
<td></td>
<td>60%</td>
</tr>
<tr>
<td>MacGregor, Slovic, Berry, Evensky (1999)</td>
<td>13%</td>
<td>265 financial planners</td>
</tr>
<tr>
<td>Olsen, Troughton (2000)</td>
<td></td>
<td>105 money managers</td>
</tr>
<tr>
<td>Helliar, Lonie, Power, Sinclair (2001) Q1</td>
<td>26%</td>
<td>132 business managers</td>
</tr>
<tr>
<td>Helliar, Lonie, Power, Sinclair (2001) Q2</td>
<td>16%</td>
<td>78 business managers</td>
</tr>
<tr>
<td>Olsen, Cox (2001)</td>
<td></td>
<td>274 financial planners</td>
</tr>
<tr>
<td>Dulebohn (2002)</td>
<td>20%</td>
<td>795 college and university employees</td>
</tr>
</tbody>
</table>

Note: Some of the research endeavors are presented more than once because they investigate multiple research groups (i.e. Group 1 and Group 2) or utilize different versions of questionnaires (Questionnaire 1 and Questionnaire 2).
5.2 The Seven Stages of Behavioral Finance Risk Perception Studies

This segment provides an extensive review of the literature pertaining to behavioral finance risk perception studies. The review is formatted in a chronological timeline separated into seven stages of research (refer back to Figure 5). Within each stage the author provides a brief discussion of the main directions, research designs and methods, statistical methods, trends, and accomplishments of research during this phase of academic work along with a review of each research endeavor presented in that timeline stage. Hopefully, this presentation of these various studies demonstrates the true value and various stages of the interdisciplinary philosophy that are the theoretical foundation of the risk perception literature in behavioral finance.

Stage 1: The Research Starting Point: Three Significant Behavioral Finance Experiments-- For the years 1969 to 1970, three important studies took place in the area of behavioral finance in which these studies utilized experiments with groups of subjects selected with non probability sampling. Cadsby and Maynes (1998) point out that the research approach for an experiment in the laboratory within a finance or investment setting should involve “at least one decision that in conjunction with others’ decisions and/or the resolution of a random process results in a payoff” (p. 277). This is an interesting occurrence since Thaler (1999) emphasized the stipulation that behavioral finance scholars develop laboratory experiments in order to test (accept or reject) a specific financial theory. Many of the prominent topics within the behavioral finance literature were first investigated in this manner or with the utilization of an experimental research methods associated with the social sciences. In particular the area of behavioral economics and experimental economic has well-established research literature and academic studies concerning laboratory experiments in works by Davis and Holt (1993) and Hagel and Roth (1995). Even within the financial literature this author has identified over 75 laboratory experiments that incorporate diverse branches of finance such as corporate finance, investments, and behavioral finance for a wide range of topics including: risk perception, agency theory, derivatives, mergers and acquisitions, and asset pricing that meet the conditions identified in the review by Cadsby and Maynes (1998).

The first research study by Green and Maheshwari was published in 1969, investigated investor perception for risk and return characteristics among 44 MBA finance subjects for a set of 10 common stocks. The purpose of this study was to determine if participants’ subjective perceptions of stocks’ associations and their favorite selections of each security were connected to expected (predicted) characteristics of mean and variance of return. It seems that the features of perceived risk (i.e. AT&T) and perceived growth (i.e. Avon) are somewhat comprehensive in the participants’ perceptions of the similarities and differences regarding common stocks. “Even when subjects are presented explicated information cues, the perceived risk and growth attributes continue to be important” (Green and Maheshwari, 1969, p. 455). Two or more dimensions might represent the participants’ perceptions. According to Gooding (1975), the authors of this study found that two of these levels substantially correlated with their perceptions of risk and growth excluding ex post data (i.e. EPS). This research endeavor utilized common behavioral tools such as multi-dimensional scaling and perceptual maps. The two main behavioral issues the research work investigated were the notion of desirability bias of a personal investment (i.e. potential investment choice) and the degree of similarity between pairs of stocks. The main limitation of this study was the authors did not employ a research methodology to measure the validity of their findings in terms of statistically significance among the financial variables because of the small sample size.

The paper by Alderfer and Bierman (1970) examined whether individuals only apply standard investment techniques (i.e. mean and variance of the probability of investment returns) as professed by academic finance regarding their assessments for risk and return according to the efficient frontier model. The research sample consisted of 3 experiments with 3 different subject groups: 45 business students, 28 graduate students, and 80 business managers, respectively. The authors offer an additional
measure of risk known as “higher moments of the probability distribution of outcomes” or simply the concept of skewness. The authors examined the behavior of investors with the examination of certain conditions such as the potential for loss and the existence of a fixed gain (payoff). The study consisted of 3 experiments (2 student groups and 1 expert group of investors) in which the subjects were provided 3 investment gambles designed with options of making gains or losses. The 3 investments options all had similar means and variance however, substantial differences to the extent of skewness. The results showed major differences between the investment choices of the students (Group 1 and 2) vs. the business managers from (Group 3). For the student groups, a majority of the subjects selected the investment option that had a “lower mean and higher variance but large positive skewness and no chance of loss…subjects preferred high positive skewness (or small chance of a larger gain) and were willing to give up a little expected value and safety to get it” (Alderfer and Bierman, 1970, p. 345-346). The group of business managers (experts) displayed a much greater tendency to consider the possibility of a loss than the student subjects.

The research endeavor by Deets and Hoyt (1970) explored the choice shift phenomenon (the notion groups make riskier decisions than individuals) in the context of investment decisions. The research sample of 58 finance students (16 groups) made 5 investment decisions consisting of choices among 17 securities within each decision set that differed in variability. These 85 securities (consisted of stocks, bonds, and cash items) were sorted by the behavioral variable of quality. The phrase “quality” in reference to investments is precisely linked to the variance of expected returns of a specific security. Subjects had to select one out of 17 “quality securities” for the investment options. The subjects were under the impression their judgments were based on actual current stock market information, when in actuality these participants were reacting to an investment simulation of 5-year time horizons. This experimental approach instituted a controlled environment for the following factors: the probabilities, the pay-offs, and the variances of all investment alternatives. The findings revealed groups and individuals showed specific variance inclinations, however, groups had significantly increased preference for high risk (variance), high-risk stocks (securities). The authors concluded that variance is an important catalyst on an individual and group basis as a proxy for risk-taking behavior.

**Stage 2: The Early Years: A Major Behavioral Perspective Combined With A Wide Range of Investment and Financial Risk Measures**—For the years 1973 to 1979, this was a very productive stage by scholars within the behavioral finance risk perception literature; however, many of these 12 research endeavors went unnoticed by the wider audience of academic finance. Most of the studies during this time focused on an extensive collection of financial and investment risk measurements, incorporated some demographic information, and hardly integrated any behavioral risk characteristics. However, many of the studies have a substantial behavioral component in terms of the research design and the statistical methods. Even though these scholars were trained in finance they displayed an uncommon ability for understanding and applying behavioral methods at a time when behavioral finance/financial psychology was in its early stages.

The dissertation work of Gooding (1973) resulted in 3 major publications during this time period. Gooding was one of the first true “financial behavioralists” since his work incorporated such an interdisciplinary aspect in terms of borrowing from psychology specifically related to behavioral methods and statistical approaches. Each of his three studies contained a small qualitative component without simply adhering to a quantitative perspective. For the Gooding (1975) study a survey with 9 stocks was mailed to randomly selected participants (professors, portfolio managers, and individual investors) based on their investment related experience and education. A stratified sample was utilized to mail two questionnaires: 1) Questionnaire 1 (105 responses among the 3 groups): asked investors to rank-order the 9 common stocks with respect to perceived risk (i.e. Value Line Beta), perceived return and perceived growth and 2) Questionnaire 2 (168 responses among the 3 groups): had investors judge different pairs of stocks with a rating
of “different” or “similar” (i.e. Kodak vs. US Steel) which is a form of words associations via semantic differential. The author employed common behavioral statistical analysis with multi-dimensional and psychological scaling. The findings of the study revealed: for investors that focused on studying the association between historical betas and investors’ risk perceptions. Betas explained only part of what investors identify as risk. In essence, historical data cannot fully capture ex ante investment risk. “The details of the results are difficult to interpret, but it appeared that portfolio managers and professors (related to price-earnings ratios and downside risk) whereas individual investors used three dimensions (related to dividend yield, past returns from holding the stock, and past growth)” (Bromiley and Curley, 1992, p.111)

Gooding (1976) employed a psychometric approach (including correlations and regression analysis) to a group of 28 portfolio managers and 27 individual investors regarding four main categories of stock risk measures including: 1) Skewness; 2) Beta coefficients; 3) Total variance of returns; and 4) Downside Risk. For this study respondents were asked to rate 9 common stocks each in chronological order by their perceived riskiness (expected risk) and requested to provide written “qualitative comments” of their definition of risk. For individual investors regression analysis revealed these individuals’ perceptions of risk significantly correlated with two risk indicators: skewness and a measure of downside risk known as Modified Quadratic Mean Returns (MQM). Certain “qualitative factors” (open-ended responses) found that 64% of both groups articulated that their perceptions of ex-ante risk is measured by ex ante distributions of stock returns namely downside risk and total variance of returns. The second prevalent response was regarding earnings volatility as a potential risk indicator by 36% of the money managers but only 13% of individual investors.

For the study by Gooding in 1978, the main premise was that stock prices are principally based on market-related measures of risk whereas the extent of financial leverage merely has a secondary role according to the assumptions of the theory of pricing risky assets in perfect capital markets (i.e. the CAPM model). The author utilized financial risk measures from his previous two studies and incorporated several new proxy variables from the behavioral accounting literature. The author employed two judgment investment tasks including: overall risk rating for perceived company risk by ranking ordering each by a collection of seven risk attributes and also, pairs of stock were rated different vs. similar. This study employed a host of risk perception statistical tools such as regression, multidimensional scaling, factor analysis, correlations and word associations via semantic differential. The study had three main findings: 1) Portfolio managers’ risk perception was multidimensional with three factors: company risk (the unpredictability of earnings per share and perceived long-term debt to net worth), beta (the perceived beta coefficient), and the standard of deviation of return (perceived variation in each stock). 2) The respondents’ expectations of return had a considerable association to their perceived risk. (Beta and company risk correlated significantly). 3) There was no relationship found between perceived financial leverage and perceived beta.

Baker and Haslem (1976) compared the decision making process of common stock investors regarding their risk and return behavior for two main groups of investors (independent investors that do not seek investment advice vs. investors who seek the assistance of other individuals). A mailed survey to a geographic area was filled out by 851 clients of a brokerage firm (542 who seek the advice of others and 309 who make independent decisions) regarding their attitudes towards different levels of risk (none, low, medium, high) as well as their viewpoints on dividend income and capital appreciation. The findings revealed: 1) Investors who typically make investment decisions by seeking the assistance of others are prepared to agree to a lower risk of investment loss than individuals who make independent judgments; 2) Clients who seek investment advice or the opinions of others are more concerned in dividend income and are more ready to accept less risk per level of dividend income than are self-reliant investors; and 3) Independent investors are more
concerned with capital appreciation and are willing to accept greater risk per capital appreciation level than those investors who are dependent on the advice of others.

