ISSN Online: 3006-4708
SOCIAL SCIENCE REVIEW ARCHIVES ISSN Print: 3006-4694
https://policyjournalofms.com

Risk Perceptions as a Mediator in Behavioral Biases and Investment Decision Making: Evidence from Pakistan Stock Exchange (PSX)

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Abstract
The study examined the mediating role of risk perception in relationship of behavioral biases and investment decision making among investors of Pakistan Stock Exchange (PSX). Based on the direct and mediating relationships, ten hypotheses were developed and tested. The respondents of the study included 268 randomly selected investors engaged in trading of stock in PSX. We collected data from the respondents using a survey questionnaire that measured disposition effect bias (6 items), herding bias (7 items), blue chip stock (5 items), risk perception (6 items), and investment decision (3 items). Data were analyzed using SPSS Version 23 through Hayes' Process Macro. Results of linear regression analysis revealed a significant positive relationship of behavioral biases with risk perception and investment decisions. The results also revealed a positive relationship of risk perception with investment decisions. Further, the study revealed that risk perception fully mediated the relationship of behavioral biases and investment decisions. Based on the findings of the study, we offered recommendations and directions for further research.

Key Words: Disposition Effect, Herding Behavior, Blue Chip Stock, Risk Perceptions, Investment Decision

Introduction
During the last two decades, decision making in uncertainty has acquired substantial attention of the behavioral finance researchers. The investment choices of the investors are largely affected by the behavioral biases. Conventional financial theories posit that rational decisions are made by the investors to maximize utility on the basis of available information (Almansour, Elkrghli, & Almansour, 2023). However, evidences propose that financial decisions are also made by them employing the cognitive factors instead of rationality. Consequently, behavioral finance as a new domain of finance emerged that combined psychology and economic models for the understanding of financial decision making under uncertainty (Kengatharan & Kengatharan, 2014). More specifically, decision making under uncertainty in the emerging markets has acquired more relevance (Aeknarajindawat, 2020). Unlike the developed markets, emerging markets such as Pakistan Stock Exchange (PSX) are characterized by greater information asymmetry, high volatility and less liquidity that may exacerbate the effect of behavioral biases (Riaz & Hunjra, 2015). Thus there is a dire need to examine the influence of behavioral biases on the investors' investment choices in the context of PSX.
Although empirical evidences depict the predictive ability of behavioral biases for investors' investment choices, we found that there are certain mediating mechanisms that explain the

relationship of behavioral biases and investment choice. One such mechanism identified by Hasan and Mustafa (2023) is risk perception. They reported that the effect of cognitive and behavior biases on investment decision may be channeled through the risk perception of investors. They further explained risk perception as the value judgment of investors towards the risk possibility and intensity. While examining the antecedents of risk perceptions, it was found that certain behavioral biases such as such as blue chip stock, herding bias and disposition effect may predict risk perception. According to Braga & Fávero (2017), disposition effect is promptly sell the winning stocks and hold the losers by the investors. The intention behind this tendency of investors is to maximize their gains and to minimize the loss. Herding is the tendency of the investors to follow the competitors possessing the information of market trends to make investment choices (Huang, Wu, & Lin, 2016). Following the knowledgeable competitors help the investors to make investment choices that help them maximize their profit and minimize the potential losses. Blue chip stock is investing in the stable firms' share that are characterized long held history of consistent profit and greater financial performance (Baghestani, Arzaghi, & Kaya, 2019).

Empirical evidences suggest that socio-cultural and economic landscape of Pakistan Stock Exchange offers a fertile ground to investigate the behavioral biases and investment decision making (Ahmed, Rasool, Saleem, Khan, & Kanwal, 2022). Factors such as financial literacy of the investors, financial practices, business regulations, market structure and market trends are significant factors that affect the choice of behavioral biases among the investors (Hasan & Mustafa, 2023; Riaz & Hunjra, 2015). Further, investment choices of the investors may also directly and indirectly influenced by the behavior biases through the potential mediating factors such as level of risk perceptions. Hence, it would be insightful to have an understanding of the relationship of behavioral biases, risk perceptions, and investment decisions in the context of Pakistan Stock Exchange.

