

Risk Perception as a Mediator Between Heuristic Biases and Investment Decision Making: Case Study of Pakistan Stock Exchange

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A B S T R A C T

Purpose - The purpose of the study is to investigate the impact of heuristic biases on financial decision-making, particularly focusing on availability bias, anchoring and adjustment, overconfidence, and representativeness. Additionally, the study aims to recommend investment-related policies based on its findings.

Study Design/Methodology/Approach - The study adopts a quantitative approach with correlational research as its methodology. It utilizes a sample size of 343 respondents and employs a structured questionnaire built upon prior studies. Independent variables such as overconfidence bias, representativeness bias, availability bias, and anchoring bias are examined, while the impact of these biases on investment decision-making, considered the dependent variable, is assessed.

Findings- The findings reveal that representativeness and anchoring biases significantly affect risk perception, consequently impacting investment decision-making indirectly. However, the availability bias and overconfidence bias did not demonstrate significant indirect impacts on investment decision-making through risk perception.

Practical Implications- The study suggests implications for enhancing the application of behavioral finance. It recommends future studies to target institutional investors, exploring factors like herd behavior to better understand decision-making processes in finance. These insights can inform the development of more effective investment policies and strategies.

Keywords: Behavioral factor, psychological biases, Heuristic Theory, Risk perception, Investment Decision Making, SEM

1 | INTRODUCTION

1.1 | Background of the Study

In the middle of the 18th century, classical economics started to take shape. During this time, the idea of utility was developed, and it was based on how satisfied a person was utilizing the products and services of other people (Keller, 2015; Pompian, 2011). John Stuart first proposed the concept of "homo economics," or the rational man, in 1844. If a person works to maximize advantages and well-being given their resources, they are fair. Three premises constitute the foundation of the concept of rationality: complete rationality, self-

interest, and perfect information. These three theories are based on the conventional financial framework (Baker & Ricciardi, 2014; Kodres & Pritsker, 2002). This paradigm assumes that everyone acts in the same manner to maximize their benefits.

A major field of academic research is the study of human behavior, and corporate sector managers can use its applications to solve specific issues. The study of psychological characteristics and how they affect financial decisions is known as behavioral finance (Abideen, Z., Zeeshan, A., Huan, Q., & Yiwei Z., 2023). Human psychology serves as the foundation for human desires, ambitions, and motives (Ahmad, 2020). Furthermore, it increases the likelihood of serious errors being made because of cognitive biases, overconfidence, emotions, and heuristics. Behavioral finance was created when psychological explanations of people's behaviour were first offered under neo-classical economics (Ahmad, 2021). An economist who earned the Nobel Prize was the first to understand the concept of restricted rationality in this setting. According to Simon (1955), people do not always make reasonable judgments since their capacity for reason is finite. Kahneman and Tversky (1979), after the basic work of limited rationality, put forth the "prospect theory," which holds that investors employ heuristics to gauge risks and psychological factors to evaluate risky alternatives.

In addition, various psychological biases might result in less logical investing behavior (Abideen et al., 2023; Kahneman & Tversky, 1979). They carried out enlightening research on the misconceptions around hazards involved and decision-making in a dynamic setting. According to conventional finance theories (Kahneman & Tversky, 1984), the findings of these investigations demonstrate variations in the investment choices made by (rational) investors. The foundation for the creation of behavioral finance was provided by classical economic theories, which assert that people behave completely rationally and that capital markets are efficient (Fama, 1970). However, there are various situations when investors' assessments and decision-making are impacted by feelings, emotions, worries, and other psychological factors, causing them to act in ways that are inconsistent with the economic model of total rationality (Ahmed and Noreen, 2021). The behavioral asset pricing model (BAPM) hypothesis, a rival to the mainstream theory, the CAPM, was introduced in 1994. According to the hypothesis, investors furthermore make non-rational investing choices in addition to rational ones. Emotions are constantly taken into account by economists when explaining the trends in the financial markets, and they consistently hold that emotions are a major factor in producing unnecessary and unwelcome price fluctuations (Shefrin & Statman, 1994). A small number of researchers with the aid of several studies (Shiv et al., 2005; Salman et al, 2024) then show the distinctions between rational and partially rational investor actions motivated by behavioral biases. By combining traditional/conventional finance theories with behavioral and psychological conceptions and theories, behavioral finance seeks to provide a rationale for why people don't always act rationally (Phung, 2010; Salman et al, 2024).

Investors' personal emotions and behavioral biases, which drive them to affect share prices by offering some alluring descriptions of the market, may be better understood and dealt with by behavioral finance. These biases significantly affect how individual investors perceive situations and make decisions (Ahmed and Noreen, 2021; Salman et al, 2024). Furthermore, according to Shefrin (2008) and Shefrin & Statman (1994), these biases are capable of affecting portfolio managers and institutional investors. Institutional investors are

essential to the health of stock markets and the reduction of Malaysia's equity imbalance (Wahab, How, & Verhoeven, 2008). According to De Bondt et al. (2008), practical investors are employing behavioral factors to make lucrative investing decisions. These behavioral studies can help investors beat the market. However, the majority of the older behavioral finance research is still being studied in academia.

Investors' future and general quality of life are impacted by the results of their financial actions. De Bondt, Muradoglu, Shefrin, and Staikouras (2008) contend that everyone must eventually learn how to manage their finances. Financial decision-making becomes increasingly challenging as investors and financial professionals must deal with risks, other possibilities, uncertainty, and a changing environment (Lucey & Dowling, 2005; Salman et al, 2024). Alquraan, Alqisie, and Shorafa (2016) performed research in which it was suggested that behavioral finance's influence on decision-making is growing. Early studies did not consider behavioral factors while deciding on investments (Shefrin, 2008). A decision about an investment is based on the investor's past success, predicting market trends, and technical analysis of financial assets, claims Baker & Wurgler (2007) and Bhavani & Shetty (2017).