Also in 1976, Falk and Matulich investigated the association between the extent of risk identified by investors for a collection of 4 main financial securities (common stock, preferred stock, bank loans, making loans other than bonds) and 5 personal risk attributes (age, experience, degree of concern, financial education, and utilization of investment periodicals). The authors utilized a multi-method approach with investment professionals from Israel for the first expert group (qualitative and survey research) in which the data was gathered with the implementation of a mailed questionnaire and also each respondent was interviewed for the 34 of financial advisors from investment companies and mutual funds. The second expert group was mailed a survey and 60 advisors from commercial banks. The authors utilized an impressive and extensive array of correlation analysis and visual diagrams by means of cognitive maps. The main statistically significant personal risk attribute between the two groups was the extent of concern for others provided an association with the degree of risk attributed to the specific investment. The other demographic risk characteristics did not reveal any major relationships for age, experience, education, and use of financial journals.

The study by Oster (1976) employed a measure of investment risk known as the Index of Riskiness. The author computed an average perception of risk for each of the 21 stocks and this average perception of risk was identified as a new risk measure referred to as the “Index of Riskiness” for a laboratory experiments of a total of 28 groups and 184 subjects. The two groups of subjects researched in this sample had different perceptions of the majority of the 21 stocks provided. The two groups of investors did not reveal a homogeneous view of perceived risk towards the sample of stocks (two-thirds of their perceptions were different). The expert investors perceived 20 of the 21 stocks as being riskier than did the student subjects. In essence, the expert subjects attributed a higher “Index of Riskiness” than did the novice subjects. The r-square of 90.6% for expert subjects, Standard and Poor’s stock ratings were revealed to be more accurate for explaining the investors’ perceptions of risk, than did the beta risk measure of 56.6%. “The rankings thus obtained conformed more closely to the S&P quality ratings than to the beta, even though beta was known to the analyst and the quality rating unknown. This finding appears to suggest that, at least in initial ranking, portfolio managers may be more interested in corporate risk (as revealed by the S&P quality ratings) than in market risk” (Crum, Laughhunn, and Payne, 1981, p. 24).

Cooley (1977) studied a group of 56 experts regarding their perceptions of risk as indicated by return-distribution moments. This experimental approach utilized a stimuli consisted of 3 possible returns and each return having a probability of occurrence along with each investor rated each distribution according to a 9-point, low-high risk scale and all possible pairs of distributions on perceived overall similarity. Through multidimensional scaling the study revealed four risk categories employed by this research sample including variance, skewness, beta, and the coefficient of variation. This study reported that while most institutional investors considered variance of returns as a significant component of investment risk. Approximately 50% of these investors, revealed a negative association between skewness and risk. This reveals a concern among some investors for downside risk; which is lower when expected returns are positively skewed. “Of the remaining two groups, one (the beta measure often employed by financial analysts) is not relevant and the other (the coefficient of variation) can be characterized as a function of the mean and the variance” (Blaylock, 1985, p. 211).

In a geographic study by Baker, Hargrove, and Haslem (1977) examined individual investors risk-return preference towards common stocks with a two step approach: 1) to determine the association between different parameters of risk and expected return rates and 2) to find out how this relationship of risk and return was linked to the specific aspects of expected return namely dividends and price appreciation. The authors mailed a survey to a group of individual investors in the Washington, D.C.
area and received a total of 851 responses. The questionnaire included 34 Likert-type scale questions on investor behavior and questions on demographic information. The authors found that age, sex, and educational level have an important influence of individual preferences regarding risk and return for equities. This study demonstrated that investors act according to the assumptions of rational decision-making from standard finance, based on the positive relationship between risk and return for equities. The risk-dividends association was negative, and the risk-capital relationship was positive.

Bart (1978) examined the homogeneity of investors’ expectations for the future equilibrium market values of specific stocks. Individual buyers and sellers were identified through broker dealers with a nonrandom sample of 452 individual investors and the 3 stocks selected were a regulated communications company, petroleum resource corporation, and mineral resource company. The main purpose of the questionnaire focused on attaining the future price range predicted by each individual investor actually buying or selling one of the 3 stocks within the sample. Investment behavior is influenced by the investors or sellers based on a time horizon. This study found that buyers adding a share into their portfolios were in general more myopic and confident about the future rate of the price change than buyers adding to their position in a stock. However, this optimism (i.e. issue of confidence) was linked by the perception of increased total variability and downside risk. Experimental findings in this risk and return relationship of these considered expectations were usually consistent with the suggestion that buyers of the stock are more optimistic regarding the disposition of its future stock price than sellers. Buyers expected rates of price increases were appropriately twice that forecasted by sellers.

Wofford and Preddy (1978) utilized multidimensional scaling as a psychometric procedure in which 53 finance student subjects provided their risk perceptions for a collection of 8 investment classes for 12 financial and behavioral risk attributes (i.e. holding period/time factor, complexity, personal attention required). The questionnaire employed a qualitative component within this study that compared between pairs of 8-investment securities on a 9-point scale measuring the similarity vs. dissimilarity known as word associations via semantic differential. Multidimensional scaling analysis revealed 4 risk dimensions in which 3 were significant based on subjects respondents from the ratings on the 12 risk attributes. The first dimension was risk related (the key risk attributes were risk, holding period, and functional/financial orientation); in which different levels of risk were related to the category of asset (functional/financial orientation) and the time period the wealth is exposed. The next risk dimension was risk oriented and also provided a risk-return association (the main factors were risk, good financial foundation, and friends who investment in the asset); the experience of friends, given the type of asset, and the holding period variable equates to concern of a possibility of loss or variability of the investment. The last significant dimension related to return: (specific variables were return, prestige, and personal expression); this revealed return is also a multi-dimensional factor based on objective and characteristics.

For the last study during the 1970s, Blandon and Ward (1979) examined whether a small group of investment experts (23 respondents) would make equivalent risk judgments when presented with similar “investment prospects” in two different forms in a comparison between probability distributions vs. time series data. The nine probability distribution observations taken from an earlier study by Cooley in 1977 and the time series data was converted based on Cooley’s distribution returns. The authors make the case that the time series data in a graphic format replicates the visual performance of a stock price, changes in a share price, stock returns and over a certain time period. The risk measures presented in this study utilized for probability distributions were variance, skewness, and kurtosis and also, for the time series data were mean, variance, skewness, and kurtosis. The results showed the experts’ perception of risk were associated with the general structure of basic utility theory; however, respondents were incapable of making consistent judgments when presented with the same information in the presentation of time series vs. the probability distributions.
Stage 3: A New Emphasis on Behavioral Characteristics and Issues: For the time period of 1980 to 1989, a collection of 14 works explored a variety of issues. In particular, scholars of behavioral finance risk perception studies began to incorporate and investigate more behavioral themes and also, the field of behavioral economics started to become significant within the literature. Studies continued to demonstrate further interdisciplinary borrowing with emphasis from the concepts associated with the field of cognitive psychology, the subjective nature of risk, the ideas of risk-taking behavior and personality traits, and a number of works focused on behavioral characteristics including: issues of knowledge, factors involving control, and concerns over catastrophic losses. Many studies employed an experimental behavioral approach as the central research design. While other studies continued to examine the significance of demographic and socioeconomic factors. The two dominant statistical methods were regression analysis and analysis of variance during this time period.

Henderson and Nutt (1980) had experienced managers from hospitals (32 participants) and private sector (30 participants) firms consider the adoption of 8 hypothetical capital projects of different risk levels over 3 different meetings. Participants were asked to evaluate each project, indicating their tendency of adopting it (i.e. likelihood of approving it) and their perception of the project risk. For this experimental study, risk and information factors were measured via two levels of risk, 1) the distribution of the return on investment (ROI) predictions and 2) a personal assessment or a computer-based model to determine return on investment estimates. The respondent was asked to evaluate the degree of risk for each of the eight projects on a 100-point scale (0 no risk and 100 too risky). The projects were classified into “low risk” (i.e. return on investment 8% to 12%) and “high risk projects” (i.e. return on investment 0% to 20%) to assist in the measurement of the cognitive decision style. The authors established that cognitive style, setting, and the control factors were interrelated with the risk assessments and the decision to adopt based on ANOVA methods. The results revealed evidence that cognitive decision style is a significant factor of behavior. In other words, “decisions seem to be a function of the decision maker’s cognitive makeup which differs for different psychological types” (Henderson and Nutt, 1980, p. 371).

The study by McInish (1980) duplicated the same approach as the Maitel, Filer, and Simon study in 1979 (the actual paper was not published until 1986) with the utilization of a stock market game simulation experiment for seven stocks among 83 student subjects. The premise of the study was that individual profits, portfolio risk, and trade commissions, are linked with the investor's perception of risk and background. This hypothesis was formulated into a linear regression model with the following characteristics: the dependent variables (Y) were profits, portfolio risk or commissions and the independent variables were a measure of “locus of control” and “a composite measure of attitude toward risk” and also, the explanatory variables age, sex, GPA, whether the student is employed, owned stock in the last two years, worked the past summer, and their religious association. The author’s findings support that of the study by Maitel, Filer, and Simon (1986) that people who possess the belief they control actions or situations (known as internal control) choose riskier portfolios as measured by beta result in increased trade executions and commissions than individuals who possess the notion they do not control outcomes (know as external control).

The next pair of research studies incorporated the behavioral characteristic known as the potential for a large loss or concern for below target returns. For Laughhunn, Payne and Crum (1980) an experimental research design was utilized in which participants (5 groups of business managers from 53 firms across various industries) were presented with a number of small investment projects to select from a set of options consisted of either one “surething” choice and one “uncertain” option. The study revealed: 1) In terms of non-ruinous losses, the study found that a majority of the sample of 237 corporate managers in the United States, Canada, and Europe were risk seekers when faced with below-target outcomes. The study revealed that 71% of the managers displayed risk-seeking behaviors with the remaining 29% of the managers were risk averse. 2) In regards to
ruinous losses or “unacceptable loss considerations,” there is a statistically significant shift in behavior among managers towards risk-averse behavior by 64% of managers. These results demonstrated that managers have an attentiveness or concern about realizing a financial loss or the possibility of experiencing a return below a certain “target” level. An experimental research approach in Payne, Laughhunn and Crum (1980) was employed in which the respondents were asked to evaluate various choices pertaining to 12 pairs of gambles and instructed them to judge the outcomes as being evaluated by $100,000 units for study #3 of this paper among 83 business managers. The research design of this study was based on the work of Kahneman and Tversky from their 1979 endeavor on prospect theory: “the relationship between a set of risky alternatives and an aspiration level was manipulated through simple additive transformations of the alternatives” (Payne, Laughhunn and Crum, 1980, p.1042). The findings of the study reveal that including or excluding a fixed amount for all outcomes in a set of gambles in general results in a reversal of choices within the pair.