Literature Review and Hypotheses Development

Behavioral Biases and Investors' Decision Making

Behavioral biases has acquired substantial attention during the recent years due to their predictive ability for investment decision making in general and especially in the wake of irrationality (Ainia & Lutfi, 2019). Empirical evidences suggest that overreliance on the disposition bias leads to missing the opportunities (Braga & Fávero, 2017). Consequently, investors may engage in suboptimal portfolio that in turn may adversely affect the overall performance of the stock (Zahera & Bansal, 2018). However, extant literature suggests that market downturns and bubbles can be mitigated through disposition effect (Christoffersen & Stæhr, 2019; Sudirman, Irwanto, & Basuki, 2017). It is instrumental in managing the risk associated with investment in winning stocks and creating an established and stable financial market. Moreover, disposition effect increase the confidence of the investors and reduce the psychological toll that swings in the market take (Mittal, 2022). This study posits and hypothesizes that;

H1: Disposition effect positively affects investment decision making of the investors.

Investment decision making process is largely influenced by the behavioral biases (Shah et al., 2017). Studies suggest that investment decision in the wake of uncertainty are made keeping in view the strategies of other investors who possess more information (Riaz & Hunjra, 2015). This imitative behavior of individual investors is referred to as herding behavior (Kim & Ryu, 2021) that is reflected in bull and bear trend of market (Zahera & Bansal, 2018). Regardless of the adverse outcomes of herding behavior as documented by Halim and Pamungkas (2023) and Christoffersen and Stæhr (2019), studies suggest that herding bias is instrumental in mitigating the stress and anxiety associated with investment decision making especially during the wake of uncertainty among the investors (Arlen & Tontrup, 2015) as it leads to less risky decisions and fosters profitability (Halim & Pamungkas, 2023) as well as stability (Arlen & Tontrup, 2015). Similarly, imitating the herd helps the investors diversify their portfolio by creating

more opportunities in the stock markets (Christoffersen & Stæhr, 2019). Portfolio diversification therefore can increase the profitability and reduces the risk associated with investment. Based on these arguments, we may hypothesize that;

H2: Herding behavior positively affects investors' investment decision making.

The investors always tend to invest in stocks that are stable, well reputed, profitable and less riskier while making their investment decision (Shiva & Singh, 2020; Baghestani et al., 2019) to mitigate the fear of possible losses (Handayani et al., 2019). Further, investing in such stocks also help them seek the benefit of persisted price hiking in the financial market (Lubis, 2021) as these firms are characterized by potential growth and lesser risk (Handayani et al., 2019; Ali & Rehman, 2013). We are aware that stable nature of blue chip firms build the confidence of investors in them and can curtail associated risk (Lubis, 2021). The stable nature of blue chip stocks increases their resilience (Shiva & Singh, 2020), reduces the volatility as well as portfolio risk (Handayani, Farlian, & Ardian, 2019). Further, blue chip stocks are also resilient to the frequent market fluctuations thereby reducing risk of loss (Shiva & Singh, 2020). This discussion help us hypothesize that;

H3: Blue-chip stock positively affects investors' investment decision making.

Risk Perceptions and Investment Decision Making

Risk perception has acquired substantial attention in the behavioral finance literature as it predicts the investment behavior of the investors (Bhatia et al., 2020; Ainia & Lutfi, 2019). It has been empirically established that risk avoidance is directly related to lower returns while high risk is associated with high returns (Almansour et al., 2023). When perceived risk is high, the investors tends to make wiser and successful investment decisions as demonstrated by Mallik et al. (2017) and Kengatharan & Kengatharan (2014). Financial behavior of the investors is predicted by the risk perceptio that in turn shapes the investment choices (Ahmed, et al., 2022).

In the context of PSX, extant literature suggests that behavioral biases strongly predict the investors' risk perception (Ahmad & Shah, 2020) that consequently shape the investment choices of investors (Ali & Rehman, 2013). Moreover, socio-economic and cultural factors like also predict the affect risk perceptions of investors which in turn influence investors' investment behavior (Riaz & Hunjra, 2015). In view of these arguments, it may be hypothesized that;

H4: Risk perception positively affects investors' investment decision making.