The relationship between investors' investment choices, risk tolerance, and information asymmetry is only partially mediated by risk perception. The objective of this study is to determine how psychological and social factors influence investors' decisions when those decisions are influenced by risk perception. A survey was sent to each investor who trades on the Pakistan Stock Exchange (PSE) on the PSX. The findings of this study offered statistically substantial support for the hypothesis that the relationship between the components of prospect theory and investment decision-making is mediated by risk perception.

Future investment decisions are highly dependent on investor behavior (Suresh, 2013; Iqbal et al, (2024)). The planned behavior hypothesis is demonstrated in earlier work and is connected to a person's ideas and behaviors (Ajzen, 1991). According to Bansal (2015), investors use their beliefs to forecast the results of their investing actions. Many investors respond negatively to market signals, while others are drawn to favorable indications. After being aware of psychological biases and their impact on selecting stock market investment options, investors are better able to make informed investing selections (Chira, Adams, & Thornton, 2008; Chandra & Thenmozhi, 2017).

1.2 | Problem Statement

Any corporate setting requires decisions to be made. Making the appropriate choice allows an organization to flourish at the right time. Behavioral biases and risky investing decisions, which are impacted by a range of prejudices, are connected by risk perception. The study will focus on particular behavioral elements that influence investor judgment. It takes into account risk perception as a mediating element that affects the interaction between behavioral finance factors and investors' decision-making and is based on the heuristics theory and prospect theory. Regardless of how they assess the connection between risk and investment, investors' attitudes are impacted by how risk is perceived (Slovic, 1987).

There is minimal study on this subject in Pakistan. Moreover, if investment decision-making is centered on investor compliance, profit maximization may be very unexpected and unclear. To comprehend the investor's behavior regarding investment choices on the Pakistan Stock Exchange, it is necessary to address this topic.

1.3 | Research Gap

When an investor invests not only his money but also his time, making investment decisions is a complicated system. The necessity to handle all the factors related to this in any way is frequently paired with risk. Investors will take risks and spend riskily in the zone of caution, such as Pakistan where there is a weak economy and political unpredictability. Decisions are frequently influenced by economic and political conditions, but they also inform us about whether to invest or not since political factors typically have an impact on economic conditions.

Pakistan hasn't been the main subject of earlier research; most academics have mainly looked at other Asian nations, such as China, and have looked at several materialistic and behavioral issues. This study will concentrate on aspects of behavior that are grounded in the prospect theory and heuristic theory, and it will evaluate the function that risk perception plays as a mediator between behavioral finance and the process of making investment decisions. This study, which takes into account risk and other elements that influence investors' choices in Pakistan, will be a milestone for aspirant academics.

1.4 | Research Objectives

The following goals are the subject of the research, stated more explicitly:

- Establish the impact of investor behavior on investment decisions and performance at the Pakistan Stock Exchange.
- To investigate probable behavioral factors that affect investor investing decisions at the Pakistan Stock Exchange, behavioral finding is applied.
- Establish the framework for more behavioral finance research in Pakistan.

1.5 | Significances of the Study

The primary objective of the study is to get a better understanding of psychological and social factors and how they influence investors' decisions in the setting of the Pakistani stock market. In general, this study will assist mutual fund managers, stock market brokers, institutional investors, financial analysts, individual investors, and stock advisers in using such criteria to assist them in making better investment selections. The study's findings will be especially useful to individual investors on the Pakistan Stock Exchange (PSX). Some of the consequences of this research include the following:

The study's findings should interest individual stock market investors. This study adds to existing research on behavioral factors and how investors perceive risk while making investment decisions by demonstrating how it may be used in practical settings.

This study aims to investigate how investor psychology and behavioral traits influence decision-making, as well as how much of a role risk perception plays in that process. The influence on risky decision making is particularly unnoticed by prejudice based on behavioral and cognitive bias.

2 | LITERATURE REVIEW

2.1 | Behavioral Finance VS Conventional Finance Theory

Market efficiency and rationality are the cornerstones of conventional finance theory. These theories aim to provide numerical solutions to problems that occur in daily life (Tekin, 2016; Iqbal et al, (2024)). Examples of such ideas include the 1952 principles of portfolio management by Markowitz, the capital asset

pricing model by Sharpe and Lintner from 1964, the option pricing theory by Merton from 1973, and the 1958 principles of arbitrage by Modigliani and Miller. These schools of view contend that individuals are rational and have access to all the data they require to make decisions. Oprean (2014) investigated both the efficiency of the financial markets and the sanity of investors. According to him, research on financial markets as well as investors uses a range of standard financial theories and models (Zhu & Niu, 2016). Out of all of them, the Efficient Market Hypothesis (EMH) is the theory and model that has attracted the most attention and criticism. According to Kristoufek and Vosvrda (2014), this theory is based on the notion of efficient markets and prudent investor behavior.

Traditional financial theories challenged the notion of efficient markets and logical individuals by failing to account for these psychological aspects and oddities present in the stock markets (Statman, 2014; De Bondt et al., 2015; Iqbal et al, (2024)). Among the oddities that called the concept of reason into question were herd behavior, dotcom bubbles, and real estate bubbles (Khan et al., 2017; Iqbal et al, (2024)). A bubble develops when traders drive up prices above a security's fundamental worth. According to Galariotis, Rong, and Spyrou (2015), the genuine price of the securities differs from the market price. According to Shah, Ahmad, and Mahmood (2018), people purchase expensive assets, violating the efficient market theory. They predicted that prices would increase substantially in the future (Asekome & Agbonkhese, 2015; Rasool & Ullah, 2020). The efficient market theory and the notion of rationality are called into question by such anomalies and illogical behavior (Thakor, 2015).

