Impact Of Behavioral Biases On Investment Decisions Of Fund Managers: Mediating Role Of Investor's Risk Perception During Covid-19

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Abstract

This study examined the relationship of one of the important factors observed during the COVID situation where different behavioral biases impact the risk perceptions and investment decisions of fund managers of Pakistan. Data has been gathered from fund managers of various organizations located in Rawalpindi and Islamabad through a structured questionnaire. The snowball sampling technique has been utilized. SPSS has been utilized for the data analysis. To test hypotheses, regression analysis has been done. The mediation and moderation results have been determined through Preacher and Hayes PROCESS macro. Model 7 of PROCESS macro has been utilized as it is best suited with moderated-mediation models. The findings of the study revealed that both the behavioral biases i.e. underconfidence bias and self-attribution bias do not influence the investment decisions of fund managers directly but both indirectly influence investment decisions when mediated with investor's risk perception. Moreover, financial literacy also significantly moderates the relationship between underconfidence bias and investor's risk perceptions and also moderates the relationship between self-attribution bias and investor's risk perception during COVID-19. The study filled the gap by taking into account financial literacy as the moderator on the relationship between behavioral biases (underconfidence bias and self-attribution bias) and investor's risk perceptions. The study is a significant contribution to the behavioral finance literature. This research helps stock market regulators and policy makers to better understand the investment mechanism.

Key Words: Underconfidence bias, Self-attribution bias, Investor's Risk Perception, Financial Literacy, Investment Decisions

1   Introduction

The process of investment decision is based on the combination of personal characteristics like personality traits, risk tolerance, and emotions, etc., demographics, market factors like expected risk, market environment, and rate of return, etc. and various related factors. Theories of finance like the Modern Portfolio theory of Markowitz (Markowitz, 1952) and the theory of Efficient Market (Fama 1965, 1970) says that investors make rational decisions based on publicly available information. However, other researchers highlight that investors are not always rational and their decisions are influenced by various psychological, cognitive, or behavioral factors.

Theories of finance are centered on this assumption that investors or participants in stock markets are always rational, and make rational investment decisions. According to Arora and Kumari (2015), investors utilize various standard finance models to estimate the expected returns as well as risks while taking any investment decision. On the other hand, behavioral finance emphasizes that individuals do not behave rationally as supposed by the economists rather their decisions and choices are affected by their behavioral biases and psychological feelings.

Investment decisions of the individuals also depend on their risk perceptions towards specific stock or investment. The risk perception of the individuals varies according to the circumstances. COVID-19 is also a circumstance that not only influences the physical health of individuals but also influences their mental health and changes their tendency to take risks. COVID-19 is a pandemic, took birth in late 2019 in Wuhan, Hubei Province, China (CDC 2020a). The disease is common among animals but this specific strain spreads abruptly with severe consequences among humans and severely attacked those with serious medical conditions like heart disease, diabetes, and lung issues. This virus spread across the world in March of 2020.

There are plenty of reasons to admit the fact that COVID-19 and the response of individuals to this virus have changed the extent to which people are willing to involve in behaviors or situations that are risky and uncertain and may lead to financial loss or gain. One of the main reasons through which it can be anticipated that risk tolerance of the investors decline due to COVID is the speed at which COVID news spread among the people. Reidy (2013) investigated that one by four American investors depends on social media while making investment portfolios. As social media goes negative during a pandemic, it adversely influences investor's perceptions regarding financial markets which ultimately reduced their investment sentiments and risk tolerance and also influence the investment decisions. Another reason based on which it can be said that investor's willingness to take the risk or their risk perceptions fell due to COVID-19 is the investor's data during the global financial crisis. According to Vogenberg and Cutts (2009), the financial crisis significantly changed the financial stability of households. They reported that in crises, the behavior and perceptions of customers dramatically changed and instead of making rational decisions, they became under-confident and made decisions that were influenced by

several biases. They also reported that many patients stopped spending on their mental care due to financial crises. Therefore, it is also possible that investors behave similarly with the emergence and widespread of COVID. Moreover, it can be perceived that due to the economic strain which is caused by shutdowns, the behaviors of investors may change that alters their willingness to take the risk and invest in stocks may reduce. It has been depicted through the previous studies that the variable financial literacy plays a crucial role in mitigating the adverse effects of behavioral and psychological biases (Ahmed & Shah (2020)). When investors have financial knowledge then the negative influence of heuristics on their risk perceptions will be decreased and they can manage their investment activities in a better way despite the heuristics.

Many factors influence the investment decisions made by investors. Therefore, it is essential to identify how these factors influence the investor's decisions, especially during COVID. In this study, two types of heuristic biases, self-attribution bias, and underconfidence bias have been taken to investigate their impact on investment decisions during COVID. Self-attribution is a behavioral bias in which investor's associate good outcomes with their knowledge and bad outcomes with external factors while underconfidence is a behavioral bias in which investors underestimate their skills. The research aims to determine the mechanism through which self-attribution bias and underconfidence bias influence the investment decisions of Pakistani Fund managers during COVID, with the mediation role of investor's risk perception during COVID and moderating role of financial literacy.

Most of the previous studies focuses on individualistic as well as developed financial markets, therefore there is a need to examine the behavioral biases of investors in developing economies and collectivistic cultures to enhance their financial stability. This gap in the literature is filled by investigating the influence of self-attribution bias and underconfidence bias on the investment decisions of Pakistani Fund managers. The previous studies conducted in western and well-developed nations cannot be generalized for Pakistan due to economic differences. Moreover, there are very few research papers that focused on the risk perceptions of investors during COVID and its effect on the fund manager's investment decisions. Therefore, this research aims to investigate that how the risk perceptions of investors impact their investment decisions during COVID.

The objectives of this research is; to examine whether underconfidence bias and self-attribution bias among fund managers influence their investment decisions during COVID, to analyze the impact of investors' risk perceptions on the relationship between behavioral biases (underconfidence bias and self-attribution bias) and their investment decision during COVID, to analyze the influence of financial literacy on the relationship between behavioral biases (underconfidence bias and self-attribution bias) and investor's risk perceptions during COVID.