Behavioral Biases and Risk Perception

We have sufficiently debated over the predictive ability of behavior biases in predicting investment decisions and risk assocaited with these choices. It has also been explained by Kahneman & Tversky (1979) who suggested the behavioral biases shape the investment behavior of investors that can be explained through their prospect theory. In an instance, disposition effect explain how investors prefer to promptly sell their winning shares and retain the losers for a longer tenure to avoid risk associated with trading of the stock (Combrink & Lew, 2020). Studies suggest that investors tends towards the disposition effect especially while making short term investment decisions instead of long-term with an aim to earn profit from the winning stocks by avoidance of prospective investment risks (Baker, et al., 2019). Empirical evidences suggest that professional and non-professional investors perceive risk differently while making investment choices (Singh, 2019). Professional investors exhibit higher risk perceptions to acknowledge losses as compared to the non-professional investors (Ahmad & Shah, 2020). Studies suggest that PSX is characterized by high volatility, investors prefer to quickly sell the winning stocks that have gained value and retain the losing stocks (Riaz & Hunjra, 2015). Based on these arguments, it is hypothesized;

H5: Disposition effect bias positively affects investors' risk perceptions.

The perceived risk associated with stock returns gives rise to herding behavior (Shah et al., 2017), a majority of the investors prefer to go with the flow or conform to overconfidence biases (Halim & Pamungkas, 2023). The risk avoidance behavior among investors with low-risk propensity give rise to this bias (Purwidianti et al., 2023). Investors lacking personal information and knowledge of market trends tends to rely on the information of other groups and follow these groups to make investment choices (Ahmad et al., 2022). Empirical evidences suggest that leading stock markets are largely characterized by herding. Bhatia et al. (2020) suggest herding behavior becomes widespread during the financial crises as well as uncertain or risky times. In developing markets such as PSX, herding behavior significantly reduces the perceived risk (Ahmad et al., 2022) associated with investment choices of the investors. Based on these arguments it is hypothesized that;

H6: Herding behavior positively affects investors' risk perceptions.

It is a common tendency of the investors that they prefer to invest in shares of established and financially stable to maximize their return on investments (Ahmad et al., 2022) as lower risk is associated with the stocks of these firm. The investors also prefer these firms because of the lower volatility contrary to the other investment options (Almansour et al., 2023). The confidence of the investors in blue chip firms is boosted due to their stability and reliability there by mitigating the perceived risk (Shiva & Singh, 2020; Combrink & Lew, 2020).This study posits and hypothesizes that;

H7: Blue Chip Stocks positively affects investors' risk perceptions.

Risk Perceptions as Mediator of Behavioral Biases and Investment Decisions

Behavioral biases in financial decision making has acquired substantial attention of the researchers (Braga & Fávero, 2017). Studies have examined the direct influences of behavioral biases on the investment decisions of investors. However, there are certain studies that suggest that effect is mediated through certain cognitive factors such as risk perceptions especially in the context of Pakistan (Parveen, et al., 2023). More specifically, influence of disposition effect on investors' investment choice is largely affected by the cognitive factor such as risk perceptions (Madaan & Singh, 2019). Investors may prefer quickly selling winning stocks to secure gains and avoid potential losses, thereby intensifying the disposition effect. (Ahmed et al., 2022).

H8: Risk perceptions mediates the relationship of disposition effect and investors' investment decisions.

Empirical evidences suggest that herding behavior may significantly influences investment decisions (Halim & Pamungkas, 2023). They may tend to imitate the market leaders possessing sufficient knowledge of the market trends. Studies suggest that in collectivist culture of Pakistan, the behavior may be found widespread (Ali & Rehman, 2013). Further, the effect of this herding behavior on investment choices may be channeled through cognitive factors such as risk perceptions. The investors assess how risk of deviating from the group behavior may influence the investment behavior. The perceived risks of deviating from the norm can influence the fear of missing out or the anxiety of making unconventional decisions (Shefrin & Statman, 1985). The herding behavior is ignited among the investors due to informational cascades as well as reduced perceived risks regardless of the irrationality.

H9: Risk perceptions mediates the relationship of Herding behavior and investors' investment decisions.