So instead of only describing past trends, behaviorists must develop models that stress anticipating the influence (impact of behavioral elements) (Bansal, 2015). The most important lesson is that behavioral theories only explain why market prices diverge for extended periods, not how to make effective investment decisions (Humra, 2016; Nouri et al., 2017). In the introductory literature, the evolution of behavioral finance and its role in financial decision-making are covered; this part is organized to cover Simon's (1955) seminal work on the subject. People don't always make sane decisions, he claims. Kahneman and Tversky developed the "prospect theory" in 1979 to increase the scope of behavioral finance's use and relevance. As a result, the historical context and significant developments of behavioral finance theories are covered in this section.

2.2 | Behavioral Finance

Psychologists and behavioral finance theory work together to understand how emotions and cognitive mistakes impact investors' behavior (Kengatharan & Kengatharan, 2014). Research from the past suggests that social science is the cornerstone of behavioral finance. The goal of this research is to better understand how human behavior impacts thinking, cognition, and decision-making. A range of perspectives, expectations, and preferences can affect an investor's decision to invest, according to a behavioral financial study (Smart, Gitman, & Joehnk, 2016). To comprehend that investors' irrational decision-making and risk-taking may result from their belief, interpretation, and partiality, which are the causes of various financial information and decision-making occurrences. This approach is applied in dynamic, uncertain settings when making judgments is both difficult and vital (Shefrin, 2001).

The ideal solution is also determined by using behavioral biases. Kahneman and Tversky were shown to have created the availability bias in 1974 (Kengatharan & Kengatharan, 2014; Kahneman & Tversky, 1979; Bakhsh et al, 2024). In a research, overconfidence was included in a heuristic. Similar to this, several other

variables also affect investors' choices; some of them are included in the study's subsequent sections (Waweru, Munyoki, & Uliana, 2008; Bakhsh et al, 2024; Aziz et al, 2024). Olsen (1998) described behavioral finance as a strategy for understanding the psychology and implications of financial markets. It is a methodical tool for forecasting decision outcomes. In *Behavioral Finance*, published by Belsky in 2010, the psychological and cognitive aspects of financial markets are examined.

2.3 | Heuristic Theory

Heuristics are skills required for the IDM process, according to Gigerenzer and Gaissmaier (2011). Most succinctly, because these judgments are not based on logical thinking, it is impossible to confirm the quality of the information and guarantee that they would produce favorable consequences in advance (Bakar & Yi, 2016). Investors employ heuristics in these situations as a tactic that overlooks some information to make snap judgments in a short amount of time (Gigerenzer & Gaissmaier, 2011). Heuristics improve shareholder competencies and competence, enabling them to make risky IDM decisions (Qadri & Shabbir, 2014). As a result, there has been a rise in the usage of heuristics in IDM (Kahneman & Tversky, 1979; Aziz et al, 2024).

Heuristics are a general rule of thumb that people adopt to guide their judgments in challenging situations. Instead of gathering and analyzing all the pertinent data, investors frequently make illogical judgments utilizing mental shortcuts (Kahneman and Tversky 1979; Manzoor, et al (2023)). People frequently make judgments using heuristics when they are pressed for time. Although heuristics might be helpful when making decisions, they usually result in unwise decisions. A few of the illusions that can arise through the application of heuristics are overconfidence, representativeness bias, anchoring bias, availability bias, and gambler's fallacy bias (Waweru et al. 2008). Three behavioral biases were included in Tversky and Kahneman's initial definition of heuristics from 1974: representativeness, availability, and anchoring. Waweru et al. (2008) introduced the gamblers' fallacy and overconfidence to the list of heuristics (Jain et al., 2021; Manzoor, et al (2023)). The summary of this section defines all biases.

2.4 | Representativeness

Evaluations of representativeness are seen as stereotypes. However, according to Shefrin & Nicols (2014), making decisions as an investor based on your experience is known as a stereotype. On the other side, representativeness bias tends to attribute underperforming initial public offerings (IPOs) to investors' short-term focus (Ritter, 2003). Great organizational traits are directly correlated with great stock features, claim(Lakonishok & Shleifer;1994 Manzoor, et al 2023).

Representativeness bias is referred to as "familiarity bias". When decisions are likely to be based on small samples because of the inherent uncertainty, it involves applying the analogy approach to analyze (Busenitz and Barney 1994). When information is incompletely available, neural connections in the brain use shortcuts to digest it. Experience serves as the basic foundation for information processing. De Bondt and Thaler (1995; Farooq, et al, 2023). claimed that representativeness bias might lead to overreaction, the purchase of hot scripts, and the avoidance of previously underperforming companies by investors.

2.5 | Overconfidence

Particularly when the faith is substantial, subjective faith in one's judgment is more reliable than the appearance of such judgments on the surface. According to Pompian (2012), the overconfidence idea refers to

investors' unwarranted faith in their own innate judgments and cognitive skills. More specifically, when people exaggerate the worth of their abilities, which is a sign of arrogance (Hvide, 2002; Farooq, et al, 2023). Overconfidence is one of the most prevalent cognitive biases. People with overconfidence bias exaggerate their knowledge, reasoning, and information accuracy to attain their goals by minimizing the chance of uncertainties (De Bondt and Thaler 1995). Overconfident investors think their perspective is significantly more trustworthy than other people's (Jain et al. 2019).