The rest of the article continues as follows: in section 2, the theories that are related with this research are described and previous studies about research variables and their relationships are discussed. It also includes hypothesis development. Section 3 includes the data collection methods

and measurement of variables. Section 4 includes the study results. Section 5 includes the discussion of results, policy implication, limitations and future directions, and conclusion.

2   Literature Review

Investment decisions are very important for organizations as these decisions influence their financial position. It is essential to make these decisions rationally but behavioral, and psychological biases of investors limit their ability to make rational decisions. The psychology and behaviors of investors impact their perceptions towards the stock market and risk attitude (Chang, (2008); Kourtidis (2011); Young (2012). The perceptions towards risk, in turn, regulate the investment decisions. Various researchers have examined the influence of different behavioral biases on investment decisions in varying cultures. Some of the findings of these researchers are very valuable for the present study. Therefore, in this chapter, the researcher analyzes the previous literature about the relationship of behavioral biases with investment decisions, financial literacy, and risk perceptions of investors. Moreover, to defense the research phenomenon, behavioral finance theories are also discussed as the theoretical base in this chapter.

Behavioral finance theories in the literature describes that how the behavioral biases influence investment decisions. Of these theories, the two that support the phenomenon of this research are 'Prospect Theory" and "Bounded Rationality Theory". Bounded rationality theory proposed by Herbert Simon in 1955 asserts that decision-makers do not make logical or rational decisions all the time due to their cognitive limitations, limited time, and limited knowledge about the particular decision. Therefore, the decision-makers who want to make sensible decisions can make satisfactory decisions, especially in complex circumstances due to their cognitive limitations. Simon (1961) explains bounded rationality as intentionally rational but just for a limited time. Prospect theory has been proposed by Kahneman and Tversky (1979). It states that individuals make decisions based on gains and losses instead of outcomes. This theory also belongs to the group of behavioral finance as it describes how people make decisions among possible choices where the risk factor is involved and the possibility of each outcome is equal.

2.1   Investment Decisions

Investment refers to the process of investing or capitalizing money with the desire to get benefits in the future. Every investor desires to invest money optimally by making rational decisions (Sharpe,1964). Merton (1987) states that optimal investment choices depend on the financial literacy of investors. In the finance and capital market domain, investors have to make decisions about financial assets such as securities, shares, and other tradable instruments. Standard finance perceives that investors make rational and optimal decisions every time and have ample information about the market. Behavioral finance perceives that investors can make irrational decisions, due to bounded rationality (Pompain, (2006), fundamental heuristics (Baker & Nofsinger, (2010), behavioral biases (Shefrin, (2007), imperfect information (Bikhchandani, 1992), or psychological biases (Baker & Nofsinger, 2002). Tversky and Kahneman (1973) argue

that systematic errors occur in decision-making due to psychological biases that lead to poor results (Barnes, 1984).

2.2 Under-Confidence Bias

Underconfidence bias is a heuristic bias and it is defined as individuals underestimate their skills, competencies, and knowledge (Pikulina et al.,2017). A lot of people undervalue their skills and underestimate what they are. These people usually suffer from a heuristic bias i.e. underconfidence bias. Some people perceive that they understand just a little than they do because they consider themselves to be inexperienced in decision-making, this behavior of people reflects their under-confidence. Investors are believed to be underconfident when they deflate their subjective knowledge (Razmdoost et al.,2015).

2.3 Self-Attribution Bias

The self-attribution bias has been developed by Bem (1965). He stated self-attribution bias as people associates their achievement to their intelligence and skills while blaming others or external factors for their failures. Self-attribution bias refers to the individual's tendency to associate success credit with their capabilities while associating failure with external factors, for instance, bad luck. It leads a person to a satisfying but wrong belief, that they are perfect and talented. Bem (1965) stated in his attribution theory that individuals strongly appreciate those events that verify the validity of their decisions with high ability. Hoffman and Post (2014) in their study reported the existence of self-attribution bias among investors who attribute achievements and high returns on stocks to their financial knowledge and investment skills.

2.4 Financial Literacy

Noctor (1992) defined financial literacy as an individual's capability to make effective choices and informed decisions about utilizing and investing money. According to Servon and Kaestner (2008), financial literacy is the ability of a person to understand and utilize the concepts of finance. The financial literacy of an individual plays a very crucial role in accepting risks that are linked with a specific financial investment. According to Banks and Oldfield (2007), illiteracy results in misallocation of resources, poor risk management, and poor yield management. The findings of the study by Jappeli and Padula (2013) reveals that financial literacy significantly and positively influences investment decisions and also aids the investors to get maximum returns from these investment decisions.

2.5 Risk Perception

Risk perceptions refer to the investor views and perceptions about the risk of a particular financial asset and it is usually based on the experience and apprehensions of investors regarding investments. Forlani and Mullins (2000) define risk perception as the way people perceive the uncertainty level of their decisions and the possibility of failure or loss in that particular action. Risk perceptions of investors significantly influence the investor's decisions (Sindhu, 2014).

2.6 Underconfidence and Investment Decisions

The link between the heuristic biases and investment decisions seems to be relatively controversial. Chaudary (2019) reveals in her paper that how salience heuristics impact short-term as well as long-term investment decisions. According to Ortmann (2008), the stock portfolio decisions that are based on heuristics often outperform the mutual funds, individual investment decisions, and market indices. However, a lot of researchers also disagree that there is any positive relation between these biases and investment decisions. Pikulina (2017) highlights in a study that the underconfidence behavior of investors leads them to make decisions that are not optimal or value-maximizing and the underconfident investors usually make inappropriate and low investments.

Underconfidence bias influences the investment decisions of fund managers. The underconfidence bias may cause underinvestment behaviors as the underconfident investors thought that their financial knowledge is insufficient and consequently makes less trading volume (Pikulina (2017)). Moreover, it can be said that COVID situation enhance the underconfidence bias among investors which adversely influence their investment decisions.

Based on the above-mentioned literature, it can be hypothesized that;

H_1: Underconfidence bias significantly influences investment decisions of fund managers of Pakistan during COVID.