Another bias that may largely influence the investment behavior of the investors is their tendency to invest in blue chip firms. These firms are characterized by financial stability, profitability and consistent financial performance (Lubis, 2021). These characteristics serve as a preferred investment choice of investors while making investment decisions. Empirical evidences suggest that overconfident investors are more likely to demonstrate blue chip stock

bias whereas high-risk perception investors are less likely to exhibit this bias (Ahmed et al., 2022; Shiva & Singh, 2020). However, this tendency towards blue chip stock in making investment choices may be influenced by cognitive factors such as risk perceptions (Ahmed et al., 2022). The brand reputation along with risk perception are thus an important factor that may influence the investment behavior of the investors (Hau, 2001). Thus, risk perception may function as a mediating factor in blue chip stock bias and investment behavior (Baghestani, et al., 2019). We can thus hypothesize that;

H10: Risk perceptions mediates the relationship of Blue chip stocks and investors' investment decisions.

Theoretical Framework and Research Model

The study is based on the Prospects theory of Kahneman & Tversky (1979) that delves into the novel relationship of behavioral biases, risk perceptions and investment behavior of investors. This theory helps us understand the the direct and mediating effect of behavioral biases on investment behavior through risk perception. Prospects theory suggest that perceptions of losses and gains are different for individuals that may cause them to behave differently when it comes to taking risks based on how those outcomes are framed (Kahneman & Tversky, 1979). This theory also explains tendency of investors toward risk avoidance, manifesting their inclination quickly sell winning stocks and to retain losing ones (Shefrin H. , 2008). It also explains how following the group behavior influences their investment choices. Prospects theory also explains how the stability and consistent financial performance of the firm affect investors' perception of risk and their investment choices.

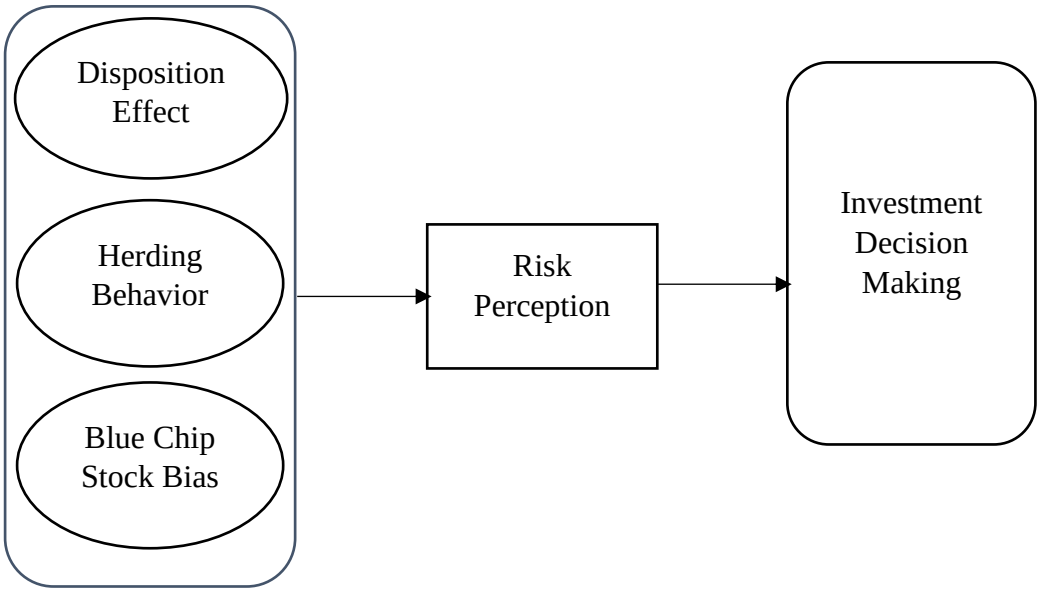

Figure 1: Research Model

Methods

Participants: The respondents of this cross-sectional study were 268 randomly selected investors engaged in trading of stock in PSX. The respondents completed a survey questionnaire that sought information about demographics of the respondents and their perceptions about the major variables of the study. The responses were anchored as Strongly Agreed=5 and Strongly Disagree=1.

Instrument: Disposition effect bias was measured using 6 items scale developed by Pompian (2011). Herding bias was measured through a 7 items scale developed by Kengatharan & Kengatharan (2014). Blue chip stock bias was measured using 5 items scale developed by Pompian (2011). Risk perception was measured using 6 items scale developed by Saqib &

Shama (2016). Investment decision was measured using 3 items scale developed by Waweru et al. (2008).