Bart and Masse (1981) investigated a proposal by Edward Miller in 1977 regarding the existence of an association of a “divergence of opinion” (under circumstances of uncertainty, potential investors in a stock come to different judgments of expected return) and risk. In a survey of 607 respondents (buyers, sellers, owners and security analysts), respondents were asked to provide their perception of the basic probability of the trading range of each stock (mutually exclusive price ranges) by the period of the respondent’s “foreseeable future” (i.e. participants were asked to define the “foreseeable future for a time period of 1 to 5 years”) for the stock. Miller’s concept is confirmed that “divergence of opinion” and risks (i.e. subjective risk, systematic risk) are associated with each other. The study finds that investors’ perceptions risk for a stock, in general, surpass the stock’s “divergence of opinion.” The authors state, “These findings are reassuringly consistent with the frequently encountered proposition that market participants expect significantly higher appreciation in the presence of significantly greater subjective risk. The fact that average subjective risk was greater than divergence of opinion for each suggests that relatively more uncertainty is reflected in subjective risk.” (Bart and Masse, 1981, p. 24).

Dickson (1981) conducted an experimental analysis with the comparison of attitudes towards risky decision-making between business risk managers and non-risk business managers for a small sample of 29 respondents. The participants were mailed a survey in which they were asked to evaluate a number of hypothetical business cases and their attitude involved with each specific judgment connected to the given situation based on 3 main issues potential for a loss, potential for a gain, and familiarity. Each business managers was provided a total of 24 of these case questions in which 12 judgments involved a loss situation and other 12 were gain-oriented. The findings of this study revealed a considerable difference regarding the risk attitudes of managers in each risk management group. The risk attitudes of all respondents were very comparable in those judgments related to gain (profit), however, in possible loss-oriented situations the risk business managers were significantly more risk-averse than their non-risk business counterparts. The risk managers that were experienced (familiar) with loss-oriented dealings seemed to make them far more cautious decisions.

For McInish (1982) 267 international business students were mailed a survey to measure for lotus of control (i.e. the 29-item Rotter's Internal-External Locus of Control questionnaire) and it was requested each individual list the 3 largest stocks held within their portfolio based on outstanding market value of each stock. The author utilized regression analysis to determine the relationship between the behavioral, financial, and demographic factors. Results from this study revealed: 1) A positive association between the standard deviation of stock betas held within the portfolio with the beta portfolio risk (even though respondents differed substantially in the distribution of their beta selections; 2) Results showed that individuals investors from this study more sophisticated investors (i.e. the issue of knowledge) than the typical college students less experienced investors from earlier studies demonstrated a greater degree of internal lotus of control; 3) Findings revealed that investors that displayed external locus of control behavior selected riskier
investment portfolios which contradicts results of earlier studies; and 4) The secondary factors of assets, age, and value of common stocks held were important risk attributes.

McInish and Srivatava (1984) utilized extensive regression analysis in order to examine whether the association was prevalent between an investor’s perception of the risk/relationship characteristics (i.e. beta, standard, skewness, expected returns) of an individual stock and demographic factors (i.e. sex, age, income, education). The authors make the case that even though investor expectations play a significant role in financial models; little empirical examination has been conducted regarding investors’ variable expectations however, standard finance models assume investors’ expectations are efficient and homogeneous. The study utilized a mailed questionnaire that resulted in a sample of 75 common stockholders from one manufacturing company in the United States. The participants were asked to indicate their expectations regarding the performance of this company stock and the Dow Jones Industrial Average for 1980. The overall results of the study revealed: 1) Demographic factors do not explain systematic differences in investors’ expectations of stock returns; and 2) Risk is a multi-dimensional process, which substantiates this notion since it has been found in past research studies of a similar nature. 3) “Investors’ ex ante risk perceptions for the stock (return, beta, standard deviation and skewness) and for the market (return, standard deviation and skewness of the DJIA average), respectively, were found to be significantly correlated” (McInish and Srivatava, 1984, p. 260).

The author Blaylock (1985) examined the notion that the process of an individual’s risk perception might be classified into 3 main components: 1) a cognitive aspect; 2) conventional risk measures; and 3) the environmental setting. The study utilized a research sample of 56 MBA candidates and student management majors assisted in an experimental design to evaluate these three main factors of risk perception. The authors utilized the statistical method known as analysis of variance with the research design to study behavior between students (i.e. within subjects, between subjects). The subjects were asked to evaluate eight case studies based on strategic/operations management based on an overall rating scale of 1 (being the least risky) and 7 (being the most risky). The author found that cognitive technique, decision situation, and objective risk factors concurrently influenced a person’s risk perception.

McConnell, Gibson and Haslem (1985) for this study was based on the data collected (from the McConnell dissertation in 1984) using a mailed questionnaire of 394 shareholders in a dual purpose mutual fund with 84 items including investor information on: portfolio composition, return preferences and investor attitudes on capital gains and dividends. The main discussion of this study for this research work was from the section on knowledge and risk-taking behavior. This study attempted to assess whether an investors’ knowledge was associated with their specific risk-return preferences. The knowledge factor was determined by requesting from investors in a dual-purpose mutual to provide their level of knowledge for 14 different types of financial securities. The 3 main factors utilized for calculating risk preference was: 1) an investor’s preference for income vs. capital gains; 2) their choice of dividends vs. capital gains; and lastly 3) their chosen level or extent of risk aversion. For these 3 risk-return preference factors the results revealed, “that knowledge was positively related to risk tolerance; that is, the more knowledge an investor had, the more risk he or she was willing to take” (Roszkowski and Snelbecker, 1989, p.22).

Maital, Filer and Simon (1986) from the field of behavioral economics for their study provided the findings of a game stimulation experiment of stock market activities focused on examining individual and cumulative options in the face of random stock prices among 87 finance student subjects. The authors utilized a stock market game simulation experiment in which subjects were provided instructions prior to the beginning of the study including: a 36-week price history of the 7 hypo-ethical stocks (students were not informed that the price history was fictitious) and instructions told subjects to maximize profits with a starting value of $10,000 in cash. All stocks were assumed to follow a random walk and portfolio risk is a weighted average of each stock’s
standard deviation. The authors utilized regression analysis to investigate the relationships between investor behavior in connection with specific psychological and demographic factors. The results displayed that the subjects believed in their own ability to control events and outcomes chose riskier portfolios than those subjects who did not hold such a belief. The authors stated, “the results tend to support our theory that those who believe they control their own fate are more likely to undertake risk and the locus of control is an additional dimension of subjective risk perception and risk aversion” (Maital, Filer and Simon, 1986, p. 290). The perception of riskiness of portfolios depended on the personality of the individual making risk assessments, thus, this challenged the belief that historic data might be a source to obtain ex ante risk measures.

In another study from behavioral economics, Sciortino, Huston, and Spencer (1987) investigated the relationship between Keynes “precautionary demand for money” (issue of liquidity preference) and an individual’s perception of risk (overall index of attitude toward risk, psychological risk characteristic). A survey instrument known as Sensation-Seeking Scale was provided to 85 college students to assist in measure the students’ perception of risk. The main variables the authors examined with regression analysis were: a precautionary money variable, a wealth factor, an income variable, and measure of risk propensity (i.e. overall index of attitudes). The findings revealed that a risk-seeking individual would take less safety measures (i.e. lower demand for a precautionary cash balance or liquidity) than a person defined as risk-averse.

In a third study from behavioral economics, Evans, Holcomb and Chittenden (1989) examined the relationship between the level of investor knowledge for three specific types of financial securities and risk-return relationships in a market setting. The authors utilized a multi-method research approach with 74 subjects in a laboratory experiment and 30 subjects were mailed a survey. Each subject in the study was presented with twelve lottery menus that reflected the same qualities as three types of financial instruments (i.e. bond, stock or option). Each lottery had three specific outcomes with the same expected value however, each held different levels of standard deviations. Each financial instrument for stocks, bonds, and options were designed with their inherent risk characteristics (i.e. bonds possessed a risk measure for default risk). The study investigated two main research questions: “First: What are the risk-return preferences of subjects in investment-type decisions? Second: Does the amount of knowledge about financial products influence the risk-return preferences of the subjects?” (Evans, Holcomb and Chittenden, 1990, p. 22) The authors found no substantial association between either objective knowledge variable or confidence factor (a subject’s own confidence in their level of knowledge) and the risk-return preference in the financial markets. The authors found no association between the knowledge factor and the risk-return preference conflicts with the earlier findings by McConnell, Gibson, and Haslem in 1984/1985.

LeBaron, Farrelly and Gula (1989) utilized an approach in this risk tolerance study that might provide scholars conducting research in the area of investment risk perception studies a beneficial format for designing a questionnaire for the selection of specific financial risk characteristics. The questionnaire developed was intended to measure an investor’s viewpoint of interest in various investment topics that also, acts as a benchmark for understanding a respondent's risk-taking propensities. (It’s the opinion of this author that this questionnaire in risk tolerance could be modified to evaluate financial characteristics for risk perception studies.) The survey instrument consists of a list of investment terms, evenly divided up by classification of three investor groups: risk-taking, risk-averse, and risk-neutral. For this research study, 94 institutional clients were asked to select the 20 items they are most interested in from at total list of 72 risk tolerance items. The findings revealed that the most dominant group category was risk-taking behavior (accounted for 48% of the selected items); the next group category was risk neutral (accounted for 34% of chosen items), and lastly, the risk averse classification (accounted for 18% of the items). The next classification was by area of risk interest that was categorized along with the percentage of risk items as: investment philosophy (40%), concerns for performance (31%), and investor psychology (29%).
Stage 4: A Diverse Collection of Risk Perception Studies and Further Research Into Behavioral Issues: For the time period of 1990 to 1995, this collection of 10 studies provided a diverse inquiry among research scholars. The decade started with three more studies that revealed the intersection between behavioral economics and risk perception as further evidence of an interdisciplinary integration across different branches of learning. This set of studies encompassed new directions concerning behavioral finance concepts such as framing, loss aversion and prospect theory. Also, a study in risk tolerance examined the affective (emotional) component of risk taking behavior (i.e. the issue of worry). These studies included new research groups that expanded the perspective of expert decision-making that incorporated a wide range of professionals including: insurance agents, countertrade managers and corporate treasurers. These studies utilized different types of multivariate statistical techniques including: regression analysis, analysis of variance, correlations, factor analysis and log-linear analysis. Several different research designs were employed such as experimental, multi-method research approach, and a substantial qualitative component that builds on the interdisciplinary and psychological foundation from earlier stages of the behavioral finance risk perception literature.

In this behavioral economics endeavor, Antonides and Van Der Sar (1990) utilized a mailed questionnaire to 63 investment club members within Holland. The objective of the study was to examine the decision making process of investors regarding risk perception and expected returns for multiple economic-psychological factors associated to future developments of financial and macroeconomic dynamics in the Netherlands along with certain demographic information. The research approach was intended to discover the characteristics and extent of factors that affect the price expectation of the most important stock in the portfolio. The survey questions that were asked regarding clubs’ prospect did not simply consist of the value of their own investments, but also included macro-economic and financial variables. The findings revealed the subjectively weighted business volume and the company’s cost level influences the club’s decision making regarding the stock in a positive manner. The club’s judgment of a stock diverges negatively with the current market price and the subjectively weighted price-earnings ratio as well as the stock price’s perceived performance in the past 3-month period.

