Global Economics Review (GER)
URL: http://dx.doi.org/10.31703/ger.2022(VII-III).03

Muhammad Javed Iqbal * | Shoaib Hassan † | Muhammad Bilal Kayani ‡

Impact of Financial Literacy on Investment Decisions with Mediating Role of Behavioural Biases

Pages: 26 – 43 | Vol. VII, No. III (Summer 2022) | DOI: 10.31703/ger.2022(VII-III).03
p-ISSN: 2521-2974 | e-ISSN: 2707-0093 | L-ISSN: 2521-2974

Contents

- Introduction
- Review of Literature
- Theoretical Framework
- Research Hypothesis
- Research Methodology
- Results
- Conclusion
- References

Abstract: *The current research aims to analyze the impact of financial literacy on investment decisions in Pakistan with mediating role of behavioural biases (self-attribution, illusion of control, and hindsight). The secondary data is collected from 217 investors using self-administered questionnaires. Descriptive and inferential statistics identified that financial literacy has a substantial and positive influence on investment decisions, but has a negative effect on behavioural biases (self-attribution, illusion of control, and Hindsight). Furthermore, the illusion of control bias and hindsight bias partially mediates the relationship between financial literacy and investment decisions, whereas the results of mediation for self-attribution bias were insignificant. The current research is beneficial for the investors as they will be able to recognize the relevance of financial literacy and the biases that impeded their decision-making, as well as create alternative ways to overcome these biases and minimize irrational behaviour.*

Key Words: Financial Literacy, Self-Attribution Bias, Illusion of Control Bias, Hindsight Bias, Investment Decisions

JEL Classification:

Introduction

Traditional finance argues that investors are reasonable and that markets work efficiently. Interest rates, incomes, demand, the rate of economic growth, the value of capital goods, technological development, government policy, and a variety of other considerations are said to affect investment decisions. Traditional finance's function cannot be ignored in investment without a doubt; however, balancing the philosophies of behavioural finance and standard finance will help investors make better decisions. Considering the psychological causes that affect investment choices is an interesting avenue to grasp individual investment behaviour.

According to conventional financial theory, investor decisions to make efficient profits are expected to be rational while taking

*MS Scholar, Department of Management Sciences, National University of Modern Languages, Rawalpindi, Punjab, Pakistan.
†Assistant Professor, Department of Management Sciences, National University of Modern Languages, Rawalpindi, Punjab, Pakistan.
‡ Lecturer, Department of Management Sciences, National University of Modern Languages, Rawalpindi, Punjab, Pakistan. Email: bilal.kayani@numl.edu.pk *(Corresponding Author)*

Citation: Iqbal, M. J., Hassan, S., & Kayani, M. B. (2022). Impact of Financial Literacy on Investment Decisions with Mediating Role of Behavioural Biases. *Global Economics Review, VII*(III), 26-43. https://doi.org/10.31703/ger.2022(VII-III).03

all available information regarding that specific investment into consideration. On the contrary, prospect theory clarifies that investor behaviour is affected by different biases under risk and uncertainty that make them act irrationally (Kahneman & Tversky, 1979; Baker and Filbeck, 2013). Conventional finance theories describe what a person is capable of doing while investing, whereas behavioural finance describes what a person actually does. People make mistakes when picking stocks, no matter how disciplined they are in their investing. According to the majority of research, investors behave differently and do not always make sound decisions. The vast majority of investors base their decisions on instinctive and automated processes rather than deliberate and regulated processes. In behavioural finance, outside signals such as news images, newspapers, and analysis reports are one type of cause of such actions; whereas, the second type is largely based on the fact that investors are human beings who go through a variety of emotions when making an investment decisions. The rational investor anticipates having access to all types of stock information, which is an unrealistic expectation in itself. The law of rationality hypothesis has been called into question by behavioural finance researchers. They take into account certain behavioural biases in investor decisions and then calculate the impact of these influenced decisions or reactions on stock price movements. Behavioural finance originated as an effort to comprehend how feelings and processing mistakes influence investors' decision-making processes (Thaler, 1999). Individuals can act irrationally and be influenced by certain behavioural biases, known as systemic judgement errors, when making financial decisions, according to research in this area (Kahneman & Riepe, 1998: 53).

The ever-changing financial circumstances and activities in the industry necessitate FL for the entire population of the world. Financial literacy, according to ever-increasing body of knowledge, is required to improve consumer behaviour when it comes to financial products and services. Lusardi and Mitchelli (2007) suggested that the increasing complexity of financial offerings and the rising importance of financial selection made by consumers, FL has become increasingly important. Individual investors have been motivated to engage actively in capital markets in recent years through the introduction of new financial offerings and instruments (Calvet et al., 2007).

In the previous studies connection of behaviour biases and corresponding investment decisions taken by investors had been discussed with respect to various demographic characteristics in Pakistan. Baker & Nofsinger (2010) and Fama (1998) found that financial professionals disagree on whether behavioural finance theory is valid. Because of the lack of agreement, behavioural finance as a concept is still in its early stages of development. While there has been a lot of research in the secondary markets, according to Fama (1997) and Thaler (2005), there has been no research on the impact of individual financial behaviour on investment decisions in the Pakistani market. Only a small amount of research has been done in Pakistan on behavioural finance. Individual investors play a significant role in Pakistan's economy (Rasool and Ullah, 2020). Individual investors can contribute a positive impact in Pakistan's economy if learn to control behavioural biases.

Financial literacy was only discussed stand-alone but there is limited evidence of this phenomena being discussed with respect to its effects on investment decisions of individual investors through behavioural biases, particularly in Pakistan. The current research intends bridging this gap by checking the effect of FL on investment decisions through three of the behavioural biases i.e. Self-attribution Bias, Illusion of Control Bias and Hindsight Bias of individual investors of Pakistan to contribute in the existing body of knowledge for industry financial actors, business organizations and individual investors working in Pakistan.