Results and Discussion

Response Rate

We administered 300 questionnaires to the stock exchange investors of PSX out of which 280 were returned giving 93% response rate. We exclude 12 incomplete questionnaires leaving behind 268 workable questionnaires and response rate was reduced to 89% which was quite satisfactory as similar studies of Asadullah et al. (2022) reported response rate of 81%.

Table 1: Demographics of Respondents

	Description	Frequency	Percent
Gender	Male	194	72
	Female	74	28
	Total	**268**	**100**
Age	20-30	60	22
	31-40	81	31
	41-50	58	21
	Above 50	69	26
	Total	**268**	**100**
Qualification	Up-To 12 Years	90	34
	14 Years	135	50
	16 Years or More	43	16
	Total	**268**	**100**
Experience	1-5 Years	135	50
	6-10 Years	97	36
	11-15 Years	24	9
	More than 15 Years	12	5
	Total	**268**	**100**

Table 1 above shows that 194 (72%) out of 268 of the respondents were male while 74 (28%) of them were females, clearly showing that male dominated the population. As far as age of the respondents is concerned, sample represented fairly all the age groups. Major part of the sample (50%) possessed 14 years of education. Similarly, major part of the sample (50%) possessed 1-5 years of experience in stock trading.

Table 2: Factor Loadings, CR and AVE

Constructs	Items	Loading	Cronbach's Alpha	CR	AVE
Disposition Effect (6×items)	DE1	.843	0.97	0.95	0.74
	DE2	.864			
	DE3	.903			
	DE4	.846			
	DE5	.843			
	DE6	.875			
Herding Behavior (7×items)	HB1	.882	0.98	0.96	0.78
	HB2	.873			
	HB3	.916			
	HB4	.887			
	HB5	.860			
	HB6	.906			
	HB7	.853			
Blue Chip Stock (5×items)	BCS1	.911	0.95	0.95	0.81
	BCS2	.909			
	BCS3	.851			
	BCS4	.906			
	BCS5	.909			
Risk Perceptions (6×items)	RP1	.850	0.98	0.94	0.72
	RP2	.848			
	RP3	.845			
	RP4	.858			
	RP5	.854			
	RP6	.850			
Investment Decision (3×items)	ID1	.663	0.79	0.78	0.54
	ID2	.779			
	ID3	.753			

DE=Disposition Effect, HB=Herding Bias, BCS=Blue Chip Stock, RP=Risk Perception, ID=Investment Decision

Table indicates strong construct validity by suggesting that the items are appropriately associated with their respective constructs. Furthermore, the constructs exhibit strong internal consistency reliability and adequately account for variance in the observed variables.

Table 3: Model Fitness

Model	Chi-Square	DF	CMIN/df	GFI	TLI	CFI	RMSEA
Default Model	706	294	2.398**	0.948	0.957	0.964	0.07

Table 3 depicts that all the fit indices are within the specified threshold. GFI (0.948>0.95), TLI (0.957>0.95) and CFI (0.964>0.95) and RMSEA (0.07<0.08) fulfill the criterion for a good model fit (Collier, 2020).