2.7 Self-Attribution and Investment Decisions

The literature reveals that behavioral and heuristic biases also exist besides rationality. The heuristic biases like self-attribution bias and over-confidence bias significantly influence the investor's decisions and make them trade more aggressively and frequently. Bakar and Yi (2016) highlights in their study that self-attribution bias significantly influences the decision-making of investors. Investors who suffer from self-attribution bias overestimate expected returns and underestimate the possible risks (Baker and Nofsinger (2002), they buy and sell stocks excessively and their portfolios are not well-diversified and as a result, they get low returns as compared to other investors of the market (Odean (2002). As per Shefrin (2000), some investors overestimate and overemphasize their skills while forecasting the marketing trends which leads to bad forecasting. Daniel, Hirshleifer, and Subrahmanyam (1998) highlights that self-attribution bias and over-confidence bias among investors cause more instability and volatility in the stock market as compared to rational investors. According to Gervais and Odean (2001), investors who are prone to self-attribution bias eventually become over-confident.

Based on the above-mentioned literature, it can be hypothesized that;

H_2: Self-attribution bias significantly influences investment decisions of fund managers of Pakistan during COVID.

2.8 Self-Attribution Bias and Investor's Risk Perception

While making investment decisions, investors display self-attribution bias on one hand due to their previous successful investment experience and at the same time make assumptions about the

returns based on their information but it becomes difficult for them to identify the uncertainty and improbability of a hypothesis due to their self-attribution bias and therefore they underestimate the possible risks. Busenitz and Barney (1997) highlights in their study that over-confidence bias and self-attribution bias may lessen the investor's risk perceptions that lead to optimistic judgments regarding risk (Kahneman & Lovallo, 1993).

Based on the above-mentioned literature, it can be hypothesized that;

H₃: Self-Attribution bias significantly influences the investor's risk perceptions during COVID.

2.9 Under-Confidence Bias and Investor's Risk Perception
The literature reveals that disasters or crises enhance under-confidence among investors due to which they overestimate the risk factors and make inaccurate investment decisions. The heuristic biases lead investors to exaggerate the fear of possible poor outcomes (risk and returns) and ultimately lead to poor investment decisions (Slovic, 1985). It is also argued that financial experts change their risk perceptions slowly with the arrival of the latest information or with change in the external environment while non-experts or those who lack financial knowledge get easily persuaded by the latest information Pidgeon (1992); Slovic (2000); Taylor (2000).

Based on the above-mentioned literature, it can be hypothesized that;

H₄: Under-Confidence bias significantly influences the investor's risk perceptions during COVID.

2.10 Investor's Risk Perception and Investment Decisions
Sindhu (2014) has examined the cause-and-effect relationship among the investor's risk perceptions and their investment decisions and the results revealed that the decisions of investors are significantly influenced by the returns they previously earned and by their perceptions towards risk. According to Robinson and Marino (2015), the risk perception of investors is negatively linked with the new investment decisions. Kahneman and Lovallo (1993) highlights that investors having self-attribution bias cannot fully understand the risk, that's why these investors overestimate their skills and take more risks (Gervais, 2011), which lead them to make investment decisions that are not appropriate.

Based on the above-mentioned literature, it can be hypothesized that;

H₅: The investor's risk perception significantly influences the investment decisions during COVID.

2.11 Investor's Risk Perception as Mediator
Previous researches highlights that the relationship between behavioral biases and investment decisions is significantly mediated by risk perceptions (Simon, 2000); Iacobucci and Duhachek (2003); Kannadhasan (2014)). Robinson and Marino (2015) also highlights that the relationship between heuristic biases and portfolio formation decisions is partially mediated by the risk perceptions of investors. Yaowen Suqing (2015) has argued that the relationship between investor's behavioral biases and their financial literacy improvised investment decisions is fully

mediated by their risk perceptions. Lim (2018) has also examined that risk perception mediates the relationship between investor's financial literacy and their intentions to invest.

Based on the above-mentioned literature, it can be hypothesized that;

H_6: Investor's Risk perceptions mediate the relationship between self-attribution bias and investment decisions during COVID.

H_7: Risk perceptions mediate the relationship between underconfidence bias and investment decisions during COVID.

2.12 Financial Literacy as Moderator

Various researches revealed that the financial literacy of investors moderates the relationships that are bivariate. The financial knowledge of the individuals is a significant variable that determines their financial risk perceptions (Guiso & Japelli, 2009); Wang (2011); Tauni (2017). Numerous studies have investigated a positive association between financial literacy of the investors and their risky investment decisions (Peress (2004); Aren and Canikli (2018)). Diacon (2004) highlights that the risk perceptions of financial experts are varied from people that have low financial knowledge. He adds that financial experts make more risky investment decisions as compared to laypeople. Aren and Aydemir (2017) investigates the moderating impact of financial literacy on the relationship between various individual factors and risk taking behaviors. The results of the study reveals that financial literacy significantly moderates the impact of individual's emotions on their financial risk perceptions. Lusard and Mitchell (2007) highlight in their study that risky investment decisions that investors made in the stock market are positively influenced by financial literacy. Based on the above-mentioned literature, it can be hypothesized that;

H_8: Financial Literacy moderates the relationship between self-attribution bias and investor's risk perceptions during COVID.

H_9: Financial Literacy moderates the relationship between under-confidence bias and investor's risk perceptions during COVID.

2.13 Theoretical Framework

In this research study, the researcher discusses the field of behavioral finance by investigating how the investor's behavioral biases and psychology influence their investment decisions and developed the theoretical framework. The researcher examines the influence of two behavioral biases on the investment decisions of investors (particularly the fund managers) in terms of particular concepts or theories i.e. prospect theory and bounded rationality theory. According to Sortino (2001), the behavioral finance field states that investors do not pursue the highest return with the highest risk, as mentioned in portfolio theory instead their behavioral biases force them to go for a satisfying strategy.