Review of Literature

Financial Literacy and Behavioural Biases of Individual Investors

Financial Literacy is the degree to which a

person comprehends his or her financial terms or matters (Epstein & Stanley, 1990). Individuals with a greater understanding of financial matters will make better investment decisions than those with a limited understanding of financial matters. According to Jappeli and Padula (2013), most individuals lack finance and economics literacy, such as behavioural finance, risk diversification, inflation, and interest compounding, leading to investment biases. A variety of factors influence FL that may including families, attitudes, economics, social life, institutes, and social life. Individuals who are financially literate are therefore capable of analyzing and making choices based on their personal knowledge. People with FL make the most use of the knowledge in sensible decision-making. If an individual has a certain level of analytical skills and employs them in making decisions, his ability to make financial decisions would be enhanced. FL may also accelerate the amount of benefits that someone receives by using this knowledge.

FL, according to Rooij, Lusardi, and Alessie (2011), affects investment decision frameworks and helps the investor make impartial investment decisions; additionally, people with little awareness of the stock market stay away from it and make decisions based on expert recommendations. Lusardi and Mitchell (2007) argue that financial ignorance is common worldwide with awareness of the stock market being especially poor. According to Zucchi (2018), FL concerns are not limited to developing countries; investors in highly developed capital systems have also suffered financial losses as a result of inadequate planning and the failure to understand market suspicions and risk. During the financial crisis of 2008, the portrayal of these shortcomings could be noticed (Klapper et al., 2013). Irrationality (Friedman and Kraus, 2011) among investors' financial actions due to a lack of financial expertise was one of the main assumptions observed during the financial crisis. Remund (2010) analyzed FL as the ability to comprehend common and important financial concepts. Furthermore, according to Sundarasen et al. (2016), FL increases the performance of cash management, credit risk management, and savings with investment. According to a survey on Turkish financial customers concerning their purchasing behaviour, financial customers with financial skills are more likely to use their credit cards in an appropriate and informed manner (Sevim et al., 2012).

Self-Attribution Bias

The presence of self-serving attribution bias, which refers to individuals taking credit for positive results while blaming circumstances or other people for bad outcomes, is one of the primary mechanisms by which people become overconfident (Barber and Odean 2002, Billett and Qian 2008). An example for this particular phenomena could be, a manager attributing the higher progress of the firm to his own intelligence and hard work, and citing unfair circumstances when the firm achieve lower growth. In various cases, attributions are affected by a human's "desires and needs," (Heider 1958). Self-attribution bias has two facets; one is called Self-enhancing bias—this is the mindset for people to give themselves an irrational amount of credit for their accomplishments and the second is Self-protecting bias—this is the baseless denial of failure.

There is a psychological and a motivating aspect to the self-attribution bias. The self-attribution bias is guided by individuals' limited information-handling capabilities, which explains the cognitive component (Miller and Ross 1975). Investors might be harmed in two ways by irrationally attributing triumphs and failures. People who are unable to see their own faults are unable to learn from them for several reasons. Second, investors who lavish praise on themselves when favourable outcomes occur may become dangerously overconfident in their own market knowledge. Self-attribution leads investors to take on excessive amounts of financial risk and trade too aggressively, magnifying personal market volatility. While rookie investors are continuously overconfident that they can outperform the

market, the majority of them fail to do so, according to this study.

People become overconfident as a result of self-attribution rather than focusing on appropriate self-assessment. Gervais and Odean (2001) explained how both inexperienced and experienced traders overestimate their ability to make high-risk investments. This is because of a lack of accountability and a failure to learn from losses, while blaming losses due to external factors. They reported that traders who are both young and active trade the most and have the most overconfidence. When evaluating his abilities, the trader gives himself far too much credit for his accomplishments. As a result, he becomes overconfident. In the early phases of his profession, a trader's projected level of overconfidence rises. Then, as he gains more experience, he becomes more aware of his own abilities. A trader who is overconfident trades too aggressively, raising trading volume and market volatility while reducing his projected earnings. Despite the fact that a higher number of successes indicates better likely competence, a more successful trader may have lower predicted earnings in the next period than a less successful trader due to his increased overconfidence. Because success breeds overconfidence, overconfident traders aren't the worst traders. Their commercial existence is not in jeopardy. Overconfidence does not make traders wealthy, but it might make them overconfident in the process of becoming affluent.

The illusion of Control Bias

The illusion of control is the belief that one can control, or at the very least manipulate, the effects of unmanageable events. Langer (1975) described an illusion of influence as the expectation of a personal success probability that is appropriately higher than the objective probability would warrant. He examined that the "claiming the individual success plausibility improperly greater than the actual probability would justify" is characterized as the illusion of control bias.

Investors overweight the chosen options from the available options in which they are essentially involved (Fama 1998; Fellner, 2009). According to Fellner's research, investors prefer to make investments over which they think they have control. Many practitioners understand that investors have no control over the result of the investments they make; they only have power over the decision to invest or not invest (in exceptional situations, one person may have influence over the outcome, but this is the exception, not the rule).

Martin, Abramson, and Alloy (1984) performed a study on college students and discovered that individuals who are unhappy have an expectation of influence. A driver who believes a car crash was caused by bad luck rather than poor driving would never want to be more focused and drive more carefully on the road. Investors may trade more than is advisable due to the illusion of control bias. Traders, particularly online traders, feel they have more influence over the outcomes of their investments than they actually do, according to research. Excessive trading leads to worse returns in the long run. Illusions of control might cause investors to keep their portfolios under-diversified.

McKenna (1993) takes the view that people underrate their individual likelihood of experiencing unfavorable outcomes, which he refers to as either unrealistic optimism or the illusion of control. According to Durand (2003), firm's illusion of control leads to biases in subsequent investment decisions. According to Fenton-O'Creevym et al (2003), are favorable to the creation of the illusion of control, and that tendency to the illusion of control is inversely linked to results. Illusion of control was viewed as a natural perception in humans (Rudski, 2004), and people who have it disregard what they don't like and overstate what they do like (Thompson, Armstrong & Thomas 1998).

FL, according to Rooij, Lusardi, and Alessie (2007, 2011), promotes people in investment decision-making and allows them to make fair decisions. FL, according to Lusard and Mitchell (2007), has a positive impact on the investment choices made by investors in capital markets. Numerous findings indicate

that investors' investment choices are affected by the illusion of control bias (Thompson, Armstrong, & Thomas 1998) which can be affected or curtailed by FL.