In 1990, two significant studies appeared in the *Journal of Behavioral Economics*. For the first study by Roszkowski and Snelbecker (1990), with a sample group of 212 financial planners, this study examined the role of “framing” (losses vs. gains) with the utilization of an investment case study (modified from the standard Kahneman and Tversky case). Additional variables that were incorporated were the ownership of the investment money under consideration, the expert’s gender, age, and experience were secondary factors. The authors implemented an experimental research design with the multivariate statistical methods such as analysis of variance and log-linear analysis. The ownership variable was presented in two versions to test for different viewpoints on risk-taking behavior: 1) the case was tailored in regards to the “client’s investment dollars (professional investment choice); and 2) the personal investment of the investment planner (personal investment choice). The study had three main findings: 1) Financial planners tended to exhibit similar framing behavior that has been demonstrated in other research studies; however, these experts appear to be more conservative in how they manage their client's investment than their own money; 2) The gain frame circumstance was in the direction of risk-avoidance behavior and the loss frame situation was in the direction of risk-seeking behavior; and 3) Financial planners in the demographic group of over 43 years of age, when making judgment regarding their own money in regards to the loss frame condition, were more likely to make riskier decisions than the other subgroups from this study.

The follow-up study by Snelbecker, Roszkowski, and Cutler (1990) examined the factors that influence an investors’ risk tolerance and return expectations so experts might provide better investment advice and clients will be provided a more accurate risk tolerance profile. The authors
make the case that too much of the advice provided by financial planners related to risk tolerance and return expectations is based on the investment products and services rather than the client’s personal characters (i.e. feelings, attitudes about investment decisions). The authors conducted two studies that investigated risk tolerance and investment return prospects of 49 financial planners in Study 1 and 801 potential investors in Study 2. In Study 1, a questionnaire was developed to investigate whether there were similarities and differences in the experts’ judgment of hypothetical clients’ statements for the concepts of risk and return. On a group level the financial planners demonstrated some uniformity in interpretations of theoretical clients’ statements, however, significant differences were apparent in individual respondents' interpretations of the identical client statements. In Study 2, a telephone survey was conducted for a much larger sample of individual investors, in which, they were provided a questionnaire with four sets of client statements of risk and return. The two client statements with the most significant responses were in regards to a behavioral characteristic identified as worry and a desire for an investment return above inflation. The worry risk component was measured with the following statement, “I don’t want to lose sleep worrying about investments” and the inflation rate factor statement was “Want investments to do substantially better than inflation rate.” Among the potential investors (hypothetical clients) there were considerable contradictions in self-ratings of risk tolerance and return aspirations although, on average, there was a substantial correlation between these two groupings of self-ratings.

De Bondt (1993) conducted 4 experiments that utilized a collection of experiments with college students and mailed investor surveys (all groups were non-expert investors) for forecasting price movements for different types of financial instruments including: the S&P 500 index, the Dow Jones Index, and the United States Dollar/Deutschmark exchange rate for different time intervals. The author found that respondents predicted higher stock market prices that are exposed to a collection of price increases, proportional to investors provided with a series of price decreases. (Either way this implies that past performance does matter to investors as part of their decision making process for future returns for the selection of an investment). The author makes the argument this is not just based on return expectations but also extends to the notion that perceived risk is based on the historical returns (past performance) of a financial security. De Bondt comments,

That people’s intuitive perceptions of risk and return are intertwined. For instance, the mere fact that a stock goes up in price increases its ‘downward potential.’ Thus, investors may become reluctant to buy more shares (slowing the advance in prices), no matter how optimistic they are about the firm’s fundamentals. Perhaps then, as the proponents of efficient markets believe, risk premia vary through time. However, in this case, the premia change because risk perceptions change, not because of changes in the public’s willingness to bear risk, or because objectively the stock became more risky. (1993, p. 369)

The study by Holtgrave and Weber (1993) investigated the difference between two sets of risk models in which model 1 (Conjoint Expected Risk Model) was based on 5 economic risk factors vs. model 2 (Slovic Model) was based on 7 psychometric risk attributes (i.e. knowledge, control, catastrophic potential) for two categories of risky activities in both a financial setting (6 risky activities) and health environment (16 risky activities) within a 1-year time horizon. (The author for this review only focused on the risky financial activities.) For the set of six risky financial activities the risk characteristics with the best explanatory power were: probability of harm (loss), expected harm (loss), catastrophic potential, and dread. The authors utilized factor analysis in order to investigate which risk attributes for each model accounted for the subject’s perception of risk. The authors found that the variances for the 6 financial risky activities accounted for the subject’s risk perception for the following: Model 1 a 46% variance and Model 2 a 36% variance. This study is a good example of an interdisciplinary perspective in terms of borrowing and collaboration between
psychology and behavioral finance with an interaction of behavioral economics. The study also builds on the work of the Decision Research scholars from the area of psychology.

Steil (1993) investigated the management of foreign exchange risk for 26 treasurers of multinational corporations regarding the perceived risk by corporate treasurers for various products (i.e. option hedging, forward hedging) in a real setting by actual experts. The author implemented a multi-method research approach by first utilizing an extensive 1-hour telephone interview with each participant to develop a questionnaire and later on in the study mailed each a follow-up survey. The mailed survey contained one foreign exchange case related to risk and a collection of individual questions on foreign exchange products and services to measure the experts’ perception of risk. The author as part of the study utilized a qualitative research aspect on the survey that incorporated open-ended questions for the respondent to provide extensive answers. The results of the study revealed that the treasurers demonstrated loss aversion behavior (i.e. a desire to avoid large losses or below-target returns) in their responses when confronted with the problems concerning foreign exchange risk. The author posited that the respondents’ behavior could not be attributed to rational economic models (Bayesian expected utility framework). The author concluded that certain cognitive issues associated with risk and uncertainty influences the corporate treasury experts including: loss aversion, regret theory, and framing.

Cassidy and Lamb (1994) investigated the association between the reported/perceived risk of insurance agents and the actual risk of a pool of insurance companies (i.e. similar to building a portfolio stocks by an investment manager). Two hypotheses that developed were: 1) Null Hypothesis: The actual risk encountered by insurance agents is consistent with their perceived risk and 2) Alternative Hypothesis: The actual risk encountered by insurance agents is not consistent with their perceived risk. The authors mailed a survey to 1,000 insurance agents and received a total of 112 usable questionnaires concerning the insurance companies they act for and the percent of business placed with each firm. The survey provided asked the respondents to categorize the risk associated with their insurance companies from very risk to no risk within a total of five risk classifications. The results revealed that insurance agents in most cases, with some differences, have a propensity to build a portfolio of insurance firms for different risk levels that do not correspond with their own inclination for risk. In essence, “some agents may be reporting a desire to take little risk but constructing a portfolio with higher than expected levels of risk” (Cassidy and Lamb, 1994, p.46). Insurance representatives seem to create their portfolio of firms devoid of the riskiness of the actual insurance firms.

Shapira (1995) investigated risk-taking behavior (he collected primary data from real decision makers) from a total sample of 706 business managers across a wide range of public, private, and military institutions in the Unites States and Israel. The author utilized a multi-method approach of qualitative data from 50 interviews and a quantitative component from an in-depth questionnaire for a total of 656 managers. The main purpose of the interviews and questionnaires was to establish a definition of risk, evaluate the subject’s views towards risk, how these managers deal with risk and each respondent provided a description of a recent situation that involved either a personal or business decision. This study utilized an extensive qualitative component on the survey since a majority of the questions were free response or open-ended questions. The respondents of this study defined risk into four main characteristics: 1) The managers displayed a tendency towards concern for downside risk; 2) The notion regarding risk was the extent of the possible loss rather than its probability; 3) The respondents believed there was a strong dissimilarity between risk taking behavior and gambling; and 4) They displayed minimal desire to condense risk to a single risk dimension (i.e. beta for stock investment risk). In terms of their viewpoint on the association between risk and return: 13% of the respondents believe risk and return are related, 30% thought the two components were provisionally linked,
48% believed these 2 variables were not necessarily connected, and lastly, 9% did not consider risk and return to be correlated.

Levy and Lazarovich-Porat (1995) test the premise associated with the concept of signaling theory that the larger the amount of entrepreneur involvement in a venture, the higher is its stock price, while tested in an auction market. The assumption was made that what determines stock price at least in the short run is not the actual risk, but the perceived risk. If the willingness of the entrepreneur to invest in the firm changes the perceived risk, it also influences stock price. An experimental research design was used within a laboratory setting with a group of 24 expert subjects in order to examine the notion associated with signaling theory. The subjects are presented with a situation of four companies in the solar energy industry, variables provided are an initial investment amount, three years of expected cash flows, and an estimated IRR however, no risk measure is provided. The authors found strong evidence of the theory of signaling. The authors state, “the subjects created their own beliefs regarding the firm’s quality. The stronger the positive signal, the higher the quality of the firm as perceived by the subjects” (Levy and Lazarovich-Porat, 1995, p.52).

Sullivan and Kida (1995) conducted two studies for a random sample of 72 corporate managers; this study investigated the notion that multiple reference points, prior gains, and prior losses might influence the risk-taking and risk avoiding behavior of managers when presented within an investment setting. In Study 1: managers were given 8 sets of investment options (with multiple reference points) presented with either a gain or loss selection involving a sure outcome (i.e. riskless asset) or a risky outcome (i.e. risky asset with a related return on investment and a probable outcome). The findings of Study 1 revealed: that managers demonstrate risk avoidance when outcomes are higher than target and are more likely to exhibit risk-seeking behavior when different outcomes are significantly below multiple reference points. In Study 2: managers were given either cases with either 2 prior gains or 2 prior losses and also, incorporated multiple reference points. “With respect to prior gains and losses, three times as many managers were risk taking with prior gains than with prior losses (39% vs. 13%, p<. 05). However, the majority of managers were still risk avoiding” (Sullivan and Kida, 1995, p. 82).