2.5 | Anchoring

When making decisions, a person exhibits cognitive distortion by being overly reliant on the information presented at the outset. When investors base their stock evaluations on the original prices, the notion of anchoring is applied. This style of investment decision-making ultimately results in losses (Tversky & Kahneman, 1974). People frequently rely on little pieces of information when making financial decisions, including trading volumes, news, and one-day returns (Andersen 2010). Investors tend to base their investment decisions on meaningless price levels. According to Waweru et al. (2008), this bias leads investors to fix the price based on prior information. Investors could therefore feel pressured to move more rapidly, which might lead them to sell their scripts for less money or buy them at a higher price.

2.6 | Availability Bias

Accessibility Heuristic bias refers to a mental shortcut based on a recent example that enters a person's head while evaluating a certain subject, concept, procedure, or conclusion. When investors make decisions based on readily available information, a phenomenon known as availability bias emerges (Ngo, Khakurel, & Le-Ngoc, 2014). Furthermore, due to the readily available information, investors proposed purchasing shares in local enterprises. As a result, this information causes prejudices (Uddin, et al, 2023). Investors tend to depend on quickly accessible information rather than researching their options (Javed et al. 2017). When decision-makers base their decisions on current events and the readily available information, availability bias is exposed. Recent events, which were intimate encounters, left an indelible impression. It is also expected that these remarkable incidents would be embellished and elicit strong emotions. Due to the information at their disposal, investors frequently make irrational decisions (Uddin, et al, 2023). Investors with an availability bias frequently invest in regional companies and scripts and select stocks recommended by well-known business experts.

2.7 | Investment Decision Making

To generate a profit or maximize their profit, investors put money into a certain enterprise, stock, or other asset. A clear vision and accurate evaluation are necessary for the investment to be most successful. An investor's primary objective is to maximize profit. Knowledge, an independent variable, is the dependent variable in rational decision-making. Therefore, psychological and behavioral elements may have an impact on our decision-making processes (Uddin, et al, 2023)

2.8 | Risk Perception

The perception of investment risk, along with other psychological and cultural factors, is a serious problem. The concept of risk perception in decision-making has developed as a result of the influence of several psychological and social theories and approaches. Every person senses danger differently, either simultaneously or at various times, depending on the situation or specific factors (Slovic, 1971). Risk

perception only partially mediates the relationship between investors' investment preferences, willingness to take risks, and information asymmetry (Uddin, et al, 2023). The results of this study provided statistically significant evidence in favor of the hypothesis that risk perception mediates the relationship between the variables of prospect theory and investment decision-making (Hasan, & Mustafa, 2023).

Assessments of the features and significance of threats are distorted by how they are perceived by people. Perceived risk, according to Ricciardi (2008), is a person's estimation of the risk (the possibility of exposure to loss, harm, or danger) associated with participation in a certain activity. Risk perception is influenced by attitudes, personal convictions, emotions, evaluations, social and cultural standards, and dispositions. The way that equity investors perceive risk has a big impact on the choices they make (Uddin, et al, 2023). As the emphasis shifted from instinct to measures and back again throughout the history of each culture, risk perception has always mirrored the prevailing mood (Bernstein 1995). Only when people feel they have little control over their characteristics can risk-taking lead to unpredictable consequences. Investors frequently feel the want to have control over the return on stock shares.

According to Slovic, Finucane, Peters, and MacGregor (2004) and Cohen et al. (2008), personal mood and lack of experience have a considerable influence on risk perception. For a company they are familiar with, investors are less worried about risk (Singh & Bhowal, 2010). Participants who are male and adults exhibit more optimism and a predisposition to take risks (Rhodes & Pivik, 2011). Riaz & Hunjra (2015) used psychological elements as the independent variable to investigate the mediation role of risk perception. This point of view could be influenced by a variety of things, such as ignorance, worry, and lack of confidence (Deb & Singh, 2018). Investors are also compelled to consider taking on possible risks even when they believe the risk to be modest (Nguyen et al., 2019).

2.8 | Development of the Research Model & Hypotheses

Heuristic Theory (Behavioral Biases) influences how investors make decisions.

Finance professionals have long studied the phenomena of investment decision-making since investors have always found it difficult to assess the factors that form a sound judgment (Saleem, Usman, Haq, & Ahmed, 2018). The decision-making process frequently leads to actions and behaviors. The investor bases their choice on their prior actions and interactions.

Behavioral finance theories are based on cognitive psychology, which claims that several cognitive illusions can influence how people make decisions (Abideen et al., 2023). Cognitive illusions fall into two categories: heuristic-induced illusions, which are a part of prospect theory, and illusions caused through the use of mental frameworks. The current study's objective is to investigate heuristics and ascertain how they influence investment decision-making when risk perception serves as a mediator.

2.8 | Hypotheses on Direct relationships amongst independent and dependent variables:

H1: There is a significant impact of Representativeness on Investor's decisions.

H2: There is a significant impact of Overconfidence on Investor's decisions.

H3: There is a significant impact of Anchoring on Investor's decisions.

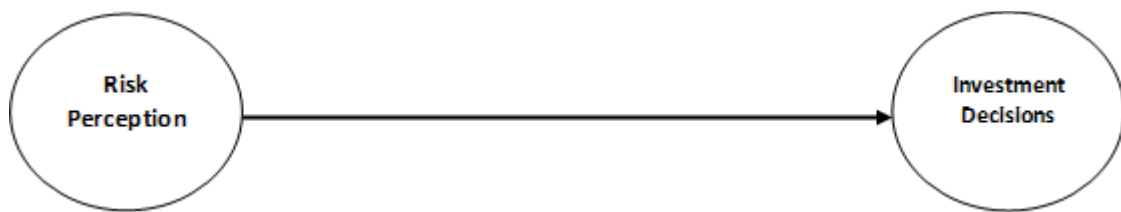
H4: There is a significant impact of Availability Bias on Investor's decisions.

2.8 | Risk perception and investment decision-making.