Hindsight Bias

Biais and Weber (2009) investigated the hindsight biases of investors and found that the ex-post memory of the original conviction would be similar to the reality than the actual ex-ante expectation. The majority of investors are optimistic in their ability to forecast potential events based on their own mistaken perceptions. Since they are biased by the experience of what has really occurred, people prefer to remember their own future forecasts. As a consequence, people expect incidents that have already arisen to be reasonably predictable. Baruch Fischoff (1975) described an experiment in which he asked individuals to answer questions from almanacks and encyclopaedias on general knowledge. Fischoff next challenged his participants to recollect their initial responses from memory after presenting the right answers. The findings are eye-opening: People, on the whole, overestimated the level of their early understanding and forgot about their mistakes. For market watchers, hindsight bias is a major issue. Once an event has become part of market history, it is common to look back at the events that lead up to it, making the occurrence seems inevitable. As Baruch Fischoff pointed out, results have an inexorable influence on their own interpretations. In hindsight, happy-ending errors are characterized as clever tactical actions, whereas sad outcomes of well-informed choices are described as preventable blunders.

Bukszar and Connolly (1988) argued that one should learn from previous incidents and adapt to new circumstances, but hindsight biased investors fail to learn lessons from past events. Furthermore, Biais, and Weber (2009) investigated hindsight bias and found that investors were unable to recall their initial response (initial experience). By underestimating the uncertainty, may lead to bad investment returns.

According to Lubinski and Humphreys (1997), the best investment decisions are made by people of good cognitive capacity and intellect. Such an individual has excellent memory and will be able to minimize hindsight bias. Frederick (2005) used a cognitive reflection questionnaire to assess the participants and found that those of greater cognitive abilities made better investment decisions. Pompian (2006) studied this tendency and came to the conclusion that hindsight bias leads investors to take undue chances by believing that an incident is predictable even though it is not. Pezzo and Beckstead (2008) investigated the phenomena and concluded that investors are unable to acknowledge the fact that they cannot forecast the outcome. They would argue that they expected the actual case if they were given the true outcome. They are better at forecasting and can estimate. He came to the conclusion that such investing behaviour skews investment decisions and causes investors to take risks outside their comfort zones.

Such erroneous beliefs or biases may contribute to the formation of false causal relationships, resulting in incorrect overstatements and causing investors to take too much risk which results in potential investing mistakes (Pompian, 2011). Recent research has taken into account the short-term nature of decision-making where the effect of hindsight bias on short-term decisions has been examined. Tchai (2012) investigated the effect of hindsight bias over short-term investing and discovered that it distorts investing decisions and causes investors to take undue risks due to incorrect event predictability. Goodwin (2010) looked at the same issue and divided the participants into three groups: stockbrokers, students, and professionals, concluding that professionals were subjected to such prejudice. The key thing that provided the immunity to resist such bias was financial knowledge.

Individual Investment Decisions and Financial Literacy

Financial literacy enables investors to have a thorough grasp of market moderating factors,

which aids them in making investing decisions. Price fluctuation, accessible market information, historical patterns of stocks, consumer propensity, over-response to value fluctuations, and basics of major stocks are among the market components that influence an individual's choice making, according to Waweru et al. (2008). Investment holders are impacted by events on the securities exchange that interest them, according to Barber and Odean (2013).

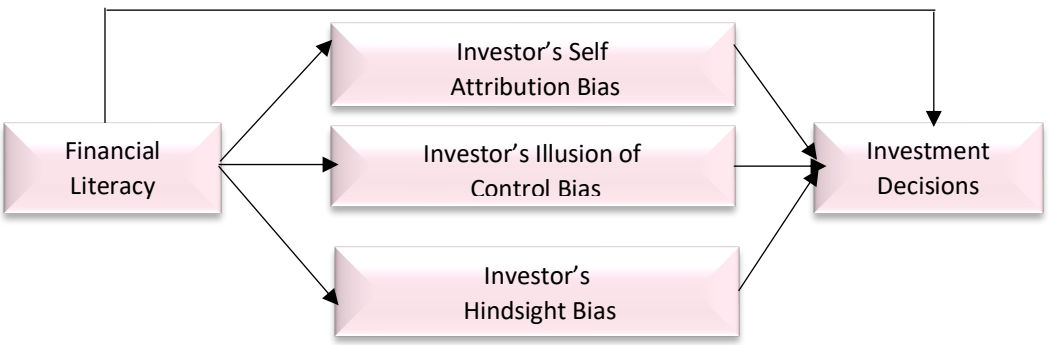
According to a number of empirical studies; FL aids investors in making better decisions about resource allocation and management in order to optimize their return. Banks and Oldfield (2007) argued that inadequate FL leads to inefficient resource allocation, poorer return management, and risk reduction. According to a meta-analysis of 201 researches, billions of dollars are spent on financial education with little influence on financial behaviour (Fernandes, Lynch, & Netemeyer, 2014). Several findings in the body of research show that FL has a beneficial impact on investment decisions and may allow consumers to get the most out of their money. According to yet another study by Chen and Volpe (1998), 53% of students at college level have poor FL and make poor investment selections.

The mediating role of Behavioural Biases between Financial Literacy and Individual Investment Decisions

Behavioural biases in finance relate to the potential for poor cognitive thinking and/or reasoning affected by emotions to lead to illogical financial decisions (Pompian, 2012). For faced with a difficult situation, a large amount of information, or a short amount of time to make a choice, decision-makers rely on heuristics, which are very beneficial when making a quick, acceptable conclusion. However, this can occasionally lead to behavioural biases (mistakes) in decision-making.

According to Schinckus (2011), behavioural finance is a novel method to studying financial reality that takes into consideration the psychological aspect of investing. Brahmana et al. (2012) proposed a model that connected behavioural biases to individual investment decisions. Chandra and Sharma (2010) carried out research to uncover significant behavioural biases that impact individual investor behaviour and, as a result, may generate a momentum effect in stock returns. Individual investor behaviour is influenced by psychological variables such as conservatism, underconfidence, opportunism, representativeness, and informational inferiority complex, according to their research.

Theoretical Framework



Research Hypothesis

H1. Financial literacy has a significant Impact on Investment Decisions through Investor's Self Attribution Bias.

H2: Financial literacy significantly impact Investment Decisions through Investor's Illusion of Control Bias.

H3: Financial literacy has a significant impact on Investment Decisions through Investor's Hindsight Bias.