In the proposed framework (Figure 1), self-attribution bias and underconfidence bias which are the behavioral biases have been taken as independent variables supposing that they have an

impact on the investment decisions (dependent variable) of fund managers of Pakistan during COVID. Investors' risk perceptions have been taken as the mediator in the proposed framework, considering the prevailing condition due to COVID, the study has incorporated investor's perceptions influenced through the circumstances. Financial Literacy has been taken as the moderator in the relationship between behavioral biases and investor's risk perceptions perceiving that it weakens or strengthens the proposed relationship.
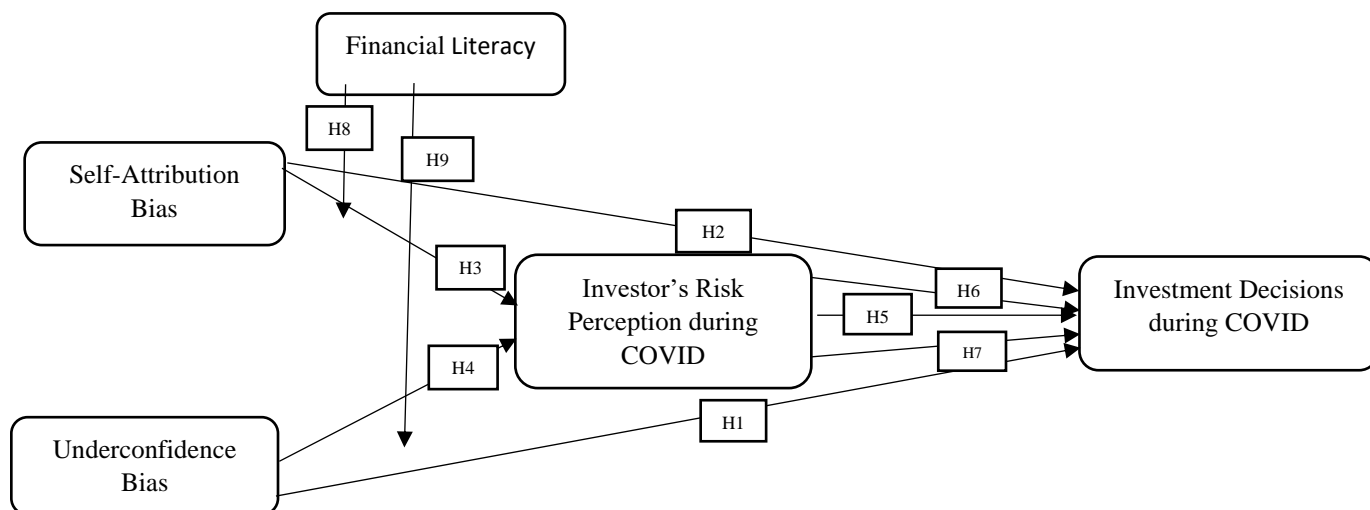

Figure 1 Theoretical Framework

3 Methodology

To effectively investigate the relationship between the research hypotheses of this study, the quantitative techniques are used. The type of investigation is "hypothesis testing" as it provides a complete understanding of the relationship present among research variables (Sekaran (2006)). The unit of analysis for this study was Fund Managers (Individuals) who are involved in investment decision-making on Pakistan Stock Exchange. Moreover, a cross-sectional design is considered more appropriate to examine a relatively huge sample in a single shot (at one time).

3.1 Target Population

The target audience for this research is fund managers who invest in Pakistan Stock Exchange. Specifically, the fund managers of four sectors (Bank, Cement and Construction, Oil and gas, and telecom) only in Rawalpindi and Islamabad have been considered as the target population.

3.2 Sampling Technique

The Snowball sampling technique is utilized in this study. It is a non-probability sampling method in which the sample has characteristics that are difficult to find. In this sampling technique, the existing subject gives referrals for recruiting the sample.

3.3 Data Collection Method

For quantitative research, the questionnaire is considered as one of the most effective and common modes of data collecting. This mode of data collection is chosen for this study as it is time as well

as cost-effective as compared to other methods (Bryman and Bell (2007)). The other reason to collect data through questionnaires is that fund managers usually avoid interviews and they do not prefer to give much time to researchers. Moreover, due to the prevailing situation of COVID, it is difficult to interact with as many people.

3.4 Sampling Plan and Data Collection

To accomplish the research purpose, a total of 250 questionnaires is delivered directly to the fund managers of various companies who used to trade on PSX as well. Of these questionnaires, 180 has been returned. Out of which 153 are completely filled by the fund managers and utilized for data analysis. The sample size through which data is collected is adequate to accomplish the statistical requirements. The adequacy of sample size can be highlighted through the previous researches conducted on the same research topics but in varied environments like the one conducted by Shah and Ahmed (2018) and Rasheed (2018), and various other similar studies in which the size of the sample ranged among 143-230. According to Hair (1998), data gathered from 100 respondents is enough to get accurate results from SPSS in quantitative studies.

3.5 Data Analysis

SPSS "Statistical Package for the Social Sciences" is utilized for the data analysis. To accomplish research objectives, various statistical techniques are used such as Cronbach's alpha, regression analysis, descriptive statistics, and correlation analysis. The techniques of statistics utilized in this research are steady with different studies conducted in varied environments but on the same topic as the one conducted by Shah et al. (2018), Hayat and Anwar (2016), and various others. Almost 65.81% of studies conducted on similar topics utilized regression analysis. The mediation and moderation results is determined through Preacher and Hayes PROCESS macro.

3.6 Model Specification

To test the formulated hypotheses, various models are analyzed. SPSS software is chosen to investigate the relationship between research variables. Moreover, the theoretical framework indicates the moderated-mediation path, so "Model 7" of PROCESS macro developed by Preacher and Hayes is best suited with the theoretical framework. In model 7, the path between the independent variable and the mediator is influenced by a moderator.

3.7 Data Collection Instruments

The close-ended questions have been asked by the target audience through a questionnaire. A five-point Likert scale has been utilized against each item so that respondents can answer in form of strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5).