Stage 5: The Late 1990s: The Emergence of Issues Concerning: An International Perspective, Behavioral Characteristics from Hazardous/Risky Activities, The Significance of Risk Tolerance Studies, The Issue of Time and The Role of Affect: For the time period of 1997 to 1999, 11 works were conducted that extended the research work to a number of new issues. From an international perspective, studies incorporated an global research sample of experts and socio-economics factors such as cultural differences towards perceived risk. Scholars from the Decision Research applied the behavioral risk characteristics (i.e. knowledge, catastrophic losses) from psychology (i.e. hazardous activities) to risk perception studies on financial and investment decision-making. As earlier stages disclosed research scholars from the area of risk perception should be aware of the important work in recent years from the studies in risk tolerance because these studies cover demographic information and behavioral issues (i.e. financial knowledge). Two new issues that started to emerge were: 1) the significance of time and perceived risk (known as short-termism) and 2) the role positive and negative affect or simply put the notion of “risk as feelings” (i.e. alluded to in earlier work concerning risk-taking behavior and emotions). The research methods utilized were wide ranging such as experimental, multi-method, qualitative approaches, laboratory experiments, and mailed surveys. Three of the studies utilized a different perspective with the creation of a set of testable hypotheses. The statistical techniques were diverse in nature including: regression analysis, discriminant analysis, correlations, intercorrelations, and principal component analysis.
Levy (1997) utilized a behavioral research design to investigate concepts of standard finance. The author employed a laboratory experiment with 64 college students in which each subject was provided with an initial investment of $30,000 and made investment judgments in a maximum of 20 stocks across 10 trading periods. The experiment was developed with a real monetary gain or loss to examine the Capital Asset Pricing Model (CAPM) and the generalized CAPM (segmented market model) with ex-ante considerations. The findings of the study revealed that the relationship between risk and return were strongly positively correlated. The generalized CAPM beta provided the preeminent findings however, also the CAPM beta revealed a strong positive relationship with mean returns. The author concluded that the risk-return model is not obsolete (i.e. beta is not dead); it is still a valid and significant risk measure than previous standard finance studies have revealed. This study represents interdisciplinary borrowing from an opposite perspective in which standard finance theory is applied within a laboratory setting in tandem with behavioral methods.

Olsen (1997) employed in two stages a mailed questionnaire with a research sample of 630 expert investors and 740 sophisticated novice investors. Questionnaire #1 provided investors with an open-ended definition of investing to obtain specific factors of risk perception, and Questionnaire #2 investigated the specific representation each of these factors influenced investors’ risk perception among 10 asset classes with a 7-point scale for this 2nd survey. With the completion of Questionnaire #2, the results of this study demonstrated both groups of professional and individual investors appear to have a similar perspective of risk. The author utilized two main statistical methods, which were correlations and regression analysis. The four main risk characteristics that these investors assign to their perceptions of risk were: the concern for a large loss, the feeling of control, the potential for a below-target return, and a perceived degree of knowledge. These four elements of risk perception accounted for approximately 77% of the variation (high r-square) in security returns for the time period 1965 to 1990. The most substantial factor across all 10-asset classes was the control variable or the ability to sell an asset in a short time horizon without suffering a significant loss for their investment. On the other hand, the “level of knowledge variable” was not relevant for any of the classes of financial securities. Finucane (2002) pointed out, “critical dimensions included dread risk (a below-target return, the potential for a large loss, the investor’s feeling of control) and unknown risk (the level of ambiguity or knowledge about an investment)” (p. 238).

Weber and Milliman (1997) utilized a stock simulation program in which 24 MBA finance students are provided with an initial investment of $100,000 and asked to select between six investment choices. The experimental design included a theoretical time span of ten investment periods; investors could only select one stock each period (this restriction was implemented to access whether an investor had a tendency to select a stock he or she considered more or less risky when compared to the other stocks). Subjects were asked to evaluate the riskiness of each stock at the end of each of these sessions 1st, 3rd, 6th, and 10th with a rating scale from 0 (not at all risky) to 100 (extremely risky). This research study focused on three specific research questions: 1) Are stock selections different as a consequence related to a successful investment vs. failed investment? 2) Is the perceived risk for stocks altered as the result of investment success vs. investment failure? 3) Is transformation in investment decisions related to changes in perceived risk, so that preference for perceived risk is constant for a given investor, even though both choice and perception are being transformed? The first two questions were positive regarding both the stock selections and the subjects’ risk perception of the stocks were modified as the consequence of outcome response (i.e. investment success vs. investment failure). For the third question, the answer is “yes” for 83% of the subjects in the experiments that “changes in choice and risk perception were related to each other such that investors may have had the same risk preference in the two sessions even though their choice differed” (Weber and Milliman, 1997, p.141-142)
Schlomer (1997) examined the role of risk perception and risk propensity in regards to the decision making process of managers that specialize in various counter-trade form transactions (i.e. barter agreements, various nontraditional forms of financial payments). The author developed four main hypotheses and utilized statistical methods such as regression, correlations, and principal component analysis. The author utilized behavioral factors such as an uncertainty measure (lack of information, inability to assign probabilities with degree of confidence) and an ability to estimate total amount of potential loss. A questionnaire was mailed to 450 counter-trade experts and 74 usable surveys were returned. The questionnaire was designed to have the respondent recall a recent a counter-trade transaction and then measured the respondents attitudes towards perceived risk and risk propensity involving this situation. The findings of the study revealed risk perception (i.e. magnitude, exposure, chance of a loss) was positively related to the internalization (i.e. degree of organizational involvement) of counter-trade transactions. Risk propensity was not significantly associated to counter-trade internalization as assumed, nor was there a negative relationship to risk perception as hypothetically anticipated. However, risk propensity revealed a significant and positive association to risk perception.

Weber and Hsee (1998) utilized a nonrandom sample among four countries (a total of 283 subjects) at universities filled out questionnaires within a laboratory experiment environment. Each subject was presented with a $20,000 initial investment, given twelve investment options (selection of possible gain and loss) along with the following: 1) the options 2) the expected value and 3) the standard deviation and each investment option was provided within a numerical and graphical context. The “perceived riskiness (R)” of each investment selection was measured with a number rating scale from 0 (not at all risky) to 100 (extremely risky). The subjects were asked two of the following questions for each investment option: 1) What would be the maximum amount you would be willing to invest to get an opportunity at this financial option? 2) How risky do you consider this investment decision is? The main findings of the study were respondents from the four countries differed in their preference towards risk, as evaluated by purchasing prices (values) for risky financial choices. Participants from China were considerably less risk-averse in their assessing value for risk financial options than people from the United States when preference for risk was measured in the traditional expected-utility structure. These obvious divergences in risk preference among the four countries were related predominantly with cultural differences in risk perception of the financial choice instead of cultural differences in viewpoint toward perceived risk. In all cultures within this study, an equivalent amount (the majority) of participants were prepared to pay more for alternatives they perceived as less risky.

Baker (1998) examined how to recognize the performance assessment process by decision makers (i.e. boards of trustees) influences the behavior of investment managers concerning their perceptions of risk and time horizons (i.e. notion of short-termism). As part of this evaluation process, the investment managers (64 UK fund managers) are reviewed on a regular basis against performance benchmarks (i.e. usually a quarterly basis), however the scope of such appraisal and the selection of standard benchmarks varies based on the category of funds under supervision. The authors utilized a multi-method research design by conducting 64 interviews with investment fund managers in combination with a survey instrument that measured their approach to portfolio composition, types of securities invested with their portfolios, their perceptions of risk and return, and the type of performance evaluation by their clients that’s administrated. In regards to their perceptions of risk, the study focused on 4 main risk measures (commercial risk, asset-liability matching, total variability of return, beta of portfolio) by the two investment characteristics of type of fund and performance benchmark. The most significant risk measure for the two investment criteria was the extent to which assets and liabilities are not matched, the 2nd moderately important risk indicator was commercial risk, whereas the traditional investment risk measures (beta, variance of returns) were a distant last. The results reveal that performance assessment affects fund experts’
perception of risk and are influenced by quarterly monitoring of decision makers (i.e. their clients). It is discovered that these investment managers think that the quarterly performance monitoring that many fund managers are subject to, pressures experts to espouse an additional short-term mind-set and method to the management of the funds under evaluation.

Marston and Craven (1998) investigated the beliefs that fund managers and stock analysts assume a short-term time horizon when making or providing advice on investment decisions. In particular, this research endeavor attempted to demonstrate the degree to which finance directors of large UK corporations perceive that financial analysts (namely sell-side vs. buy-side analysis) assess their companies on short-term benchmark. An extensive survey was mailed to financial directors from a list of UK Top 500 corporations in which 325 executives responded to the questionnaire regarding the concept of short-termism. For this section of the study, there was some confirmation concerning the notion that some finance directors perceived institutional investors as being short-termist regarding some companies but that the occurrence is more narrowly focused and of less significance than its proponents declare. The main hypothesis related to short-termism and risk examined that there is a positive relationship between perceptions of short-termism and comparatively high price volatility. The results of this hypothesis based on the responses from financial directors regarding their perceptions of the two types of analysts groups supported this hypothesis for sell-side analysts and not for buy-side analysts.

Sarasvathy, Simon, and Lave (1998) investigated perceptions of risk between entrepreneurs and bankers when it comes to dealing with risky business situations for specific risk attributes based on feelings of control (i.e. control of the possible returns of the decision, control the risks involved in the problem), personal values, and responsibility. A very small sample of investment experts was given a questionnaire with five cases based on financial risk, risk connected to a natural disaster, and risk linked to human health/life in which they selected between two options. This ad-hoc group had to respond to the five cases on the questionnaire that was designed with a qualitative research techniques including: verbal protocols, a similarity matrix, and open-ended questions. The authors utilized research methods such as cluster, protocol and content analysis to evaluate and process the qualitative data from this small convenience sample. The findings revealed that entrepreneurs displayed a tendency to take on risk voluntarily, attempt to control at different levels of risk, take into account personal beliefs in resolving a problem, and accept greater accountability concerning the outcome of their actions. Whereas, bankers showed an inclination to focus more on target outcomes, attempted to control risk in established prepared situations, and shun occurrences where personal accountability is at higher risk.

Grable and Lytton (1999) examined whether specific issues involving a collection of demographic, socioeconomic, and attitudinal variables that could be utilized in order to predict the financial behavior of individuals with different levels of risk. A questionnaire was designed to measure specific risk-behavior including: a risk tolerance index (classified two groups into above average vs. below average risk tolerance investors), gender, age, marital status, occupation, income, education, financial knowledge, and economic expectations. This survey was mailed to a random sample of employees of a research university located in the Southeastern United States that resulted in 1,075 usable surveys. The authors utilized the statistical method discriminant analysis to assist in grouping investors into risk tolerance classifications by the respondent’s demographic and socioeconomic characteristics. The findings revealed that an individual’s educational level and financial knowledge were the best predictors of risk tolerance behavior and a person’s income level and occupation were two other significant factors. The responses based on gender, economic expectations, age, and marital status presented a low explanatory power when compared with the others significant factors.
The objective of the study by the MacGregor, Slovic, Berry and Evensky (1999) was to obtain a better comprehension regarding how the financial decision-making process is linked to various aspects of investments/asset classes, specifically expert’s perceptions of returns, risk, and risk/return associations. A survey was mailed to financial advisors in which, the 265 participants that responded were asked to provide their assessment of a series of 19 asset classes with 14 specific variables (all of the 14 scales provided a range of choices with a 5-point rating scale). Some of these 14 characteristics were behavioral in nature: attention, knowledge, time horizon and others were judgment related: perceived risk, perceived return, likelihood of investing. The main findings revealed with the utilization of multiple regression analysis with perceived risk as the dependent variable revealed that three significant factors (worry, volatility, and knowledge) explained 98% r-square of the experts’ risk perception. The study reaffirms the notion that risk is a multi-factor decision making process across a wide range of investment classes. The authors describe their findings of risk from this study:

The psychological demands associated with ongoing monitoring and evaluation of investment performance (i.e. worry or attention), predictability of performance, potential loss-of-capital risks, and perceived adequacy of regulation. These differing definitions of risk appear not to be specific to broad asset classes (i.e. equity assets versus debt assets), but are related to the character of rather narrow class definitions (i.e. mutual funds versus blue chip stocks, or U.S. Savings Bonds versus foreign bonds). (MacGregor, Slovic, Berry and Evensky, 1999, p. 84)

Finucane further comments, “perceived risk was judged as greater to the extent that the advisor would worry about the investments, that the investments had greater variance in market value over time, and how knowledgeable the advisor was about the investment option” (2002, p. 238). Lastly, in terms of the degree of interdisciplinary borrowing and collaboration this study is a true example of the worthwhile research endeavor and a in-depth integration of psychology and finance. (This study by the Decision Research Group is based on their earlier work in psychology.)