Research Methodology

The population comprises on the individual financiers listed with Islamabad and Rawalpindi brokerage / investment houses and PSX in Islamabad Pakistan. The sample was selected at random specific in terms of characteristics of participants being individual investors listed with brokerage / investment houses and PSX in Islamabad and Rawalpindi using convenience sampling. To gather data for analysis, the study used an online as well as a self-administered questionnaire-based survey of structured questions. Total 244 responses were received from both methods; online 207 responses and self-administered questionnaire 37 responses. After excluding the missing values responses, the size of the respondents selected for analysis are 217 Individual investors.

Reliability of Instruments

Table 1. Reliability of Instruments

Variables	No. of Items	Cronbach's Alpha
Financial Literacy	7	0.879
Self-Attribution Bias	5	0.799
The illusion of Control Bias	3	0.960
Hindsight Bias	4	0.859
Investment Decisions	7	0.747
Total	19	0.848

Results

Frequency Distribution and Descriptive Statistics

Frequency distribution with respect to demographic variables i.e. gender, age, education, and income has been shown in table 2, 3, 4, 5 followed by descriptive statistics of study variables in table 6 respectively.

Table 2. Frequency Distribution with respect to "Gender".

Gender	Frequency	Percentage (%)
Male	166	76.5
Female	51	23.5
Total	217	100

Table 2 shows that male respondents account for 53.5 percent (116 males), while female respondents account for 46.5 percent (101 females) of the total 217 respondents. The findings indicate that male respondents 116 outnumber female respondents in this research sample. While the gap in numbers is not significant, the explanation for the lower number of female respondents may be due to a lack of gender diversity in financial institutions.

Table 3. Frequency Distribution with respect to "Age"

Age	Frequency	Percentage (%)
20 and below Years	04	1.8
21 to 30 Years	98	45.2
31 to 40 Years	65	29.9
41-50 Years	40	18.5
51 and above Year	10	4.6
Total	217	100

Table 3 shows the response rate of respondents according to their age. According to the aforementioned table, respondents between the ages of 21 to 30 years received the highest percentage of responses 98 (45.2%). Then, 04 respondents were under the age of 20, while 65, 40, and 10 were between the ages of 31-40, 41-50, and 51 and beyond, respectively.

Table 4. Frequency Distribution with respect to "Education"

Education	Frequency	Percentage (%)
Bachelors	75	34.6
Masters	97	44.7
MS/ Mphil	43	19.8
PhD	02	0.9
Total	217	100

Table 4 shows detail on the educational backgrounds of the respondents. According to the findings, respondents with a Master's degree had the highest response rate, with 97 (44.7 percent) out of 217 responding. In their profession, 43 respondents have M.Phil/MS degrees, while 02 have Ph.D. degrees. In this research sample, 75 respondents had bachelor's degrees, as seen in the table above.

Table 5. Frequency Distribution with respect to "Income"

Number of Responses (N=217)		
Income	Frequency	Percentage (%)
Below 25000	4	1.8
25000-50000	35	16.1
50,001-75,000	36	16.6
75,001-100,000	105	48.4
Above 100,000	37	17.1
Total	217	100

Table 5 reveals information about the monthly income of the respondents. As per the results, the highest rate of response is from the respondents earning between 750,001-100,000 Rs on monthly basis i.e. 105 (48.4 %) out of 217 total respondents. 37 respondents earn above 100,000 Rs monthly whereas 36 respondents earn between 50,001-75,000 Rs on a Monthly basis. The above table also shows that 35 respondents earn between 25,000-50,000 monthly in this research study.

Table 6. Descriptive Statistics

Variables	Mean	Std. Deviation
FL	2.5405	.38671
SAB	2.3346	.41226

ICB	2.3149	.55894
HB	2.3030	.47271
ID	2.6926	.37191

Where ID = Investment Decision, FL= Financial Literacy, SAB= Self Attribution Bias, ICB= Illusion of Control Bias, HB =Hindsight Bias

The outcomes of data obtained by applying descriptive statistics to all research variables, are revealed in the above table (Table 6). The mean values against the sample variables in the above table signify whether the responses of the respondents are positive or negative. Financial Literacy, Self-Attribution Bias, Illusion of Control Bias, Hindsight Bias, and Investment Decisions have mean values of 2.5405, 2.3346, 2.3149, 2.3030 and 2.6926, with standard deviations of 0.38671, 0.41226, 0.55894, 0.47271 and 0.37191 respectively.

Inferential Statistics

Correlation Analysis and Regression Analysis techniques are used for computation of inferential analysis.

Correlation Analysis

Table 7. Correlation Analysis

		Self-Attribution Bias	Illusion of Control Bias	Hindsight Bias	Financial Literacy
ID	1				
SAB	-0.514**	1			
ICB	-0.506**	0.818**	1		
HB	-0.541**	0.947**	0.889**	1	
FL	0.889**	-0.572**	-0.578**	-0.589**	1

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

Where ID = Investment Decision, FL= Financial Literacy, SAB= Self Attribution Bias, ICB= Illusion of Control Bias, HB =Hindsight Bias

By summarising the values of Pearson's correlation coefficient, the findings of table 7 show that there is a substantial correlation among all variables. The findings in the table above reveal that FL is positively associated towards Investment Decisions at a correlation coefficient of 0.889 with significant results. However, FL is negatively associated with SAB at a 5% degree of significance, with a correlation coefficient of -0.572. The ICB is also negatively related to FL, with a statistically meaningful correlation coefficient of -0.578 at the 5% level of importance. HB has a statistically meaningful correlation coefficient of -0.589 for FL at the 5% level of importance. All Pearson Correlation Coefficient values of -0.514,-0.506, and -0.541 indicate that Investment Decisions is negatively associated with SAB, ICB and HB individually and at the 5% degree of importance, their associations are notable. Furthermore, with correlation coefficients of 0.818 and 0.947, SAB is positively associated with ICB and HB respectively. In addition, with a correlation coefficient of 0.889, ICB is positively associated with HB. Finally, we can draw that all the elements of research, including FL, Investment Decisions, SAB, ICB, and HB, are moderately but substantially associated with each other towards. However, FL is positively associated with Investment Decisions, whereas, FL is associated with SAB, ICB and HB in a negative direction.