Table 1 Measurement of Variables

	Constructs	Items	Sources
1	Investment Decisions	8	Wanyana (2012)
2	Underconfidence Bias	3	Sheldrake (2016)

3	Self-attribution bias	6	Wood and Zaichkowsky (2004), Chun and Ming (2009), Goo et al. (2010), Lin (2011), Kudryavtsev (2013)
4	Financial Literacy	14	Wanyana (2012)
5	Investor's Risk Perception	9	Sindhu and Kumar (2014)

4   Results and Analysis

4.1   Demographic Statistics

Table 2 demonstrates the demographic statistics of the sample utilized for analysis. 94.8% of the sample represents male investors while only 5.2% represents female investors. The gender composition also symbolizes Pakistani culture i.e. males are more dominant at managerial positions. In the context of age, most of the fund managers (investors) lied within the age group of 36-45 i.e. 35.9%, while 34.6% lied within the age group of 46-55, 20.3% lied within 26-35, 5.2% are below 25 years and 3.9% are above 55 years of age. In the context of qualifications, 49% of fund managers have done Masters, 24.2% have done MS/ M.Phil., 22.2% have done Bachelors, 3.3% held a Ph.D. degree, and just 1.3% of the fund managers have intermediate education. In the context of experience, 2.6% have less than 1 year of experience, 9.2% have 1-3 years of experience, 31.4% have 4-5 years of investing experience, 29.4% have 6-8 years of investing experience, and 27.5% have more than 8 years of investing experience in the stock market.

Table 2 Demographic Statistics

Category		Frequency	%
Gender	Male	145	94.8
	Female	8	5.2
Age	Below 25 years	8	5.2
	26-35	31	20.3
	36-45	55	35.9
	46-55	53	34.6
	Above 55	6	3.9
Qualifications	Matric	2	1.3
	Bachelors	34	22.2
	Masters	75	49.0
	MS/ M.Phil.	37	24.2
	PhD	5	3.3
Experience	Less than 1 year	4	2.6
	1-3 years	14	9.2
	4-5 years	48	31.4
	6-8 years	45	29.4
	More than 8 years	42	27.5

4.2 Reliability Analysis

Table 3 indicates the findings of the reliability analysis. The "Cronbach's alpha value" of all research variables is more than 0.7 i.e. falling above cut-off point. Therefore, the value indicates that all the instruments are reliable for further testing.

Table 3 Reliability Analysis

Variables	No. of Items	Cronbach's alpha
Underconfidence Bias	3	.955
Self-attribution Bias	6	.940
Investors Risk Perceptions	9	.844
Financial Literacy	14	.959
Investment Decisions	8	.858

Correlation Analysis

Table 4 presents the correlations among all predictor variables. UCB indicates underconfidence bias, SAB indicates Self-attribution bias, IRP indicates Investor's risk perception, and FL indicates Financial Literacy. The finding of the analysis reveals that Self-attribution bias is negatively related to underconfidence bias with a Pearson's correlations coefficient of r= -.818** which is significant at 0.01 level (p= 0.00). This value shows a strong association between self-attribution bias and underconfidence bias. The Pearson's correlation coefficient of r= 0.070 between underconfidence bias and investor's risk perceptions indicates that these variables are not correlated with each other i.e. the correlation between these two variables is insignificant (p=.388). The Pearson's correlation coefficient of r= -.113 between self-attribution bias and investor's risk perceptions indicates that these variables are not correlated with each other i.e. the correlation between these variables is not significant (p=.165). Moreover, underconfidence bias is negatively related to financial literacy with a Pearson's correlations coefficient of r= -.613** which is significant at 0.01 level (p=0.00). This value indicates a moderate association between underconfidence bias and financial literacy. Self-attribution bias is positively related to financial literacy with a Pearson's correlations coefficient of r= .652** which is significant at 0.01 level (p=0.00). This value indicates a positive and moderate association between self-attribution bias and financial literacy. The Pearson's correlation coefficient of r= 0.049 between financial literacy and investor's risk perceptions indicates that these variables are not correlated with each other i.e. the correlation between these two variables is not significant (p=0.547).

Table 4 Correlations

		UCB	SAB	IRP	FL
UCB	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	153			
SAB	Pearson Correlation	-.818**	1		
	Sig. (2-tailed)	.000			

	N	153	153		
IRP	Pearson Correlation	.070	-.113	1	
	Sig. (2-tailed)	.388	.165		
	N	153	153	153	
FL	Pearson Correlation	-.613**	.652**	.049	1
	Sig. (2-tailed)	.000	.000	.547	
	N	153	153	153	153

**. Correlation is significant at the 0.01 level (2-tailed).

4.3 Regression Analysis

Regression Analysis has been performed to test the hypothesis and model fitness. Table 5 presents the coefficients and collinearity diagnostics. To check multi-collinearity, we check VIF and tolerance values in the table. As the tolerance values of all the variables are in the limit of 1 and VIF values are less than 10, which shows that there is no multicollinearity issue in data. However, the t value and p-value indicate that only the investor's risk perception variable is significant at 1% i.e. t= 13.463 and p=.00, and the remaining are insignificant. It highlights that risk perceptions significantly influences the investment decisions of fund managers during COVID.

Table 5 Coefficients and Collinearity Statistics

Model		Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)		.895	.372		
	UCB	.006	.065	.948	.320	3.130
	SAB	-.004	-.043	.966	.288	3.471
	IRP	.740	13.463***	.000	.961	1.041
	FL	.120	1.635	.104	.541	1.848

Table 6 gives the model summary. The R square value in Table 6 is .570 which indicates that 57% of the variance in Investment Decisions (dependent variable) can be explained by the predictor variables (Financial Literacy, Investor's Risk Perceptions, Underconfidence bias, Self-attribution bias).

Table 6 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.755a	.570	.559	.53297	.570	49.126	4	148	.000

a. Predictors: (Constant), FL, IRP, UCB, SAB

b. Dependent Variable: ID

4.4 Mediation and Moderation Results

Mediation analysis is done to investigate the mediation effects of investor's risk perceptions on the investment decisions of fund managers during COVID. Moderation Analysis is utilized to investigate the interactive impacts of financial literacy on investor's risk perceptions. To test mediation and moderation results, PROCESS macro that is developed by "Andrew Hayes" is used.