Investors' opinions are influenced by their perception of risk when assessing historical performance or the correlation between investment risk and other factors (Daskalaki & Skiadopoulos, 2016). The relationship between the concepts of uncertainty and risk influences how seriously an investor takes a risk. Risk cannot exist without insecurity (Daskalaki, Kostakis, & Skiadopoulos, 2014). Although insecurity may be sharply separated from the well-known concept of risks, it has never been fully isolated. In literature, risk is seen as more important than uncertainty (De Bondt, Mayoral, & Vallelado, 2013). The performance of a portfolio can reveal how investors view themselves in cases when they want to invest to preserve their cash out of fear of losing it. In other words, if the result is different from what was anticipated, the risk was not appropriately evaluated.

Figure 1

Impact of Risk Perception on Investors' decisions of investors. Source: Author



2.8 | Hypothesis on Direct relation between mediating variable and dependent variable:

H5: There is a significant impact of Risk Perception on Investor's decisions.

Investment choices and behavioral biases can be mediated by risk perception.

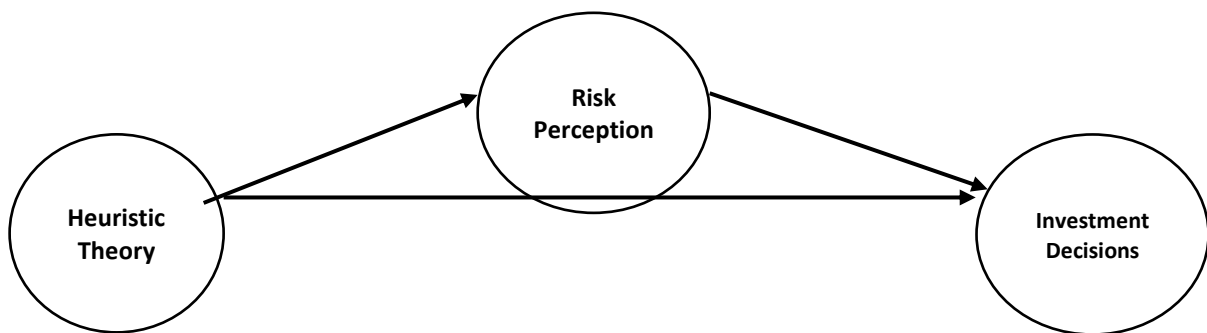
In contrast to risk perception, which only partially mediates the relationship, Riaz and Hunjra (2015) found that risk propensity and information asymmetry are the factors that have the most influence on investors' investment decisions. Risk aversion may operate as a moderating element between investors' actions and behavioral characteristics. Investors benefit from the mediating effects of risk aversion and risk perception (Hunjra & Rehman, 2016; Deb & Singh, 2016). Lack of knowledge, fear, and lack of confidence are a few elements that consistently affect this mentality (Deb & Singh, 2018). Aeknarajindawat (2020) also looked into how risk perception and risk tolerance affected investing choices and discovered a positive correlation between the two.

Risk perception has a considerable impact on individual decision-making, and as a result, the decision-making of equity investors (Pidgeon et al. 1992). Ricciardi (2004) lists several cognitive biases that affect how people perceive danger. Heuristics, overconfidence, prospect theory, loss aversion, representativeness, framing, anchoring, etc. are some of these biases. Several studies conducted in the past have demonstrated that behavioral biases affect investors' perceptions of risk (; Slovic et al. 1982; Russo and Schoemaker, 1992; Barnes 1984). Similar studies have been conducted to support the notion that people's perceptions of risk affect their decision-making (Krueger and Sutcliffe 1994; Bromiley and Curley 1992; Dickson 1994; Keyes 1985). The explanation presented above demonstrates how behavioral biases affect how people perceive risk and how

risk affects people's decision-making. Risk perception shifts from being an independent variable to being a dependent variable in connection to its link with behavioral biases, and vice versa in relation to its relationship with investment decision-making. Since risk perception serves as both a dependent and an independent variable, it is permissible to employ it as a mediator.

Figure 2

Mediating impact of Risk Perception on the Relationship between Heuristic Theory and Investors decisions of investors. Source: Author



Hypotheses on the Impact of Risk perception as a mediator on the relationship between independent and dependent variables:

H6: Risk perception is the mediator between Representativeness and Investor's decisions.

H7: Risk perception is the mediator between Overconfidence and Investor's decisions.

H8: Risk perception is the mediator between Anchoring and Investor's decisions.

H9: Risk perception is the mediator between Availability Bias and Investor's decisions.

3 | METHODOLOGY & DESIGN

3.1 | Research Design

The tests run on the collected data direct the study to certain patterns that aid in the creation of a new hypothesis (Saunders et al., 2016). In this study, a conceptual model is developed using a deductive methodology. The study incorporates current behavioral finance and traditional finance ideas to investigate novel concepts. All the research variables (behavioral factors) have their data collected and coded into numerical values. Structural equation modeling (SEM) has been used to examine the theories that have been provided.

3.2 | Data Collection

The process of gathering essential data and turning it into useful knowledge is a crucial part of doing research. The type of data needed for the underlying study will depend on the objectives of the investigation (Bryman & Bell, 2009). This study mainly depends on the primary information gathered from the investors in PSX via a predesigned questionnaire since its goal is to assess the hypotheses put forth based on the grounds. The researcher gave each PSX investor a self-administered questionnaire and asked them to fill it out.

3.3 | Research Sampling Techniques

Purposive sampling is used to gather the sample needed for this inquiry. Since investors are more likely to be familiar with the application of behavioral theories in decision-making and psychological considerations, this study focuses on investors rather than day traders. Since the target population of the current study is the individual investors of the Pakistan Stock Exchange, who are dispersed throughout numerous stock exchange brokerage organizations, purposeful sampling is a legitimate strategy for choosing the sample.