Regression Analysis

Table 8. Path A to Self-Attribution Bias

Path A to Self-Attribution Bias			N = 217		
	Constant	Beta	R^2	T	P
Financial Literacy	5.884	-0.537	0.327	-10.224	0.000

Table 8 indicates that the model and results both are significant (p<0.05), hence, FL is a negative predictor of Self Attribution Bias. It also shows that 32.7 % (R Square=0.327) variance is caused by FL to Self-Attribution Bias. Moreover, the beta co-efficient value of FL for Self Attribution Bias is measured at -0.537 indicating that it has a negative and significant association with Investor's Self Attribution Bias.

Table 9. Path A to Illusion of Control Bias

Path A to Illusion of Control Bias			N = 217		
	Constant	Beta	R^2	T	P
Financial Literacy	4.437	-0.400	0.334	-10.383	0.000

Table 9 indicates that the model and results both are significant (p<0.05), hence, FL is a bad predictor of Illusion of Control Bias. It also shows that 33.4 % (R Square=0.334) variance is caused by FL to Illusion of Control Bias. Moreover, the beta co-efficient value of FL for the Illusion of Control Bias is measured at -0.400 which indicates that FL has a negative and significant association with Investor's Illusion of Control Bias and it confirms our study hypothesis (H2) that it has a significant impact on Investor's Illusion of Control Bias.

Table 10. Path A to Hindsight Bias

Path A to Hindsight Bias			N = 217		
	Constant	Beta	R^2	t	P
Financial Literacy	4.132	-0.482	0.347	-10.683	0.000

Table 10 indicates that the model and results both are significant (p<0.05), hence, FL is a bad predictor of Hindsight Bias. It also shows that 34.7 % (R Square=0.347) variance is caused by FL to Hindsight Bias. Moreover, the beta co-efficient value of FL for Hindsight Bias is measured at -0.482 indicating that it has a negative and significant association with Investor's Hindsight Bias.

Table 11. Path B to Investment Decisions (DV)

Path B to Investment Decisions (DV)			N = 217		
	Constant	Beta	R^2	T	P
Self-Attribution Bias	3.775	-0.464	0.264	-8.786	0.000

Table 11 indicate that the model and results both are significant (p<0.05), hence, Self-Attribution Bias is a bad predictor of Investment Decisions. It also shows that 26.4 % (R Square=0.264) variance is caused by Self Attribution Bias to Investment Decisions. Moreover, the beta co-efficient value of Self Attribution Bias for Investment Decisions is measured at -0.464 indicates that Self Attribution Bias has a negative and significant association with Investor's Investment Decisions.

Table 12. Path B to Investment Decisions (DV)

Path B to Investment Decisions (DV)			N = 217		
	Constant	Beta	R^2	T	P
The illusion of Control Bias	3.471	-0.336	0.256	-8.595	0.000

Table 12 indicate that the model and results both are significant ($p<0.05$), hence, ICB is a bad predictor of Investment Decisions. It also shows that 25.6 % (R Square=0.256) variance is caused by ICB to Investment Decisions. Moreover, the beta co-efficient value of ICB for Investment Decisions is measured at -0.336 which indicates that ICB has a negative and significant relationship with Investor's Investment Decisions.

Table 13. Path B to Investment Decisions (DV)

Path B to Investment Decisions (DV)			N = 217		
	Constant	Beta	R^2	T	P
Hindsight Bias	3.672	-0.425	0.292	-9.427	0.000

Table 13 indicate that the model and results both are significant ($p<0.05$), hence, Hindsight Bias is a bad predictor of Investment Decisions. It also shows that 29.2 % (R Square=0.292) variance is caused by Hindsight Bias to Investment Decisions. Moreover, the beta co-efficient value of Hindsight Bias for Investment Decisions is measured at -0.425 which indicates that Hindsight Bias has a negative and significant association with Investor's Investment Decisions.

Table 14. Path C to Investment Decisions (DV)

Path C to Investment Decisions (DV)			N = 217		
	Constant	Beta	R^2	T	P
Financial Literacy	0.520	0.855	0.791	28.525	0.000

Table 14 shows that the model and results both are significant ($p<0.05$), hence, FL is a strong predictor of Investment Decisions. It also shows that 79.1 % (R Square=0.791) variance is caused by FL to Investment Decisions. Moreover, the beta co-efficient value of value of 0.855 indicates that FL has a positive and significant association with Investor's Investment Decisions

Regression Analysis for Mediation to check the Partial or Full Mediation

Path A, Path B, and Path C regression analysis above indicate the significant associations and fulfill the basic requirement of mediation. Now we can investigate mediating roles of behavioural biases involving Financial Literacy (IV) and Investment Decisions (DV).

Table 15. Results for Mediation

	Beta	T	P
FL	0.853	22.777	0.000
SAB	0.119	1.348	0.179
ICB	0.083	1.805	0.072
HB	-0.200	-2.079	0.039

Where FL= Financial Literacy, SAB= Self Attribution Bias, ICB= Illusion of Control Bias, HB =Hindsight Bias

The results of the above table indicate that Illusion of Control Bias (Beta 0.083 at 0.1 significance level ($p<0.1$)) and Hindsight Bias (Beta -0.200 at 0.05 significance level ($p<0.05$)) partially mediates the relationship between FL and Investment Decisions, whereas, Self-Attribution Bias does not represent significant results ($p>0.1$) indicating that FL has a strong positive and significant association with Investor's Investment Decisions, however,

only two of the understudy behavioural biases; Illusion of Control Bias and Hindsight Bias partially mediates the relationship between FL and Investment Decisions. The above results also show that Self Attribution Bias does not represent significant results, hence, our study hypothesis (H8) that behavioural biases mediates the relation between FL and Investor's Investment Decisions is partially fulfilled.

Conclusion

It is concluded through the findings of our research that individual investors who are financially literate and aware of behavioural biases, as well as other market-driven factors influencing their investing, will be able to make better decisions. Individual investor's behavioural biases such as self-attribution bias, the illusion of control bias, and hindsight bias of Rawalpindi and Islamabad have a negative relationship with FL. As a result, enhancing FL in Islamabad and Rawalpindi will mitigate the harmful consequences of these behavioural biases on investors. Profitable strategies are more important to stock market investors than losing tactics. As a result, investors must be aware of and cautious against behavioural biases while seeking to become financially educated in order to make profitable investments.