Table 7: Moderation effects of Financial Literacy between Underconfidence bias and Investor's Risk Perceptions

Outcome variable: IRP

Model						
	coeff	se	t	p	LLCI	ULCI
Constant	1.6551	.6248	2.6649	.0085	.4305	2.8998
UCB	5.992	.1609	3.7240***	.0003	.2813	.9172
FL	.5571	.1509	3.6915***	.0003	.2589	.8553
Int_1	-.1422	.0421	-3.3807***	.0009	-.2253	-.0591

Table 7 shows that the regression of the underconfidence bias with that of the mediator (investor's risk perceptions) was significant, b=.5992, t=3.7240, p=0.0003. The results are significant at 1%. Therefore, it accepts the fourth hypothesis of this study. Moreover, Table 8 also shows the beta values, significance values, and interaction terms. The beta coefficient value of underconfidence bias is .5992, which means that a 1% change in underconfidence bias causes a 59.92% change in investor's risk perceptions. Also, t values show that the relationship is significant. P-value also shows that the relationship between underconfidence bias and investor's risk perceptions in the presence of moderator financial literacy is quite significant, as the p-value is less than .05.

The interaction term in the table indicates the moderation effect of financial literacy on the relationship of underconfidence bias and investor's risk perceptions and this relationship is inverse with the beta coefficient of -.1422. So, we can say that a 1% change in the interaction term will cause about 14.22% inverse effect on investor's risk perceptions and this negative relationship is significant at a 1% level, t= -3.3807, p=0.0009. Moreover, there is no zero between upper and lower boundaries of interaction term which means moderation is significant. The interaction term (underconfidence bias * financial literacy) significantly moderates the relationship between underconfidence bias and investor's risk perceptions, but it is a negative relationship. Therefore, hypothesis 9 has been accepted.

Table 8 Mediation effects of Investor's Risk Perception between Underconfidence bias and Investment Decisions

Outcome variable: ID

Model						
	coeff	se	t	p	LLCI	ULCI
constant	.7561	.2518	3.0032	.0031	.2586	1.2536
UCB	-.0372	.0313	-1.1903	.2358	-.0990	.0246

| IRP | .8284 | .0598 | 13.8640*** | .0000 | .7104 | .9465 |

Table 8 shows the regression of underconfidence bias with the investment decisions ignoring the mediator, which was insignificant, b=-.0372, t=-1.1903, p=.2358. Therefore, it rejects the first hypothesis of this study. The zero between upper and lower boundaries also reveals the insignificant relationship. Table 9 also indicates that the mediator (investor's risk perceptions) is significantly related to investment decisions i.e. b=.8284, t=13.8640 (significant at 1%), p=0.00. Moreover, there is no zero between upper and lower boundaries. Therefore, it accepts the fifth hypothesis of this study.

From the analysis of table 7 and table 8, it is examined that the direct relationship between underconfidence bias and investment decisions is insignificant. However, the relationship between underconfidence bias and investor's risk perception and the relationship between investor's risk perception and investment decisions are significant which means that the indirect path i.e. (UCB -> IRP -> ID) is significant. Therefore, it is found that investor's risk perceptions fully mediate the relationship between underconfidence bias and investment decisions. By incorporating a mediator, the insignificant relationship between the independent and dependent variables becomes significant. Therefore, it accepts the seventh hypothesis of this study.

4.4.1 Graph Plot A

Graph A mentioned in the Appendix shows the impact of the moderator (Financial Literacy) on the relationship between underconfidence bias and investor's risk perceptions. The steepest line indicates a stronger effect of moderator on the relationship between under-confidence bias and investor's risk perceptions. In the graph, the line with yellow dots depicts the steepest line which shows that there is an inverse effect of financial literacy on the relationship of underconfidence bias and investor's risk perceptions. At the low value of financial Literacy, the relationship between underconfidence bias and investor's risk perception is higher as compared to the high value of financial literacy. This means that when financial literacy is low, the impact of under-confidence bias on investor's risk perceptions is high and vice versa.
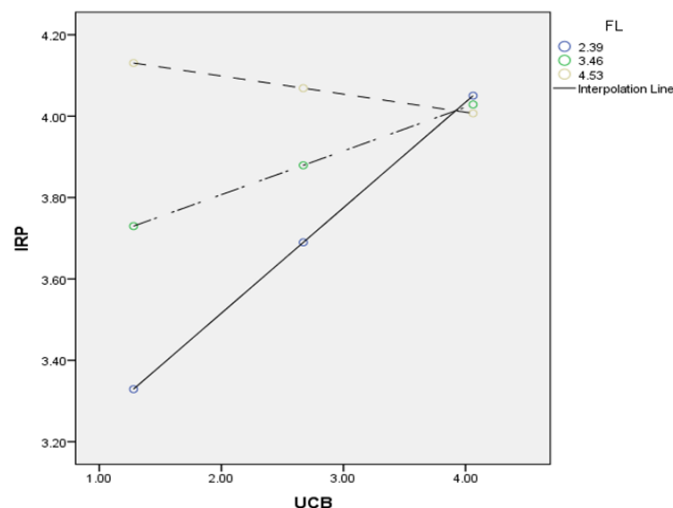
Figure 2: Moderation Plot A

Table 9 Moderation effects of Financial Literacy between Self-attribution bias and Investor's Risk Perceptions

Outcome variable: IRP

Model						
	coeff	se	t	p	LLCI	ULCI
constant	5.3230	.4563	11.6650	.0000	4.4213	6.2247
SAB	-.6580	.1704	-3.8618***	.0002	-.9946	-.3213
FL	-.2494	.1421	-1.7546	.0814	-.5302	.0315
Int_1	.1410	.0442	3.1903***	.0017	.0537	.2284

Table 9 indicates that the regression of the self-attribution bias with that of the mediator (investor's risk perceptions) is significant, b=-.6580, t=-3.8618, p=.0002. The results are significant at 1%. Therefore, it accepts the third hypothesis of this study. Table 10 presents the beta values, significance values, and interaction terms. The beta coefficient value of self-attribution bias is -.6580, which means that a 1% change in self-attribution bias causes an inverse 65.80% change in investor's risk perceptions.

The interaction term in the table indicates the moderation effect of financial literacy on the relationship of self-attribution bias and investor's risk perceptions and this relationship is significant with the beta coefficient of .1410. So, we can say that a 1% change in the interaction term will cause about 14.10% effect on investor's risk perceptions and this relationship is significant at a 1% level, t=3.1903, p=0.0017. Moreover, no zero between upper and lower boundaries also indicates significant moderation. The interaction term (self-attribution bias * financial literacy) significantly moderates the relationship between self-attribution bias and investor's risk perceptions. Therefore, hypothesis 8 has been accepted.