Williams and Voon (1999) incorporated the role of affect (i.e. mood, emotion) based on four Asian business venture case studies regarding risk perception for a group of 85 managers for a wide range of risk dimensions. The authors incorporated secondary factors such as potential losses and perceived control. The questionnaire was a mailed survey designed with specific business case studies including: 1) based on an investment in a Southeast Asian venture; 2) the consideration new investment of a new product line; 3) a decision to eliminate a product line or make an additional expenditures; and 4) a company experiencing financial problems. The authors developed an experimental research design to investigate the study’s seven hypotheses: the central component was the notion of an increase in positive affect influenced risk-taking behavior related to the following 7 risk dimensions: 1) perceive situational uncertainty (decreases); 2) perceive situational gain (increases) and loss (decreases); 3) perceive situational framing (more positively); 4) perceive situations as less personal; 5) perceive situations as safer; 6) perceive more control; and 7) perceived increased higher risks will result in increased risk seeking behavior. The authors described the main results from their study as:

We found that participants’ managerial moods while responding to the questionnaire significantly influenced how situational framing was perceived and the extent to which managers believed they could influence-risk related outcomes: Mangers in good moods were more likely to perceive situations in positive terms and to believe that could control risky outcomes. Additionally, we found that positive affect influenced the likelihood of taking risks for managers who perceived higher situational riskiness. Managers who perceived the overall risk as generally safe were likely to select the risky course of action, regardless of their mood state; however, positive affect increased the likelihood that managers who perceived situations as risky would choose riskier options. (Williams and Voon, 1999, p. 281-282)
Stage 6: The Turn of the Century—A Very Productive Year by Risk Perception Scholars—

The Year 2000 was a very vibrant phase for research work within the risk perception literature with a collection of 11 studies. The main themes of this year were: 1) A number of studies incorporated the ideas of behavioral risk attributes (i.e. familiarity, postponement of losses) from the risky activities of psychology to the financial judgment process; 2) There was further investigation into issues of downside risk, the importance of investment time horizon, and issues of framing; 3) A new trend emerged in which 5 endeavors started to emphasize specific hypotheses within their research designs; 4) The continued importance of risk tolerance studies regarding behavioral risk indicators (i.e. issues of knowledge and control); 5) The notion of an inverse relationship between risk and return; and 6) A greater emphasis on the use of descriptive statistics and statistical methods such as regression, correlations, and factor analysis were employed. 7) Interdisciplinary research extended to an international perspective, since many of these European scholars conducted risk perception studies across many different disciplines.

This study by Goszczynska and Guewa-Lesny (2000a) compared the perception of different forms of money and financial assets in the bank employees and customers in Poland. Three Polish banks were surveyed for the study (113 bank employees vs. 108 bank consumers) in which participants were asked to evaluate the typicality (relates to the familiarity of assets) of 22 forms of money (i.e. Polish money and coins) on a 7-point Likert scale. In terms of standard forms of money (i.e. cash, notes) there was no significant difference between bank clerks and clients (experts vs. novices), however, non-cash forms of money (i.e. stocks) revealed a divergence. The bank clerks provided higher rating of typicality for seven forms of money such as bankcards, shares, and insurance polices. This finding potentially has substantial implications since how individuals perceive the typicality of money differently might extend to how investors perceived the degree of risk associated with these different forms of money as investigated in the follow-up study by the same scholars.

This next study incorporated the earlier work of Decision Research Scholars with the integration of hazardous activities and the investment decision-making. The risk perception aspect focused on investigating whether the ratings would be based on qualitative factors similar to those found in a study by Slovic, Fischhoff, and Lichtenstein in 1980 involving technological and ecological risk. The Goszczynska and Guewa-Lesny (2000b) examined 11 qualitative risk indicators (based on the earlier work of Slovic and others) in which respondents were asked to judge their perceptions of risk on 7-point Likert scales for 10 types of financial investments (i.e. stocks, bonds) among a sample of 3 banks in Poland (113 experts vs. 108 novices). The main question explored was “Do experts and novices differ significantly regarding their assessment of risk for various categories of financial assets?” The responses between the two groups demonstrated a considerable divergence regarding the following risk characteristics: the amount of profit, certainty of profit, judgmental independence, and familiarity for specific categories of investment. The authors developed three risk dimensions (factors) including: certainty of profit, the familiarity of risk, and the deferment of losses. These three risk dimensions accounted for more than 60% of the total variance. Factor 1 known as “certainty of profit” was created from the qualitative risk factors including: trust, amount of profit, income certainty, and independence of judgment. The second factor labeled “familiarity of risk” was made up of controllability, knowledge, and accessibility of information. The third factor “fear of immediate loss” dealt with loss postponement and anxiety of loss (behavior attributed to loss aversion). The other major component of this endeavor was to examine the connection between how typical various forms of money (relates to the familiarity of assets) and their overall perceived riskiness based on qualitative constructs. The statistical analysis with correlation and regression revealed that four significant risk indicators for describing the “typicality of ratings opinions” of specific types of money were: trust, clarity of information, knowledge and familiarity.
Olsen and Troughton (2000) revisit the difference regarding uncertainty (ambiguity) and risk fostered by Frank Knight in 1921. The authors examined or alluded to several behavioral issues such as confidence, familiarity, and catastrophic risk. An expert group of 314 respondents identified as “well-trained and experienced money managers” were asked to fill out a questionnaire and a central source of the data regarding rating of stocks was from Value Line. In terms of the issue of familiarity bias, in some cases the names of the stocks were given and other instances the names were withheld. The 1st component of the questionnaire was to assess risk-related characteristics. The two most important aspects of risk were: 1) downside risk (the chance of incurring a large loss) and (2) uncertainty/ambiguity (uncertainty about the true distribution of possible future returns). A third risk measure variability of returns (i.e. beta, standard deviation) was only given a rating of minimal to average importance by the expert respondents. The 2nd major aspect of the survey was to identify the main factors associated with ambiguity and risk by evaluating the perception of risk by the professionals for 20 actual stocks on a 7-point Likert scale. The two most important factors of perceived risk were: 1) downside risk or Value Line safety rank (a risk measure of potential risk connected to a specific stock) and 2) the Index of Analyst Disagreement (IAD) factor. The 3rd major part of this study extended to ten asset classes regarding the perceived risk among the expert respondents. The findings for the asset classes revealed that the risk measure variable “a large loss” was the most significant and the ambiguity factor known as an “ability to estimate risk” (in other words, identify with confidence the allotment of expected future returns) was second in importance.

In this behavioral economics study on risk perception, Unser (2000) utilized eight hypothetical discrete stock price distributions in order to measure the influence of different target outcomes and structures (i.e. charts or histograms) among 199 business students. This paper investigated an individual’s risk perception in a stock market framework. The purpose was to experimentally research private investors perceived risk in investment decision-making in which the authors utilized 3 main sets of hypotheses. Even though various theoretical models in finance focus on variance or mean absolute deviation as the risk measure however, lower partial moments (LPM) seem to be a more suitable risk measure according to the author. The focal point was on the connection of risk perceptions with particular lower partial moments (LPMs). LPMs “reflect the popular negative meaning of risk since they only take negative deviations from a reference point to measure risk” (Unser, 2000, p. 253). The main findings can be summarized as: 1) Traditional (symmetrical) risk measures (i.e. variance) should be rejected in favor of shortfall measures (i.e. lower partial moments.) 2) The reference point/target of respondents for assessing losses was the original price in a time series of stock prices and not the distribution’s mean. 3) The lower partial moment risk measure identified, as the most significant was the “probability of loss or potential for loss” that justifies the risk perception of participants. 4) The framing of stock price distributions in the form of charts or histograms had an important affect on average risk ratings. 5) Positive deviations from an individual target or reference point had an inclination to reduce the extent of risk perception.

Forlani and Mullins (2000) investigated how the issues of risk, risk perceptions, and entrepreneurs' propensities to endure risks affect their decision-making process for potentially risky entrepreneurial ventures. A sample of 78 entrepreneurs from America's fastest growing companies were mailed a survey to make selections among a sequence of four hypothetical new-found ventures (projects) for seven hypotheses in which the authors develop the perceived new venture risk indicator to test them. Each case provided equal expected values; presented information for target ROI and all four firms were from the same industry. The two independent factors were the variability and the degree of hazard (loss) and gain. The authors of this study found that such choices are influenced by the risks inherent in the new endeavor, as confirmed by the arrangement of outcomes expected in each venture, the entrepreneurs' conflicting perceptions of these risks, and disparities in their own individual inclinations to take risks. The respondents in
the study of entrepreneurs were not inclined to select projects having a high degree of variability in their configuration of estimated outcomes. But, the entrepreneurs seemed to be prepared to consent a significant level of exposure (downside risk) in their new venture choices, apparently in search of potentially substantial profits.

Grable and Joo (2000) investigated a wide range of variables that might influence a person’s financial risk tolerance involving behavioral, socioeconomic, and demographic information. An extensive pilot study was conducted that developed the survey instrument. A questionnaire was filled out by 242 college students that measured risk tolerance as related to behavioral characteristics such as locus of control, financial knowledge, and money ethics (attitudes towards money) as well as socioeconomic variables including economic expectations and birth order. The demographic factors were the traditional set including: gender, marital status, income, age, and ethnic background that might be associated with an individual’s risk tolerance. With the utilization of regression analysis, the results of this study revealed in terms of the three main categories of risk factors the most significant groupings were the psychological factors namely locus of control (i.e. internal control) and financial knowledge however, the only significant explanatory demographic variable of risk tolerance was gender. All other demographic and socioeconomic factors did not provide any significant explanation for the risk tolerance behavior of these sampled respondents.

Houghton, Simon, Aquino, and Goldberg (2000) considered the cognitive biases (i.e. law of numbers, illusion of control, overconfidence) that influence risk perception decision-making on an individual basis and investigated whether these biases exist in a group (team) setting. The authors surveyed 154 business college students on an individual basis, and then on a group basis (46 teams). The participants were given a teaching case that incorporated the three behavioral concepts: the law of small numbers bias, illusion of control, and overconfidence to investigate the five main hypotheses. The main findings from the study were: the biases of the law of small numbers and illusion of control declined the risk perception at both levels and also, the law of small numbers had a considerably greater influence on group risk perception than on individual risk perception. On the other hand, the overconfidence factor was not significant in either decision making level involving risk perception on an individual basis or group setting.