Individual investors make mistakes when selecting shares and stocks, no matter how careful they are with their investments. According to the majority of studies, investors behave in a variety of ways and do not always make sensible decisions. The vast majority of individual investors rely on instinctive and automatic processes to make their decisions, rather than planned and controlled methods. One sort of reason of such behaviour in behavioural finance is external cues such as television photographs, publications, and study results; however, the second type is principally dependent on the fact that individual investors are human beings who experience a spectrum of emotions that are driven by behavioural biases when making investment decisions.

Another conclusive decision drawn from our study is that an individual investor who understands the financial market critically makes more rational and prudent choices, whereas a novice investor is more prone to make poor investment judgments. Individual investors must be cautious and well-versed in the sector through FL to get the most out of financial transactions.

Our findings fit with the prospect theory, which states that when faced with risk and volatility, investors are influenced by a range of assumptions that lead to irrational behaviour. It also backs up the notion that acknowledging the effects of behavioural biases on the investment process will improve economic outcomes and help people meet their financial goals. Simply detecting behavioural biases at the right time can help you protect your investments. It can also be concluded that individual investors can be encouraged to participate more aggressively in stock markets by using a financially literate approach to mitigate the impacts of behavioural biases. Because these financial offers are rather complex instruments to understand for new individual investors, investors must be financially literate in order to make the best investing selections and take advantage of developing investment opportunities.

After thorough results, analysis, findings, discussions and conclusions; it is recommended that FL is an important requirement of our Pakistani investing/ financial markets to make better decisions. Well informed, rationale and unbiased strategies are more important to individual investors of Pakistan to be aware and cautious against behavioural biases while making effective and long-term investments. Behavioural biases and its effects must be heightened by Pakistan government, financial institutions and educational institutions and make swift and concentrated efforts to make them learn FL. Moreover, understanding of financial markets must be imparted critically with FL so they make more rational and prudent choices. Individual investors can be encouraged to participate more aggressively in

stock markets by using a financially literate approach to mitigate the impacts of behavioural biases.

All the potential investors are reliant on the provision of chances to learn, acquire, and improve essential life skills that they will require now and, more significantly, tomorrow as successful investors. To develop a new paradigm, the topic of investor sentiments caused by behavioural biases and FL should be brought out of the shadows in medium to higher education in Pakistan. Individual investors are recommended to be cautious and well-versed with behavioural biases and deal with the adverse effects of these biases through FL to get the most out of financial investments.

References

Agrawal, S., & Goyal, N. (2017). Near-Optimal Regret Bounds for Thompson Sampling. *Journal of the ACM*, *64*(5), 1–24. https://doi.org/10.1145/3088510.

Baker, H. K. & Filbeck, G. (2013). Paradigm shifts in finance – some lessons from the financial crisis. *European Financial Review*, 12-18. https://www.europeanfinancialreview.com/paradigm-shifts-in-finance-%E2%88%92-some-lessons-from-the-financial-crisis/.

Baker, H. K., & Nofsinger, J. R. (2002). Psychological biases of investors. Financial Services Review, 11(2), 97-116. https://www.proquest.com/openview/71733cc3dac821b5a48b3a06bf8da7ca/1?pq-origsite=gscholar&cbl=31458.

Banks, J., & Oldfield, Z. (2007). Understanding Pensions: Cognitive Function, Numerical Ability and Retirement Saving. *Fiscal Studies*, *28*(2), 143–170. https://doi.org/10.1111/j.1475-5890.2007.00052.x.

Barber, B. M., & Odean, T. (2001). Boys will be Boys: Gender, Overconfidence, and Common Stock Investment. *The Quarterly Journal of Economics*, *116*(1), 261–292. https://doi.org/10.1162/003355301556400.

Bettman, J. R., & Weitz, B. A. (1983). Attributions in the Board Room: Causal Reasoning in Corporate Annual Reports. *Administrative Science Quarterly*, *28*(2), 165. https://doi.org/10.2307/2392616.

Biais, B., & Weber, M. (2009). Hindsight Bias, Risk Perception, and Investment Performance. *Management Science*, *55*(6), 1018–1029. https://doi.org/10.1287/mnsc.1090.1000.

Billett, M. T., & Qian, Y. (2008). Are Overconfident CEOs Born or Made? Evidence of Self-Attribution Bias from Frequent Acquirers. *Management Science*, *54*(6), 1037–1051. https://doi.org/10.1287/mnsc.1070.0830.

Bradley, J. V. (1981). Overconfidence in ignorant experts. *Bulletin of the Psychonomic Society*, *17*(2), 82–84. https://doi.org/10.3758/bf03333674.

Bukszar, E., & Connolly, T. (1988). Hindsight Bias and Strategic Choice: Some Problems in Learning from Experience. *Academy of Management Journal*, *31*(3), 628–641. https://doi.org/10.5465/256462.

Calvet, L. E., Campbell, J. Y., & Sodini, P. (2006). Down or Out: Assessing the Welfare Costs of Household Investment Mistakes. *SSRN Electronic Journal*, *115*(5), 707–747. https://doi.org/10.2139/ssrn.881768.

Camerer, C., Loewenstein, G., & Weber, M. (1989). The Curse of Knowledge in Economic Settings: An Experimental Analysis. *Journal of Political Economy*, *97*(5), 1232–1254. https://doi.org/10.1086/261651.

Cooper, D. R. & Schindler, P. S. (2003). *Business Research Methods*. 8th Edition, McGraw-Hill Irwin, Boston.

Cude, B. (2006). *Conference College Students and Financial Literacy: What They Know and What We Need to Learn.* Eastern Family Economics and Resource Management Association 2006 (pp. 102–109). https://www.fermascholar.org/wp-content/uploads/2013/07/22-college-students-and-fin-literacy.pdf.

Dhar, R., & Zhu, N. (2006). Up Close and Personal: Investor Sophistication and the Disposition Effect. *Management Science*, *52*(5), 726–740. https://doi.org/10.1287/mnsc.1040.0473.

Doukas, J. A., & Petmezas, D. (2007). Acquisitions, Overconfident Managers and Self-attribution Bias. *European Financial Management*, *13*(3), 531–577. https://doi.org/10.1111/j.1468-036x.2007.00371.x.

Durand, R. (2003). Predicting a firm's forecasting ability: the roles of organizational illusion of control and organizational attention. *Strategic Management Journal*, *24*(9), 821–838. https://doi.org/10.1002/smj.339.