Table 10 Mediation effects of Investor's Risk Perceptions between self-attribution bias and Investment decisions

Outcome variable: ID

Model						
	coeff	se	t	p	LLCI	ULCI
constant	.4860	.2838	1.7123	.0889	-.0748	1.0468
SAB	.0463	.0358	1.2949	.1974	-.0244	.1171
IRP	.8322	.0599	13.8842***	.0000	.7138	.9506

Table 10 indicates the regression of self-attribution bias with the investment decisions ignoring the mediator, was insignificant, b=.0463, t=1.2949, p=.1974. Therefore, it rejects the second hypothesis of this study. Table 11 also indicates that the mediator (investor's risk perceptions) is significantly related to investment decisions i.e. b=.8322, t=13.8842 (significant at 1%), p=0.00. Therefore, it again confirms and accepts the fifth hypothesis of this study.

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From the analysis of table 10 and table 11, it is examined that the direct relationship between self-attribution bias and investment decisions is insignificant. However, the relationship between self-attribution bias and investor's risk perception and the relationship between investor's risk perception and investment decisions are significant which means that the indirect path i.e. (SAB -> IRP -> ID) is significant. Therefore, it is found that investor's risk perceptions fully mediate the relationship between self-attribution bias and investment decisions. Therefore, it accepts the sixth hypothesis of this study.

4.4.2   Graph Plot B

Graph B mentioned in the Appendix shows the effect of the moderator (Financial Literacy) on the relationship between self-attribution bias and risk perceptions of investors. The steepest line indicates a stronger relationship with the moderator. In the graph, the line with yellow dots depicts the steepest line which shows the strongest effect of financial literacy (moderator) on the relationship of self-attribution bias and investor's risk perceptions. At the low value of financial Literacy, the relationship between self-attribution bias and investor's risk perception is weaker as compared to the high value of financial literacy. It indicates that when financial literacy is low, the impact of self-attribution bias on investment decisions is also low.
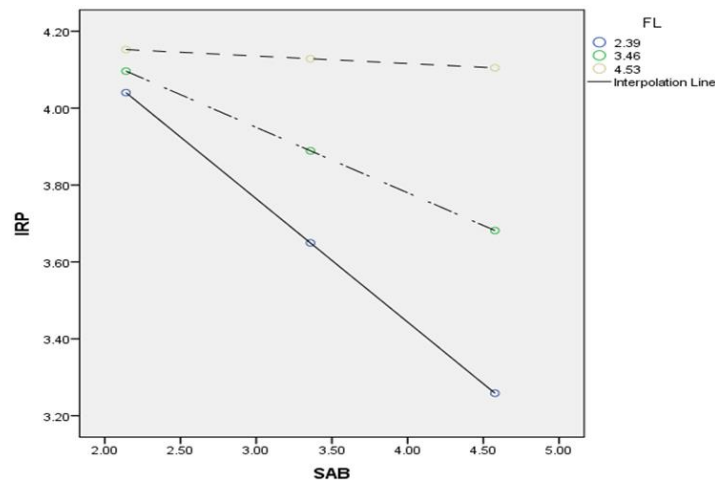

Figure 2: Moderation Plot B

4.5   Summary of Results

The reliability and normality tests of the data reveals that all instruments are reliable for testing, the data is normal and we can run further parametric tests on data. The overall results of regression indicates that only the variable investor's risk perceptions significantly influence the investment decisions. Moreover, all the hypotheses included mediation and moderation is analyzed through PROCESS macro. The result of the analysis highlights that neither underconfidence bias nor self-attribution bias significantly influences the investment decisions of fund managers during COVID. Therefore, rejecting the first and second hypotheses. Moreover, the two biases i.e. underconfidence bias and self-attribution bias significantly influence the investor's risk perceptions during COVID, accepting third and fourth hypotheses. The relationship between investor's risk perceptions and

investment decisions is also significant, accepting hypothesis five of the study. It indicates that the full mediation exists and accepts the six and seventh hypotheses of the study. The moderation results also reveals that the relationship between underconfidence bias and investor's risk perceptions during COVID is significantly moderated by financial literacy and also the relationship between self-attribution bias and investor's risk perceptions is significantly moderated by financial literacy, therefore accepting the eighth and ninth hypotheses of the study.

5   Discussion, Implications and Future Directions

The findings and data analysis revealed that these two behavioral biases i.e. underconfidence bias and self-attribution bias does not influence the investment decisions of fund managers in a COVID situation. These findings are inconsistent with the findings of the past studies on similar topics in which researchers examined the influence of different behavioral biases on investor's decisions and the performance of different types of investors. Pikulina (2017) highlights the effect of underconfidence bias on investment decisions and noticed that this bias negatively effects investor's decisions. Barber and Odean (2000) reported that self-attribution bias leads to poor investment performance. Ahmad and Shah (2020) investigates how overconfidence bias effects the investment decisions as well as investment performance of investors trading on Pakistan Stock Exchange and examines that behavioral bias negatively influences investment decisions and performance. However, the findings of the present study are quite contradictory with all these previous results.

The findings also revealed that both behavioral biases i.e. underconfidence bias and self-attribution bias significantly influences the investor's risk perceptions during COVID. The relationship between underconfidence bias and investor's risk perception is positive indicating that when employees rate themselves high at underconfidence, they overestimate the risk factor and associate high risk with a certain asset. It may be because crises situation due to COVID enhances underconfidence bias among investors that adversely influence their perceptions towards risk. However, the relationship between self-attribution bias and risk perceptions of investors is negative. It is due to that the self-attribution bias of investors makes it difficult for them to depict the uncertainty and possible risk associated with specific investments. They usually underestimate the risks associated with specific investments. These findings are quite consistent with the existing literature. The findings of Busenitz and Barney (1997) reveal that overconfidence bias and self-attribution bias may lessen the investor's risk perceptions that lead to positive thoughts regarding risk (Kahneman and Lovallo, (1993)). The finding that there is a positive association between under-confidence bias and investor's risk perceptions are uniform with the results of Slovic (1985) who highlighted that the behavioral biases exaggerate the fear of possible poor outcomes i.e. risk perceptions.