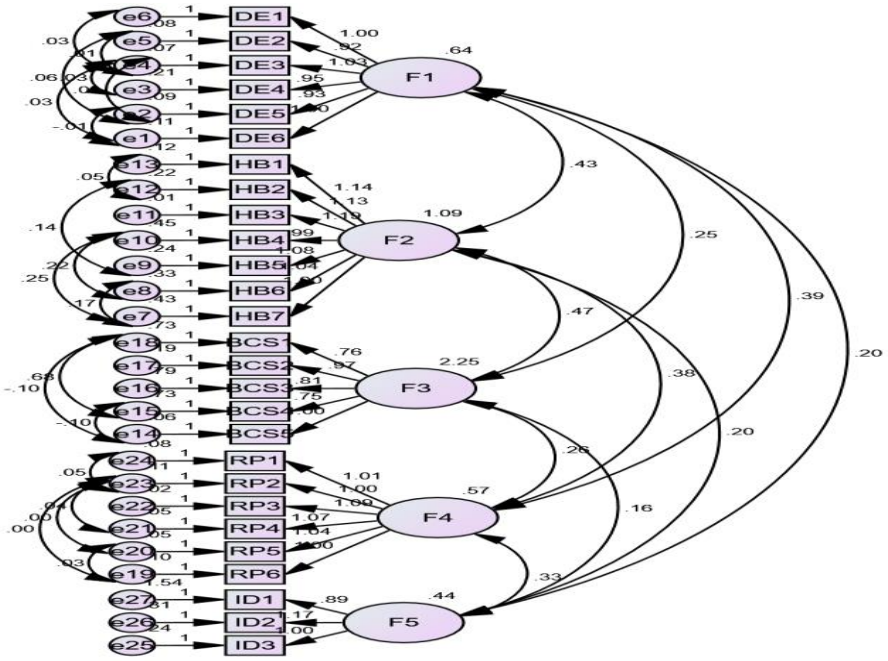

Figure 2: Structural Model

Correlation Analysis

Table 4: Correlation Matrix

	DE	HB	BCS	RP	ID
DE	1				
HB	.489**	1			
BCS	.210**	.284**	1		
RP	.624**	.500**	.220**	1	
ID	.324**	.270**	.373**	.554**	1

Table 4 shows that disposition effect significant positive relationship

4.8 Linear Regression Analysis

Regression analysis was run to check the relationship between propose model. Since, no demographic variable has significant relationship with dependent variables; no demographic variable during the regression analysis was controlled to nullify their effect on KH and OCB. Table 4.9 below presents the results of linear regression analysis;

Table 5: Linear Regression Analysis

Predictor	ID			RP		
	β	**R ²**	**Δ R ²**	**β**	**R ²**	**Δ R ²**
DE	.324**	0.105	0.102	.624**	0.390	0.387
HB	.270**	0.073	0.070	.500**	0.250	0.247
BCS	.073**	0.005	0.002	.220**	0.048	0.045
RP	.554**	0.307	0.304			

** shows P<0.05

Table 4 depicts that disposition effect bias predicts 32.4% change, herding behavior bias predicts 27% change, blue chip stock bias predicts 7.3% change and risk perception predicts

55.4% change in investment decision. Further, disposition effect bias predicts 62.4% change, herding bias predicts 50% change and blue chip stock bias predicts 22% change in risk perception of the investors.

4.9 Mediation Analysis

Table 6: Mediation Analysis

Relationship	Direct Effect	Indirect Effect	Confidence Interval		Conclusion
DE→RP→ID	-0.0366 (0.5889)	0.3713	**LLCI**	**ULCI**	Full Mediation
			0.2467	0.4675	
HB→RP→ID	-0.0061 (0.8854)	0.2787	**LLCI**	**ULCI**	Full Mediation
			0.1745	0.3846	
BCS→RP→ID	-0.0312 (0.3313)	0.1244	**LLCI**	**ULCI**	Full Mediation
			0.0643	0.1860	

Results at 6 depicts an insignificant direct effect (B=-0.0366, P=0.2926) and significant indirect effect (B=0.5889, P<0.05) of disposition effect on investment decision in the presence of risk perceptions showing full mediation. Results also depicted an insignificant direct effect (B=-0.0061, P=0.8854) and significant indirect effect (B=0.3747, P<0.05) of herding behavior on investment decision in the presence of risk perceptions showing full mediation. Further, an insignificant direct effect (B=-0.0312, P=0.3313) and significant indirect effect (B=0.1244, P<0.05) of blue chip stock on investment decision in the presence of risk perceptions showing full mediation.

Discussion and Conclusion

Regardless of the established belief that disposition effect produces suboptimal outcomes of investment (Braga & Fávero, 2017), empirical evidences suggest that it may positively influence the investment decisions. Literature reported that disposition predicts investors' decisions and they retain the losing stocks and quickly sell the winners to minimize the loss and maximize the profit (Christoffersen & Stæhr, 2019; Zahera & Bansal, 2018). Consequently, it promotes optimal portfolio management and more risk-taking that in turn positively affect the financial performance of the firm (Braga & Fávero, 2017). There are mix findings regarding the effect of herding behavior on investment decision making. On one hand, studies suggest that herding bias negatively influences the investment decision of the investors due to their blind following of herd while making investment decisions. Contrary to it, there are sufficient empirical evidences suggesting thet follwing the market leaders with more information may reduce the risk (Kim & Ryu, 2021; Shah et al., 2019) and fosters a sense of security and confidence among investors (Bhatia et al., 2020; Zahera & Bansal, 2018). Although there is growing criticism on blue chip stock because of the its prospective limitations in growth and diversification potential, studies suggest that investors feel confident and secure to invest in these stocks due to their stability and reliability (Lubis, 2021). Further, wider media coverage, endorsement of celebrities and financial experts may heighten the confidence of investors in blue chip stocks (Shiva and Singh, 2020; Handayani et al., 2019).