Epstein, L. G., & Zin, S. E. (1990). "First-order" risk aversion and the equity premium puzzle. *Journal of Monetary Economics*, *26*(3), 387–407.

https://doi.org/10.1016/0304-3932(90)90004-n

Ernandes, D., Lynch, J. G., & Netemeyer, R. G. (2014). Financial Literacy, Financial Education, and Downstream Financial Behaviors. *Management Science*, *60*(8), 1861–1883. https://doi.org/10.1287/mnsc.2013.1849.

Fama, E. F. (1997). Market Efficiency, Long-Term Returns, and Behavioral Finance. *SSRN Electronic Journal*, *49*(3), 283–306. https://doi.org/10.2139/ssrn.15108.

Fellner, G. (2009). Illusion of Control as a Source of Poor Diversification: Experimental Evidence. *Journal of Behavioral Finance*, *10*(1), 55–67. https://doi.org/10.1080/15427560902740006.

Fenton-O'Creevy, M., Nicholson, N., Soane, E., & Willman, P. (2003). Trading on illusions: Unrealistic perceptions of control and trading performance. *Journal of Occupational and Organizational Psychology*, *76*(1), 53–68. https://doi.org/10.1348/096317903321208880.

Frederick, S. (2005). Cognitive Reflection and Decision Making. *Journal of Economic Perspectives*, *19*(4), 25–42. https://doi.org/10.1257/089533005775196732.

Friedman, J. & Kraus, W. (2011). *Engineering the Financial Crisis: Systemic Risk and the Failure of Regulation*. University of PA Press, PA.

Gervais, S., & Odean, T. (2001). Learning to Be Overconfident. *Review of Financial Studies*, *14*(1), 1–27. https://doi.org/10.1093/rfs/14.1.1.

Godden, B. (2004). Sample Size Formulas. Journal of Statistics, 3, 66. http://williamgodden.com/samplesizeformula.pdf.

Goodwin, P. (2010). Why Hindsight Can Damage Foresight. *Foresight: The International Journal of Applied Forecasting*, *17*, 5–7. https://ideas.repec.org/a/for/ijafaa/y2010i17p5-7.html.

Greenberg, J., Pyszczynski, T., & Solomon, S. (1982). The self-serving attributional bias: Beyond self-presentation. *Journal of Experimental Social Psychology*, *18*(1), 56–67. https://doi.org/10.1016/0022-1031(82)90081-6.

Grou, B., & Tabak, B. M. (2008). Ambiguity Aversion and Illusion of Control: Experimental Evidence in an Emerging Market. *Journal of Behavioral Finance*, *9*(1), 22–29. https://doi.org/10.1080/15427560801897162.

Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.

Hirshleifer, D. A. (2001). Investor Psychology and Asset Pricing. *SSRN Electronic Journal*, *56*(4), 1533–1597. https://doi.org/10.2139/ssrn.265132.

Hoffmann, A. O. I., & Post, T. (2014). Self-attribution bias in consumer financial decision-making: How investment returns affect individuals' belief in skill. *Journal of Behavioral and Experimental Economics*, *52*, 23–28. https://doi.org/10.1016/j.socec.2014.05.005.

Jappelli, T., & Padula, M. (2013). Investment in financial literacy and saving decisions. *Journal of Banking & Finance*, *37*(8), 2779–2792. https://doi.org/10.1016/j.jbankfin.2013.03.019.

Jonsson, S., Söderberg, I.-L., & Wilhelmsson, M. (2017). An investigation of the impact of financial literacy, risk attitude, and saving motives on the attenuation of mutual fund investors' disposition bias. *Managerial Finance*, *43*(3), 282–298. https://doi.org/10.1108/mf-10-2015-0269.

Kahneman, D., & Lovallo, D. (1993). Timid Choices and Bold Forecasts: A Cognitive Perspective on Risk Taking. *Management Science*, *39*(1), 17–31. https://doi.org/10.1287/mnsc.39.1.17.

Kahneman, D., & Riepe, M. W. (1998). Aspects of Investor Psychology. *The Journal of Portfolio Management*, *24*(4), 52–65. https://doi.org/10.3905/jpm.1998.409643.

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–292.

Kim, Y. H. (Andy). (2013). Self Attribution Bias of the CEO: Evidence from CEO Interviews on CNBC. *SSRN Electronic Journal*, *37*(7), 2472–2489. https://doi.org/10.2139/ssrn.2213119.

Klapper, L., Lusardi, A., & Panos, G. A. (2013). Financial literacy and its consequences: Evidence from Russia during the financial crisis. *Journal of Banking & Finance*, *37*(10), 3904–3923. https://doi.org/10.1016/j.jbankfin.2013.07.014.

Kombo, K. D. & Tromp, L. A. D. (2006). *Proposal and thesis writing: an introduction*. Nairobi: Pauline Publications Africa.

Kumar, S., & Goyal, N. (2016). Evidence on rationality and behavioural biases in investment decision making. *Qualitative Research in Financial Markets*, *8*(4), 270–287. https://doi.org/10.1108/qrfm-05-2016-0016.

Kumari D.A.T., & Ferdous Azam S. M. (2019). The Mediating Effect of Financial Inclusion on FL and Women's Economic Empowerment: A Study Among Rural Poor Women in Sri Lanka. *International Journal of Scientific & Technology Research, 8*(12).

Langer, E. J. (1975). The Illusion of Control. *Journal of Personality and Social Psychology, 32*(2), 311-328.

Libby, R., & Rennekamp, K. (2011). Self-Serving Attribution Bias, Overconfidence, and the Issuance of Management Forecasts. *Journal of Accounting Research*, *50*(1), 197–231. https://doi.org/10.1111/j.1475-679x.2011.00430.x.

Lin, H. W. (2011). Elucidating rational investment decisions and behavioral biases: Evidence from the Taiwanese stock market. *African Journal of Business Management, 5*(5), 1630-1641.

Loibl, C., & Hira, T.K. (2005). Self-directed Financial Learning and Financial Satisfaction. *Journal of Financial Counseling and Planning, 16*(1), 11-21. https://www.proquest.com/openview/a77005a77c40e59f1232036c33260863/1?pq-origsite=gscholar&cbl=38873.