3.4 | Study Sample and Sample Size

The study's sample is the population under investigation, and its conclusions apply to the entire population. The findings have an impact on the population. The data were gathered using the nonprobability convenience sampling approach. The ability of this method to save time and money was one of the factors that went into the decision (Bryman & Bell, 2015). The sole dependent variable in this study that is a (01) is Investment Decision Making (IDM). The only (04) independent components are availability bias (AB), anchoring bias (ACB), overconfidence bias (OB), and representativeness bias (RB). The sole (01) mediating variable is risk perception (RP).

3.5 | Data Collection Method

Investors in the PSX who trade on the Pakistan Stock Exchange (PSE) were each handed a questionnaire. A total of 343 questionnaires were distributed to the targeted respondents. The questionnaire was distributed to the target respondents who agreed to participate in the study. Most investors committed to the following day; thus, the questions were filled out by the respondents the following day. Other respondents finished the questionnaire on the same day, while others did not. Calculate the respondent's response using a Likert scale. The Likert scales go from 1 (Strongly Disagree) to 5 (Strongly Agree), with 1 being the opinion that is most strongly opposed.

3.6 | Techniques for Data Analysis

In the first study, which made use of validity and reliability testing, a structural equation model (SEM) with underlying ideas and concepts served as the analytical model. Utilizing structural equations that can simultaneously test measurement models and structural models using the SmartPLS program. The best approaches for this sort of study are those that were recommended by Markus (2012) and Nachtigall, Kroehne, Funke, & Steyer (2003) to analyze the data.

4 | RESULTS and ANALYSIS

4.1 | Measurement Model Analysis

A model that specifies the links between each block of indicators and their latent variables and has convergent validity, discriminant validity, and composite reliability is then used to assess the precision of tools and the validity of concepts.

4.2 | Convergent Validity

Validity testing relates to the premise that structural indicators and load factor indicators in PLS should have a high degree of correlation. The significance of the factor loading in explaining the factor matrix increases with its magnitude. Both the loading factor value and the AVE value must be larger than 0.7. The output of the SmartPLS Outer loading is shown in Figure 3.

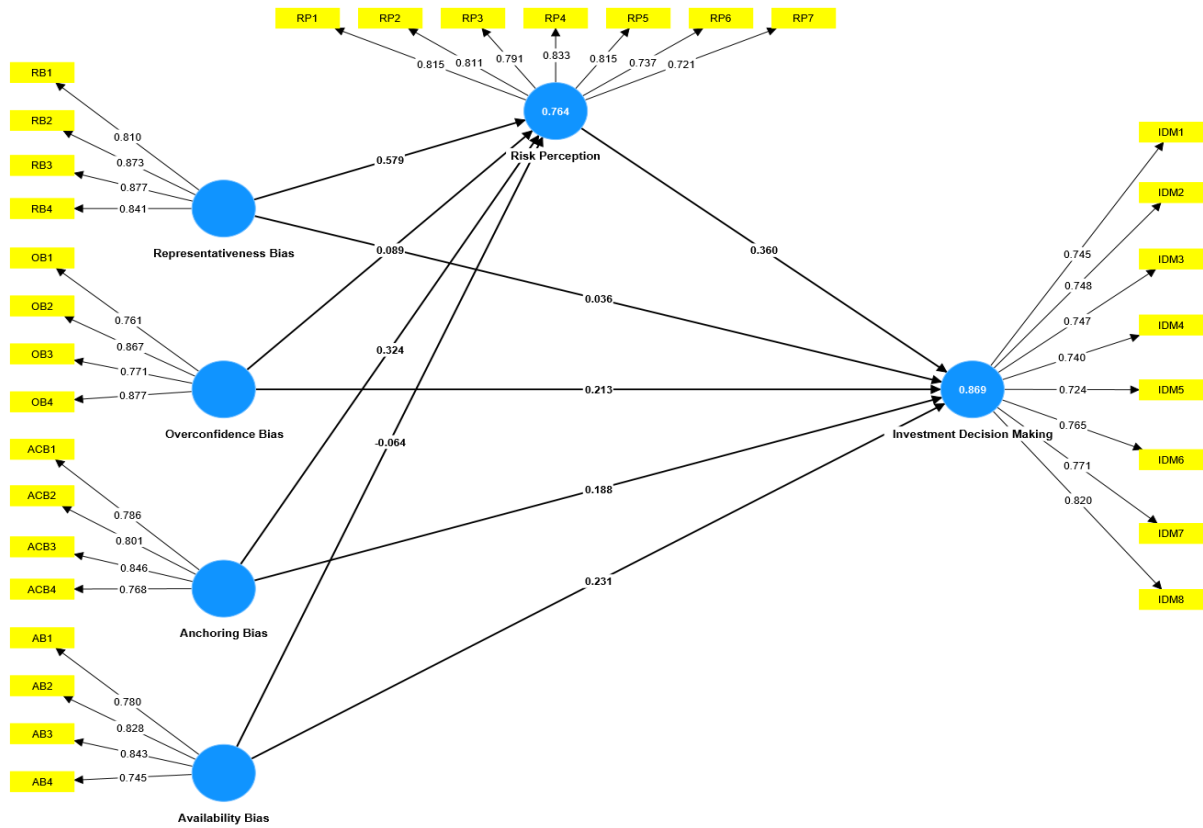
Figure 3*Outer Loading*

Figure 3 displays Outer loading results showing that every indication has a value greater than 0.7, indicating that every indicator is valid.