Although studies reported an inverse relationship between risk perception and investment decision (Ainia & Lutfi, 2019; Nguyen et al., 2019); empirical evidences suggesting that risk taking behavior fosters investment decision ability among the investors (Bhatia et al., 2020; Mallik et al. (2017). Studies (Combrink & Lew, 2020; Christoffersen & Stæhr, 2019) suggest

that investment behavior is key to successful investment decision making as the investors may make more strategic and cautious investment choices (Sarkar & Sahu, 2018).

While examining the impact of behavioral biases on risk perception, our findings are supported by the studies of Ahmad & Shah (2020), Razen et al. (2020) and Ainia & Lutfi (2019) who reported that reliance on disposition may function as a psychological barrier against engaging in overly risky behavior (Valaskova, Bartosova, & Kubala, 2019). Similarly, empirical evidences suggest that herding behavior positively influences the investors' risk taking tendency to invest in a specific stock. They tend to take risk to invest in the shares which others are purchasing with a hope to seek better return on investment (Ahmad & Shah, 2020; Bhatia et al., 2020). Moreover, studies (Almansour et al., 2023; Ahmad et al., 2022; Combrink & Lew, 2020) reported that lesser risk associated with the blue chip stocks prompts the investors to invest in these stocks to earn a maximum return on their investment.

Regardless of the novel mediation of risk perception in behavioral biases and investment decision relation, studies (Lubis, 2021; Baghestani, et al., 2019; Braga and Fávero, 2017) suggested that the relationship may be chanalized through perception of the investors. These studies suggest that based on their assessments of risk and loss aversion, investors may decide to keep their investment positions. In view of the results of our study and the findings of the previous studies, we may assert that behavioral biases indirectly affect the investment decision making of investors through their perceived risk.

Theoretical Implications

Our study has several theoretical implications that expand our understanding of the role of behavioral biases in mitigating risks associated with investment decisions. First, this study explains how the relationship of behavioral biases and investment decision making is mediated by of risk perceptions through the lens of prospect theory. Secondly, it also explains how integration of behavioral biases with risk perceptions deepens our understanding of the psychological underpinnings of risk assessment and decision-making processes. Finally, it also highlight the significance of taking investors' subjective risk perceptions into account when analyzing the relationship between biases and investment decisions.

Our study also has certain practical and managerial implications as well. The findings of the study may help investment advisors in creating awareness among investors about behavioral biases and devising risk mitigation strategies for individual investors by understanding the influence of behavioral biases on risk perceptions. Similarly, based on the findings of the investors can make efficient investment decisions with the help of provided information and they can get gain better returns on investment.

Limitations and Directions for Further Research

Like the other studies, our study has also certain limitations that may be addressed by the future researchers. First, we employed a cross-sectional design that may result in issue of generalizability because human behavior is characterized by variability change over time. Thus issue may be addressed by undertaking longitudinal design to observe the changes in investors' behaviors over time and its impact on investment decisions. Secondly, selecting sample from PSX may restrict generalizability of the results to other populations and settings. It is this suggested that sample from other sectors and settings may be recruited to seek more generalizable results. Use of self-report measures for data collection is still another limitation that may lead to response bias thereby affect the results of the study. We selected only three behavioral biases to predict the investment decision making. Inclusion of more biases may offer more useful insight and expand our understanding of role of behavioral biases in investment decision making. Finally, we examined the mediating mechanism of risk perception to understand the investment behavior of investors. Examination of buffering and amplifying mechanisms of the relationship is still neglected. Future researchers may investigate the potential moderators of this relationship such as investor demographics and personality traits

to investigate how these moderators buffer or amplify the effect of biases on investment decisions.

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