Lubinski, D., & Humphreys, L. G. (1997). Incorporating general intelligence into epidemiology and the social sciences. *Intelligence*, *24*(1), 159–201. https://doi.org/10.1016/s0160-2896(97)90016-7.

Lusardi, A., & Mitchell, O. S. (2007). Financial Literacy and Retirement Preparedness: Evidence and Implications for Financial Education Programs. *SSRN Electronic Journal*, *42*(1), 35–44. https://doi.org/10.2139/ssrn.957796.

Madarasz, K. (2009). Information Projection: Model and Applications. *SSRN Electronic Journal*, 1–31. https://doi.org/10.2139/ssrn.1407190.

Martin, D. J., Abramson, L. Y., & Alloy, L. B. (1984). Illusion of control for self and others in depressed and nondepressed college students. *Journal of Personality and Social Psychology*, *46*(1), 125–136. https://doi.org/10.1037/0022-3514.46.1.125.

McKenna, F. P. (1993). It won't happen to me: Unrealistic optimism or illusion of control? *British Journal of Psychology*, *84*(1), 39–50. https://doi.org/10.1111/j.2044-8295.1993.tb02461.x.

Mellenbergh, G. J. (2008). *Chapter 10: Tests and questionnaires: Construction and administration. In H. J. Adèr & G. J. Mellenbergh (Eds.) (with contributions by D. J. Hand), Advising on research methods: A consultant's companion* (pp. 211–234). Huizen, The Netherlands: Johannes van Kessel Publishing.

Miller, D. T., & Ross, M. (1975). Self-serving biases in the attribution of causality: Fact or fiction? *Psychological Bulletin*, *82*(2), 213–225. https://doi.org/10.1037/h0076486.

Miller, K. D., & Shapira, Z. (2004). An empirical test of heuristics and biases affecting real option valuation. *Strategic Management Journal*, *25*(3), 269–284. https://doi.org/10.1002/smj.374.

Nisbett, R. E. & Ross, L. (1980). *Human Inference: Strategies and Shortcomings of Social Judgment*. Prentice-Hall.

Noctor, M., Stoney, S. & Stradling, R. (1992). *"FL", a report prepared for the National Westminster bank.* London.

Pezzo, M. V., & Beckstead, Jason. W. (2008). The effects of disappointment on hindsight bias for real-world outcomes. *Applied Cognitive Psychology*, *22*(4), 491–506. https://doi.org/10.1002/acp.1377.

Pompian, M. M. (2006). *Behavioral Finance and Wealth Management*. United States of America: Hohn Wiley& Sons, Icnc., Hoboken, New Jersey.

Pompian, M. M. (2011). *Behavioral Finance and Wealth Management: how to Build Investment Strategies That account for Investor Biases (Vol. 667)*. JohnWiley and Sons, New York, NY.

Rasool, N., & Ullah, S. (2020). Financial literacy and behavioural biases of individual investors: empirical evidence of Pakistan stock exchange. *Journal of Economics, Finance and Administrative Science*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/jefas-03-2019-0031.

Remund, D. L. (2010). Financial Literacy Explicated: The Case for a Clearer Definition in an Increasingly Complex Economy. *Journal of Consumer Affairs*, *44*(2), 276–295. https://doi.org/10.1111/j.1745-6606.2010.01169.x.

Roy, B., & Jain, R. (2018). A study on level of FL among Indian women. *IOSR Journal of Business and Management, 20*(5), 19–24.

Rudski, J. (2004). The illusion of control, superstitious belief, and optimism. *Current Psychology*, *22*(4), 306–315. https://doi.org/10.1007/s12144-004-1036-8.

Sevim, N., Temizel, F., & Sayılır, Ö. (2012). The effects of financial literacy on the borrowing behaviour of Turkish financial consumers. *International Journal of Consumer Studies*, *36*(5), 573–579. https://doi.org/10.1111/j.1470-6431.2012.01123.x.

Shefrin, H., & Statman, M. (1985). The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence. *The Journal of Finance*, *40*(3), 777–790. https://doi.org/10.1111/j.1540-6261.1985.tb05002.x.

Shiller R. J. (2000). *Irrational exuberance*. Princeton, New Jersey, Princeon University.

Simon, M., Houghton, S. M., & Aquino, K. (2000). Cognitive biases, risk perception, and venture formation. *Journal of Business Venturing*, *15*(2), 113–134. https://doi.org/10.1016/s0883-9026(98)00003-2.

Statman, M. (1995, December). *Behavioral finance versus standard finance*. In AIMR conference Proceedings, 14-22. Association for Investment Management and Research.

Sundarasen, S. D. D., Rahman, M. S., Othman, N. S., & Danaraj, J. (2016). Impact of FL, financial socialization agents, and parental norms on money management. *Journal of Business Studies Quarterly, 8*(1), 140-156.

Takeda, K., Takemura, T., & Kozu, T. (2013). Investment Literacy and Individual Investor Biases: Survey Evidence in the Japanese Stock Market. *The Review of Socionetwork Strategies*, *7*(1), 31–42. https://doi.org/10.1007/s12626-012-0031-z.

Tchai, T. (2012). The hindsight bias effect in short-term investment decision-making. *Universal Journal of Management and Social Sciences, 2*(11), 201-212.

Thaler, R. H. (1999). The End of Behavioral Finance. *Financial Analysts Journal*, *55*(6), 12–17. https://doi.org/10.2469/faj.v55.n6.2310.

Thompson, S. C., Armstrong, W., & Thomas, C. (1998). Illusions of control, underestimations, and accuracy: A control heuristic explanation. *Psychological Bulletin*, *123*(2), 143–161. https://doi.org/10.1037/0033-2909.123.2.143.

Van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial Economics*, *101*(2), 449–472.

https://doi.org/10.1016/j.jfineco.2011.03.006.

Volpe, R. P., Chen, H. & Pavlicko, J. J. (1998). Personal investment literacy among college students: a survey. *Financial Practice and Education, 6*(2), 86-94.

Zucchi, K. (2018). "Why FL is so important". www.investopedia.com/articles/investing/100615/why-financial-literacy-and-education-so-important.asp

Zuckerman, M. (1979). Attribution of success and failure revisited, or: The motivational bias is alive and well in attribution theory. *Journal of Personality, 47*(2), 245–287. https://doi.org/10.1111/j.1467-6494.1979.tb00202.x.