Table 1

Construct Reliability, AVE, Outer Loadings, and Cronbach's alpha

Cronbach's alpha	Composite Reliability	AVE	Outer Loadings	Items	Construct
0.872	0.913	0.723	0.810	RB1	Representativeness Bias
			0.873	RB2	
			0.877	RB3	
			0.841	RB4	
0.839	0.892	0.674	0.761	OB1	Overconfidence Bias
			0.867	OB2	
			0.771	OB3	
			0.877	OB4	
0.814	0.877	0.641	0.786	ACB1	Anchoring Bias
			0.801	ACB2	
			0.846	ACB3	
			0.745	AB1	Availability Bias
			0.780	AB2	
			0.828	AB3	
			0.843	AB4	

			0.768	ACB4	
			0.780	AB1	
0.813	0.877	0.640	0.828	AB2	Availability Bias
			0.843	AB3	
			0.745	AB4	
			0.815	RP1	
			0.811	RP2	
0.899	0.921	0.624	0.791	RP3	Risk Perception
			0.833	RP4	
			0.815	RP5	
			0.737	RP6	
			0.721	RP7	
			0.745	IDM1	
			0.748	IDM2	
			0.747	IDM3	
0.894	0.915	0.575	0.740	IDM4	Investment Decision Making
			0.724	IDM5	
			0.765	IDM6	
			0.771	IDM7	
			0.820	IDM8	

According to Table 1, the AVE value is higher than 0.5, Cronbach's Alpha is higher than 0.50, and Composite Reliability is higher than 0.70. Construct reliability and validity criteria also show that they are dependable and valid.

4.3 | Discriminant Validity

According to the recommended model measurement analysis findings, which can be summarized based on their factor estimates and statistical significance, the three constructs are all valid measurements of their respective individual constructs. The measurement model created appropriate reliability and validity requirements to be used in the actual data collection stage.

Table 2

Fornell-Larcker Criterion

Variables	ACB	AB	IDM	OB	RB	RP
Anchoring Bias	0.801					
Availability Bias	0.817	0.800				
Investment Decision Making	0.854	0.828	0.758			
Overconfidence Bias	0.786	0.760	0.832	0.821		
Representativeness Bias	0.763	0.757	0.825	0.777	0.851	
Risk Perception	0.782	0.706	0.860	0.744	0.846	0.790

The Fornell-Larcker criteria in Table 2 dictates that the square root of the average variance extracted for each construct (AVE) must be greater than the correlations between the construct and other constructs. The

Fornell-Larcker criteria are met by all of the constructs in the table because their average variance extracted (AVE) values are higher than those of their correlations with other constructs. The conditions are specifically satisfied by the following biases: risk perception (AVE = 0.790), overconfidence (AVE = 0.821), availability (AVE = 0.800), investment decision-making (AVE = 0.758), and anchoring (AVE = 0.801). Thus, the constructs' validity and uniqueness in the analysis are supported by this evidence that they are distinct from one another and are legitimate. This proves the reliability and distinction of the constructions. In other words, this supports the legitimacy of the research of those conceptions and demonstrates how unique from one another they are.

4.4 | Structural Model

The relationship between the constructs in the structural model is assessed by comparing the dependent construct, the path coefficient value, or the t-value for each path using R2. The production model is more accurate when R2 is larger since it assesses how much the free variable deviates from the bound variable.

Table 3

R-Square

Variables	R-square	R-square adjusted
Investment Decision Making	0.869	0.867
Risk Perception	0.764	0.761

Investment Decision Making has an R2 score of 0.869. This suggests that 86.9% of the variance in investment decision-making may be accounted for by the independent variables in the regression model. The adjusted R2 value for Investment Decision Making, which takes into account the sample size and the number of predictors, is 0.867. The adjusted value, which is more conservative, is frequently used to assess the model's goodness of fit. It implies that the predictors may explain around 86.7% of the variance in investment decision making when model complexity and sample size are taken into consideration.

For the variable Risk Perception, both the R2 and adjusted R2 values are 0.869. The adjusted R2 value remains the same because the model's complexity and sample size have not changed, demonstrating that the model's predictors can explain 86.9% of the variance in risk perception. Together, these high R2 values show that the regression model, which takes into account risk perception and investment decision-making as predictors, does a good job of describing the variation in each of these variables.

4.5 | Testing Hypothesis

The relationship between the underlying idea and the guiding process, or the degree of influence, is shown by the route coefficient. By comparing statistical values of t with values from t-tables, this approach aims to determine whether exogenous variables impact endogenous variables.

Table 4*Direct Effect*

Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Decision
Anchoring Bias → Investment Decision Making	0.117	0.115	0.030	3.883	0.000	Supported
Availability Bias → Investment Decision Making	-0.023	-0.024	0.025	0.914	0.361	Not Supported
Overconfidence Bias → Investment Decision Making	0.032	0.035	0.032	0.991	0.322	Not Supported
Representativeness Bias → Investment Decision Making	0.208	0.207	0.035	5.897	0.000	Supported

As seen in Table 4 above, the Anchoring Bias and Representativeness Bias are both supported by statistical evidence and are statistically significant with t- t-statistics values of 3.883 and 5.897, respectively, and p-values of 0.000 for each. On the other hand, the Availability Bias and Overconfidence Bias are not statistically significant and are not supported since; both the t-statistics value and the p-value are 0.914 and 0.361 for the first case, and 0.991 and 0.322 for the second.