Worzala, Sirmans, and Zietz (2000) examined the responses of a questionnaire mailed to investment managers for large pension funds (96 respondents) and insurers (47 respondents) concerning their perceptions of the inherent risk and return of 20 investment securities. The main research question focused on whether the money manager’s risk rankings suitably replicate their expected return for each actual asset type? The null hypothesis of the study was “that the risk ranking proposed by each respondent will approximate the average return ranking for each asset class. That is, we hypothesize that portfolio managers will rank return and risk levels the same for each of the investment alternatives” (Worzala, Sirmans, and Zietz, 2000, p. 157). The authors’ research approach utilized the following aspects: an expert sample (comparison of two groups pension fund vs. insurers) and a partial focus on real estate investments (i.e. REITS). Subjects were asked to evaluate 20 investment asset classes on a 5-point scale from 1 (very low return) to 5 (very high return) in order to: 1) estimate the relative return (i.e. perceived return) for each asset class and 2) estimate the relative risk (i.e. perceived risk) for each asset class. The findings of the study revealed a means difference test on responses showed that these experts in general do not believe that the inherent risk of most financial assets is warranted by the return expected for a specific asset. For many asset classes, investors indicated that they perceive an asset to have a higher inherent risk level than the expected return for that asset category. This suggests that investment experts might employ different risk and return levels for an assortment of assets in their portfolio allocation methods.
Siebenmorgen and Weber (2000) examined the influence of different investment time horizons (in the short term vs. the long run) on investors’ risk behavior regarding their risk perception and asset allocation decisions. The authors investigate framing effects concerning the arrangement of historical data with 1-year vs. 5-year performance returns among 103 MBA students. The study revealed that biases in risk assessments instead of biases in predicted volatilities influence the tested investment behavior. Results demonstrated significant underestimations of long-term risks in all 5 informational conditions that resulted in a higher allocation of risky assets in a long-term portfolio. Two exploratory reasons were provided 1) a belief in mean-reverting asset prices seems to influence the more risk taking in the long-term by subjects and 2) limited cognitive abilities attributed to framing effects.

Siebenmorgen, Weber, and Weber (2000) investigated how the arrangements of historic volatility information influences risk perception and investment decisions. The 120 business student subjects were asked to estimate the volatility of 16 different investment alternatives by providing an estimate for the 10%, 50% and 90% quantiles for the future value of all investments. The data provided concerning the issue of time was historical volatility for 10 years (i.e. annual percentage of return). Each individual rated the risk of each of the 16 investment options with a 9-point scale 1(no risk) to 9 (highest risk), then, the 16 investment selections were grouped into 3 categories of risk: low, intermediate, or high risk. Next subjects were asked to rate their risk attitude by choosing little, moderate or great tolerance for risk. The subjects had to allocate their new wealth by choosing a maximum of 5 assets and provide percentages for their portfolio. The results demonstrated both risk and volatility perceptions varied considerably as a function of type and presentation of information, though in different aspects. Biases in risk perception, however, not in forecasts of volatility (i.e. the standard deviation expected/predicted returns), influenced portfolio investment decisions by the participants. “Providing historical return information in the form of an estimated density function rather than as a bar graph of annual returns led to greater estimates of volatility and risk…Knowledge of the name and type of assets, on the other hand, led to lower estimates of volatility and risk. Differences in the format in which historical volatility information was provided had a larger impact on volatility forecasts than risk perception, whereas knowledge of name and thus type of assets had a larger effect on risk perception” (Siebenmorgen, Weber, and Weber, 2000, p.12-13)

Ganzach (2000) conducted four experiments with a total of 129 finance students knowledgeable in the topics of risk and expected returns. Subjects were asked to assess the relationship between risk and return judgments concerning both unfamiliar and familiar financial items. The premise was unfamiliar financial items (assets) had an negative association: if an asset was perceived by the finance student as “good” it would be considered as a high return and low risk investment, but if the asset was seen as “bad” by student subjects identified this inherit affiliation of a low return and high risk asset. For familiar assets, the hypothesis was the association between risk and return decisions are positive. To illustrate the research approach and results as the basis for understanding these four experiments, this is a basic overview of Experiment 1. In Experiment 1 (between-subjects study), the subjects were separated into two groups in which one group utilized risk measures and the other group only return factors for risk judgment of 30 international markets of unfamiliar assets. The results for this experiment revealed: “estimated by Cronbach’s alpha, these interrater reliabilities were .93 for the risk judgments and .76 for the return judgments…risk judgment seems to be a more reliable measure” (Ganzach, 2000, p. 358). In general, the results of the studies demonstrated evidence for the author’s two main assertions concerning risk and return judgments for unfamiliar and familiar financial instruments. The author’s main conclusion for the four experiments was risk and return judgments are based on the specific situation related to global preference, psychological constructs, and ecological value of risk.

Stage 7: The Trends and Issues Within the Literature for 2001 and 2002 – This last phase within the risk perception literature continues to build on the theoretical ideas and theories of past
academic studies especially since the mid-1990s for this grouping of 10 studies. The main issues for this stage were: 1) Authors continued to investigate and apply the notion of psychometric behavioral risk traits (i.e. issues of control, concern for catastrophic losses) from psychology to the financial judgment process; 2) Other studies provide additional exploration into the inverse relationship between perceived risk and expected return (perceived return); 3) Within the research designs of academic studies, some authors continue to forward the notion of utilizing hypothesis testing while others employ the psychometric paradigm founded by the Decision Research; 4) The literature reveals that behavioral indicators and demographic information continue to be further integrated by scholars conducting studies in risk perception and risk tolerance; 5) While other studies examined how consumers perceive financial risk. 6) The dominant two forms of statistics were regression analysis and factor analysis; and 7) The deep assimilation of an interdisciplinary approach continued between the social sciences and business disciplines in both directions behavioral finance to psychology and psychology to behavioral finance within the realm of financial and investment decision making.

Heilar, Lonie, Power, and Sinclair (2001) provided an investigation into the attitudes of UK managers to risk and uncertainty in relation to risk management practices. The study examined a collection of risks that firms are presented with, investigated the different judgments taken in specific instances, and identified managers’ perceptions and viewpoints of risk. The study took a comprehensive consideration of a wide range of issues including: personal traits, loss aversion, organizational factors, judgment characteristics (i.e. issues of time), and behavioral reactions (i.e. control over the situation). The authors employed a multi-method research approach with the use of qualitative techniques (29 interviews were conducted) and a quantitative aspect (two sets of major questionnaires were mailed out). A total of 997 surveys were mailed out based on a stratified random sample to various types of business managers in which a total of 210 were returned (132 of questionnaire 1 and 78 of questionnaire 2). The main findings in regards to risk perception of this study were business managers in the United Kingdom showed a tendency to concentrate on loss aversion rather than risk aversion. Out of the 14 major risk characteristics identified by these managers: the two main concerns involved a behavioral perspective of risk: 1) the potential for incurring a loss in the future; and 2) loss averse behavior (the greater the degree of any possible loss resulting from a decision). The most prevalent conventional viewpoint of risk was associated with the standard deviation of outcomes, which placed a statistically significant 3rd place out of the 14 risk factors.

In a study by the Decision Research, Olsen and Cox (2001) investigated the idea that even if individuals have similar training, professional experience and information; financial professionals still formulate distinctive judgments related to particular cultural differences. This research endeavor concentrated on the notion of gender in which investment professionals have different viewpoints regarding their risk perception and their reaction to risk. A survey was administered to two expert groups in which the questionnaire was filled out by 209 financial analysts and 274 financial planners. The first aspect of the questionnaire was to assess “risk-related attributes.” The authors developed a regression equation in which stock risk was (the dependent variable) and a host of financial risk indicators were explanatory factors for the model. The two most important risks for women were: 1) downside risk (the chance of incurring a large loss) and 2) uncertainty/ambiguity (uncertainty about the true distribution of possible future returns). The two most important aspects for men were: 1) downside risk (the chance of incurring a large loss) and 2) an aspiration level (the possibility of an investment earning less than a target). The second section of the survey had the professionals (rate by risk level) ten actual stocks on a 7-point Likert scale in which the names of the stocks were withheld in order to investigate the notion of familiarity bias. The following three factors: downside risk, variability of return, and ambiguity all play an important role in the risk perception of investment experts. Women professional investors emphasized risk factors including: the downside risk and ambiguity/uncertainty, more
significantly than their male counterparts. Female investors also have a tendency to focus on risk reduction more than male investors in portfolio formation. Whereas, gender differences seem to affect perceptions of risk and advice to clients by investment professionals, these differences usually are likely to be more significant for financial assets and portfolios at risk extremes.

Muradoglu (2001) examined the behavior of individual investors based on the notion of the overreaction hypothesis by performing a controlled experiment. The author based this study on a collection of experiments by De Bondt in 1993; this study extends past research by utilizing real time stock quotes and the use of expert investors (the previous work only sampled student subjects). The author had 35 investment managers and 45 novice student investors evaluate return expectations (predicted stock prices) and risk perceptions for 6 unnamed stocks (alluding to the issue of familiarity bias) from the Turkey stock exchange. Subjects were given point and interval forecasts that presented different forecast horizons within bull and bear markets. The results of the study regarding the factors of expected return and perceived risk were attributed to: 1) the existence of background information; 2) the movements in the financial markets; and 3) the level of expertise of the individual respondent.