Investor's risk perceptions play a crucial role in the procedure of investment decision-making. The findings of the present research indicate that the investor's risk perceptions is positively associated with the investment decisions during COVID. It indicates that if an investor perceives that a specific investment is riskier than the investor makes better investment decisions.

These findings are quite contradictory with prospect theory as prospect theory emphasizes that investors give more weightage to investments with perceived gains as compared to the perceived loss and when high risk is involved then investors tend to avoid these investments. This positive relationship between investor's risk perceptions and investment decisions during COVID verifies the "Markowitz Portfolio Theory" of "risk and return". The positive association is also consistent with the findings of Yaowen (2015).

The findings of the present study revealed that the relationship between self-attribution bias and investment decisions is fully mediated by investor's risk perceptions during COVID. Also, the relationship between underconfidence bias and investment decisions is fully mediated by investor's risk perceptions during COVID. These outcomes are coherent with the results of Pompian (2011). The findings are consistent with the findings of Kahneman and Lovallo (1993) that self-attribution bias urge investors to underestimate the risks associated with the specific investments and therefore, influence their investment decisions (Gervais (2011)). These results are also harmonious with the results of Yaowen Suqing (2015) that risk perceptions fully mediate the relationship between behavioral biases and investment decisions. The findings of the study support the bounded rationality theory that investors do not make logical or rational decisions all the time due to their cognitive limitations. However, this influence is indirect in this case being mediated by the variable investor's risk perceptions.

The findings of the study revealed that investor's financial literacy significantly moderates the relationship between self-attribution bias and investor's risk perceptions. And also moderates the relationship between underconfidence bias and investor's risk perceptions. The findings revealed that financial literacy weakens the impact of underconfidence bias on risk perceptions of investors. However, the influence of self-attribution bias on risk perceptions of investors enhances with an increase in the extent of financial literacy. The findings are consistent with Aren and Aydemir (2017). The outcomes of the study are quite coherent with the results of Lusard and Mitchell (2007) that risk perceptions and investment decisions of investors are significantly impacted by financial literacy.

Therefore, the discussion confirms that the financial literacy of investors matters a lot while making risky investment decisions. The behavioral biases of investors also influence the investment decisions of fund managers but in presence of a mediator i.e. investor's risk perceptions.

5.1 Implications of the Study

Based on the findings, it is suggested to fund managers and individual investors to not rely on any behavioral or heuristic bias while associating risk with any investment or while making risky investment decisions. However, the investors should conduct proper quantitative analysis of investing opportunities, formulate investment objectives, and conduct risk analysis before making any investment decision. The research provides valuable insight to policy-makers of the stock market and aids them in understanding the investment mechanisms. This research helps stock market regulators to better understand the investor's behaviors and risk perceptions and develop

policies according to their behaviors and risk perceptions to ensure efficient movement of the stock market.

Spindler (2011) highlights that global financial crisis has made the protection of investors a priority for policymakers of the stock market along with effective regulation of the stock market. The COVID has also adversely influenced the businesses and stock markets like global financial crisis, therefore it has become very essential for policymakers to understand investors behaviors during COVID that whether they become underconfident or overconfident during the crisis. The study also helps financial advisors to understand their client's psychology in a better way. It aids them in formulating an investment portfolio that is behaviorally modified and best suits the preferences of their clients.

5.2 Directions for Future Research

The discipline of behavioral finance is quite remarkable. There are various aspects of "behavioral finance" that can be researched. Future researches can be carried out to confirm the results of this study but with a large sample size as well as with varied respondents. Future researches should target the investors who invest themselves and the investors who invest in the stock market through financial intermediaries. The target population (investors) can also be segmented based on experience and financial needs. The culture and demographics of the investors can also be incorporated as moderating variables between heuristic biases and investment decisions. Future researchers can also gather data about investor's behaviors, risk perceptions, and investment decisions at different periods of COVID to deeply analyze their changing investment patterns with the change in COVID situations. Future researches can also analyze the effect of behavioral biases on "short-term and long-term" investments. Furthermore, future researchers can also compare the investor's behaviors by targeting the stock markets of a developed and a developing country. The comparative study will add much value to the existing knowledge of behavioral finance.

5.3 Conclusion

This research aim to analyze the impact of "under confidence bias" and "self-attribution bias" on the "investment decisions" of Pakistani Fund managers who trade on PSX during COVID, with mediating role of "investor's risk perceptions during COVID" and moderating role of "financial literacy". The findings of the study reveals both underconfidence bias and self-attribution bias does not influence the investment decisions directly but these behavioral biases indirectly influence the investment decisions when mediated with the investor's risk perceptions. These behavioral biases significantly influence investor's risk perceptions during COVID which in turn influence their investment decisions. It has been found that investor's risk perceptions fully mediate the relationship between "underconfidence bias and investment decisions" and between "self-attribution bias and investment decisions". Moreover, the research also concluded that financial literacy significantly moderates the impact of underconfidence bias on risk perceptions of investors and also moderates the effect of self-attribution bias on risk perceptions of investors.

This study is the first to investigate the effect of the two behavioral biases i.e. under-confidence bias and self-attribution bias on investment decisions of Pakistani fund managers in the COVID situation. Various researchers have assessed the direct impact of behavioral biases on investment decisions (e.g. Barber and Odean (2000); Shah et al. (2018)) but these two behavioral biases haven't been investigated together. Moreover, none of the existed studies on similar topics were conducted during the COVID situation, so the COVID situation differentiates this study from existing knowledge on behavioral biases and investment decisions.

This research contributes to the behavioral finance literature by giving valuable insights into the association between underconfidence bias, self-attribution bias, and investment decisions during COVID, risk perceptions of investors during COVID, and financial literacy. Moreover, most studies in the literature of behavioral finance focused on developed economies and markets, and there are very little researches conducted on investor's behaviors in developing economies (Shah et al. (2018)). Therefore, this study contributes significantly to fill this literature gap. The study has theoretical and practical implications for individual investors, fund managers, finance practitioners, portfolio managers, financial planners, policymakers, brokers, financial advisors, and financial analysts. However, the study is most beneficial for those who take financial and investment decisions on the behalf of corporates.

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