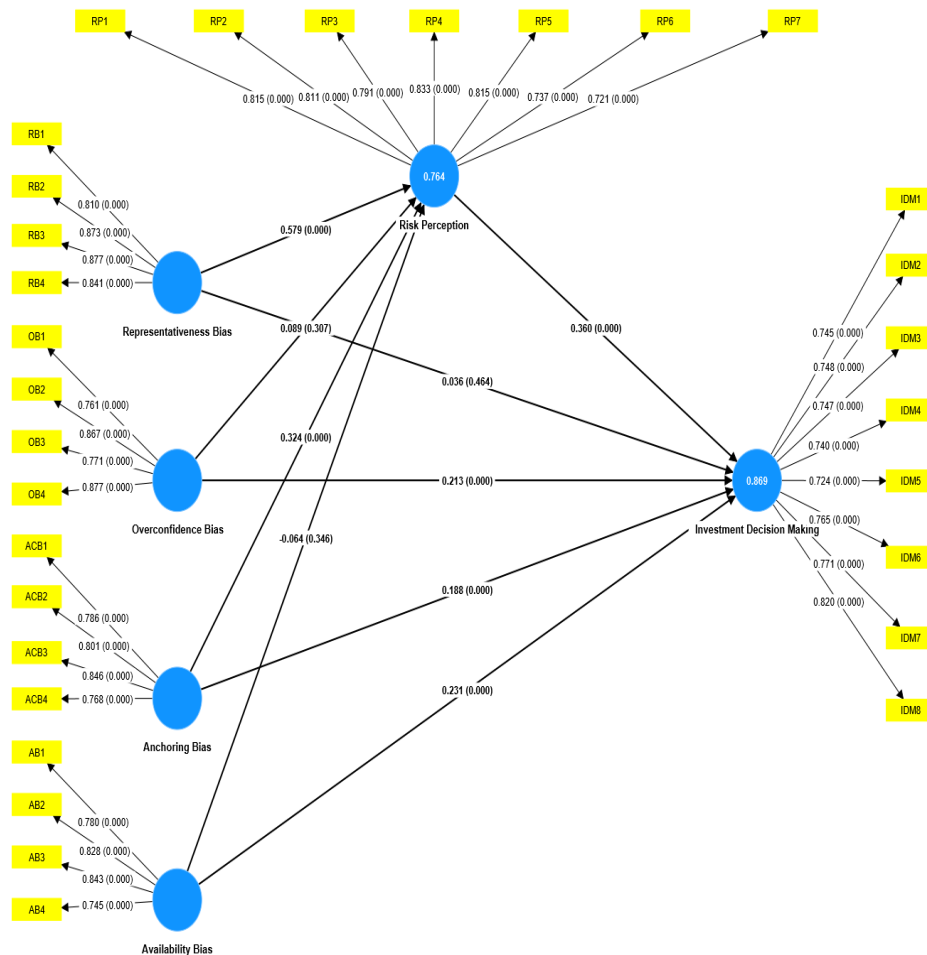
Figure 4*Structural Model*

Table 5*Indirect Effect*

Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values	Decision
Representativeness Bias → Risk Perception → Investment Decision Making	0.208	0.207	0.035	5.897	0.000	Supported
Anchoring Bias → Risk Perception → Investment Decision Making	0.117	0.115	0.030	3.883	0.000	Supported
Availability Bias → Risk Perception → Investment Decision Making	-0.023	-0.024	0.025	0.914	0.361	Not Supported
Overconfidence Bias → Risk Perception → Investment Decision Making	0.032	0.035	0.032	0.991	0.322	Not Supported

The notion that there is a mediating influence on the association between the variables from the heuristic theory and investment decision making is supported by the fact that all the p-values are below the significance threshold of 0.05. According to the indirect effect shown in Table 5 above, which takes into account representativeness bias and anchoring bias, risk perception has a mediating impact on investment decision-making. The p-values for each are all greater than the significance level of 0.05, making them statistically unimportant and unsupported, yet it has been shown that in the setting of Availability Bias and Overconfidence Bias, risk perception has no mediation effect on investment decision making.

5 | DISCUSSION AND CONCLUSION

The study aimed to explore the role of risk perception as a mediating factor in the relationship between psychological and social factors and investors' investment decisions. The study found that by affecting how risk is perceived, both the representativeness bias and the anchoring bias have indirect implications on investment decision-making. This suggests that persons who are affected by these biases tend to perceive risks in a way that influences their decision to invest. However, the indirect effects of the availability and overconfidence biases on risk perception throughout the investment decision-making process were not supported. This implies that these biases could not significantly influence how individuals perceive risk, which may limit how they influence investment decisions. The findings are confirmed by earlier research and behavioral finance theories, including the prospect theory and the heuristic theory proposed by Kahneman and Tversky in 1979. By employing risk perception as a mediator, the current study clarifies the findings of direct as well as indirect effects of psychological and social factors on investment decisions supported by Slovic (1987). Prior studies by Akhtar & Batool (2012) and Lu et al. (2013) indicate that risk perception has a big influence on how investors make decisions. Investors are influenced by psychological and cultural aspects when making decisions or investments if risk perception is seen as a subjective issue (Slovic et al., 1982;

Slovic, 1987). It has been established that behavioral traits have a considerable impact on risk perception (Hallahan et al., 2004).

5.1 | Recommendation

Investors are given recommendations based on the findings to assist them in selecting PSX more wisely. Investors are recommended to consider sociological as well as psychological factors while investing. The results of this study are particularly useful for individual investors, financial advisors, and fund managers in Pakistan and other developing countries where investors are less conscious of behavioral biases and where markets are not fully efficient.

5.1 | Future Research Directions

Investors are advised by the study's findings to take advantage of behavioral factors that influence decision-making favorably while avoiding those that do not. This study has certain limitations; however, these might be addressed in further research investigations with the addition of new dimensions. Future research must be done on this topic because this study demonstrates that overconfidence has little influence on corporate decision-making. In addition, more study has to be done on the effects of other factors, other than overconfidence, that are connected to a person's behavior when he or she decides whether to invest in a certain organization. Through experimental methods and microfinance, behavioral finance could one day be enlarged. Future research may potentially employ institutional investors as the target population to look at herd behavior and other important factors influencing decision-making to expand the use of behavioral finance.

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