Shefrin (2001) conducted several studies over a five year period with the same group of eight stocks on a questionnaire that examined an alternative premise of the risk and return relationship among student or expert investment groups. The author makes the premise that behavioral finance is based on the belief of a negative relationship between expected return and perceived risk (or expected vs. beta). A discussion is made that suggests that investors are dependent on the representativeness heuristic as the main clarification why individuals relate higher perceived returns from safe stocks (lower risk perceived stocks). Shefrin describes safer stocks as “good stocks/good companies” in which persons view higher quality stocks based on such traits as the quality of the stock (i.e. financial soundness) and the perceived goodness of the firm (i.e. management reputation). Shefrin commented:

It is argued that characteristics such as book-to-market equity provide additional information over and above the information conveyed by beta due to the representativeness-based heuristic “good stocks are stocks of good companies”. However, representativeness may lead to erroneous associations between characteristics and realized returns. The author concludes that the biased judgments that investors make about risk and return appear to be robust. (2001)

Diacon and Ennew (2001) investigated the risk perceptions of consumers from United Kingdom for various personal financial products among a collection of behavioral risk characteristics (i.e. many based on Slovic and his co-authors of the Decision Research Group) and financial risk indicators. The authors utilized a questionnaire to six groups at organizational meetings for a total of 123 respondents in order to measure their perceived risk for various financial items. For each of the 20 financial products, the respondent was asked, “Do you own/have owned this product?” in order to assess this potential investment ownership judgment. The 25 risk characteristics were mainly behavioral in nature (i.e. issues of losses, knowledge, time) with a few financial risk indicators. Factor analysis was employed to classify the 25 risk attributes into five main risk dimensions including: mistrust of the investment product or source (i.e. a salesperson), the dislike for adverse outcomes, a distaste to the volatility of a financial product, inadequate knowledge of an financial item, and the failure of regulation accounted for 59.5% of the variance of perceived risk. The authors also explored the notion of an inverse relationship between perceived risk and return (gain). The authors write,

Although investors need to be compensated for some aspects of perceived risk (such as the possibility of adverse consequences and poor information) this does not apply to all dimensions of perceived risk. In particular there is little evidence
that individual investors want compensation for volatility of returns. (Diacon and Ennew, 2001, p.405)

This next study by Diacon (2002) utilized the same collection of 25 risk indicators across the 20 investment products from the previous work by Diacon and Ennew (2001). This endeavor investigated the perceptions of investment risk by expert financial professionals and personal consumers that incorporated a variety of financial services such as retirement plans, savings instruments, banking products, and investment products available to individual savers in the United Kingdom. The author utilized a convenience sample of two research groups (41 experts and 123 novice investors) filled out a questionnaire covering a total of 20 investment products for 25 financial and behavioral risk indicators. The author of this study incorporated many of the behavioral risk attributes based on the earlier study by Slovic, Fischhoff, and Lichtenstein in 1985. A comparative approach was utilized with factor analysis known as the psychometric paradigm method that revealed significant differences between expert and novice investors concerning how investment risks are perceived. Both research groups revealed a similar degree of distaste for volatility pertaining to their perception of risk. The findings from the respondent’s questionnaire showed that novice investors were more loss averse (concerned with losses) than expert investors. However, investment professionals were more exposed to what is known as affiliation bias (the notion of trusting salespeople and suppliers) than consumer (novice) investors, also think that the products are less complicated, and are less pessimistic and suspicious about the safeguards presented by regulators.

In a recent study by Bloomfield and Michaely (2002) conducted two experiments (study#1: included 198 investment bankers, traders, and research analysts and study#2: utilized 25 senior analysts) concerning perceived risk and the mispricing of financial securities among a sample of investment professionals for a specific time horizon (i.e. time factor). These authors investigated the role of how beta, firm size and market-to-book ratios influence expected returns of investment experts regarding how these variables affect perceived risk or mispricing of the value of a stock. The authors with these studies examined the assumptions of both standard finance and behavioral finance schools of thought. The findings revealed the assumptions of standard’s finance of asset pricing models held in pertaining to the positive relationship between risk and return, which expert respondents expected companies with higher betas to be riskier stocks and result in higher rates of returns. Whereas, consistent regarding the tenets of behavioral finance the findings supported the idea that these expert subjects anticipate companies with higher Market-to-book ratios to be riskier and mispriced (overpriced). Further, this sample of professionals revealed larger companies to be less risky, however, they do not believe firm size to be an indicator of mispricing.

Weber, Blais, and Betz (2002) investigated risk-taking behavior across five risk dimensions including: financial, recreational, ethical, safety, and social judgments among a large group of several hundred undergraduate students enrolled in an introductory psychology course for two main studies. The authors utilized the psychometric approach in tandem with a host of multivariate techniques such as factor analysis, regression, and correlations. In Study 1, 560 subjects were asked to assess their perceptions of risk among 101 activities regarding how likely or not they would engage in each risk taking behavior. The two main factors from the study regarding financial behavior were labeled “Financial Gambling Risk” and “Investment Risk” accounted for 3.6% and 4.6% of the variance, respectively. The findings seemed to be dependent in the financial risk construct on whether the respondent classified the activity as to its degree of “controllability.” For the Study 3, 357 undergraduate students were surveyed with a similar approach to Study 1; however, the study was modified to improve the quality of its validity and reliability of the questionnaire. In terms of the financial behavior risk domains were labeled “Financial Investing” and “Gambling” which accounted for 7.6% and 3.7% of the variance related to the 6-factor model.
Forlani (2002) investigated the topic of how business managers take on different degrees and the size of risk in their new business investment decisions. The authors developed a dependent measure based on the individual’s new-product decisions in order to test these two hypotheses:

H1: When perceived control over a decision alternative’s outcome is low, managers in the domain of losses, versus gains, will choose alternatives with larger potential magnitudes of loss, but with similar probabilities of loss.

H2: When perceived control over a decision alternative’s outcome is high, managers in the domain of gains, versus losses, will choose alternatives with more probable losses, but with similar magnitudes of loss. (Forlani, 2002, p.130)

The 45 subjects were provided with a hypothetical case study in which they had assumed the role of a marketing manager for a large manufacturing firm to decide to invest in three different new product innovations. The cases provide specific financial information for each venture and specific risk indicators including: the probability of loss (i.e. the product potential for failure) and disclose the magnitude of loss (i.e. the size of the loss from the project or downside risk). The findings revealed (supported both hypotheses mentioned above) that the subjects’ level of perceived outcome control integrated with the specific decision area to establish subsequent degrees of risk taking that are explicit to each factor of risk.

Dulebohn (2002) examined specific risk characteristics that workers employ when making investment judgments for their employer-sponsored retirement plans. A field survey of college and university employees (795 respondents) were given a questionnaire with a hypothetical situation that requested them to decide on investment of eight allocation alternatives for a fixed sum of $10,000 offered by defined contribution pension plans. The authors employed a collection of 8 main hypotheses and utilized statistical methods such as intercorrelations and regression to test them. The author investigated the importance of specific behavioral and demographic factors regarding an employees' risk taking behavior within three risk constructs: 1) The ability for a person to recover or cover a potential loss (income level, age, and investments in other retirement plans); 2) the persons’ perceived personal control (internal locus of control, knowledge, self-efficacy); and 3) behavioral tendencies (gender, overall risk propensity). The author used two measures for evaluating investment risk: 1) an investment risk level in which respondents had to rate each of the eight options with a risk scale of 1 to 8; and 2) a real loss tolerance that was designed to assess the indicator for each person. The findings identified the main aspects of risky taking behavior for the respondents of retirement plans including: 1) The socioeconomic variables, income level and other retirement plan involvement had a positive association with a persons’ investment risk behavior whereas age revealed an inverse relationship; and 2) The variables dealing with behavioral factors: demonstrated a positive relationships self-efficacy and knowledge of investment principles persons’ risk behavior; lastly overall risk propensity and risk tolerance had a positive association.
6.0 Conclusion

A noteworthy topic within the behavioral accounting and behavioral finance literature is the concept known as risk perception/perceived risk. The author presented a short summary of the concepts of risk, perception, and perceived risk with the financial academic in mind. The next section discussed some of the main topics and ideas within the risk perception literature from psychology, behavioral accounting, and behavioral finance. Hopefully, after reading this review of the risk perception literature, scholars are encouraged to pursue a research path in this subject area since it is gaining wider acknowledgment within the financial world both in academic and professional circles.

Also, this paper presented a systematic review of the literature pertaining to the area of risk perception studies including chronological timelines. The author provided an extensive literature review to the reader (also known as a narrative research review) with a discussion of risk perception studies that cover over 30 years of research from two main disciplines: behavioral accounting and behavioral finance. Since this review of the literature encompassed over 80 academic research endeavors, the author attempted to present various issues from a unique perspective for the finance scholar. The main structure for the narrative research review was a discussion of each study that provided details of the main objective of the study, the type of research group (i.e. experts, novices), the number of respondents or subjects, research design issues, and the main findings. For the sections on behavioral accounting and behavioral finance, the author created a timeline of all the academic studies and then classified each individual research project into specific stages or major trends within the risk perception literature. The narrative research review highlights the main themes, research approaches, and findings from this collection of studies in order to demonstrate the potential and value of conducting future research within this branch of knowledge for behavioral finance scholars.

A central aspect of this paper was to bring together the previous studies in the literature from the three disciplines of behavioral accounting, behavioral finance, and psychology for the purpose of conducting a risk perception study based on the academic foundation of the core themes, research approaches, and findings from this collection of research endeavors. (The author is currently working on this risk perception study for his dissertation.) Since the research studies from behavioral accounting and behavioral finance consist of over 150 accounting, financial, and investment surrogate risk factors the author has developed a structured approach known as the Statistically Significant Method for Risk Perception Studies (Ricciardi 2004). Based on this approach the author has selected the most important financial risk indicators and statistically significant proxy variables from each risk perception study. With the utilization of an 18-step process from the Statistically Significant Method for Risk Perception Studies has resulted in the development of 6 financial risk indicators based on 15 proxy risk measurements from accounting, finance, and investments (Ricciardi 2004). The 6 financial risk indicators are: a company’s balance sheet liquidity, the financial condition (health) of the firm, the degree of volatility, the concern for downside risk in percentage terms, the significance of earnings, and the expected investment performance for the stock.

Whereas, the selection of the 6 behavioral risk indicators and 5 decision making attributes are based on the past findings, main issues, and the emerging topics that could affect a person’s perception of risk. An investment professional’s perception of risk for a stock might be influenced by a combination of several different financial and behavioral risk characteristics. A major source of the selection of the 6 behavioral risk characteristics and the 5 decision-making attributes was based on the narrative review of the 17 works from the risk perception studies in psychology associated with hazardous activities. (The individual narrative reviews of these 17 studies are not provided within this paper.) The selection of the behavioral risk characteristics and
the 5 decision-making attributes were selected from the academic literature in behavioral accounting, behavioral finance and psychology in which the author of this endeavor has created an 11-step process (Ricciardi 2004). The 6 psychological risk indicators are: the role of affect or feelings, the influence of worry, the notion of perceived control, the significance of expert knowledge, the issues of overconfidence, and the concern or potential losses in dollar terms. The 5 judgment attributes are: the role of familiarity, the overall perceived riskiness of a stock, the overall perceived return of a stock, the significance of the investment time horizon (short term vs. long run), and the likelihood of investing in the stock.

On a final note, the behavioral finance researcher should appreciate that the subject of risk perception is based on the notion of an interdisciplinary perspective that incorporates the philosophies from the social sciences and business fields (Ricciardi 2003, 2004). This narrative research review demonstrated an interdisciplinary perspective offered from a wide range of scholars in behavioral accounting, behavioral finance, behavioral economics, and psychology. The true significance of interdisciplinary research is providing scholars in the field a fuller understanding and improved body of knowledge concerning the past, present, and future direction of the risk perception literature from a behavioral and financial perspective. Finance scholars should recognize that a project involving behavioral finance (including the topic of risk perception) and based on an interdisciplinary research presents some unique challenges including:

1. The scholar has to become trained in areas of behavioral research methods and highly knowledge concerning the topics and theories of behavioral finance.
2. This type of research is even more time consuming and requires additional effort than standard approaches within a narrowly focused topic area.
3. The researcher has to be able to contrast the similarities and differences regarding the assumptions, theories, and concepts between standard finance and behavioral finance.
4. Present the material in a manner that a wider audience of finance academics and professionals understand and can replicate it.
5. Lastly, Locker (1994) made the following observation about interdisciplinary research, “When we work in different paradigms, we disagree about what kind of data is relevant, what kind of analysis is convincing, and indeed what research questions are important” (p. 139).
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