The Influence of Overconfidence on Trading Frequency: The Mediating Role of Risk Perception and the Moderating Role of Financial Literacy

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Abstract: One of the most widespread and damaging behavioral biases in financial decision-making is overconfidence, but the effects of this bias on the trading behavior are understudied. This paper will explore the role of overconfidence on the frequency of trade among Pakistani retail investors, where risk perception will be one of the mediating variables, and financial literacy will be one of the moderating variables. Primary data was gathered on 350 retail investors, who actively trade at the Pakistan Stock Exchange using digital trading platforms, like CDC Access, Finja, and Sadapay in Karachi, Lahore, and Islamabad, by using a quantitative cross-sectional research design. The analysis of data was done through SPSS and PROCESS Macro (Model 7) to analyze moderated mediation. The results demonstrate that overconfidence contributes a lot to trading frequency. This relationship is partly mediated by the risk perception, whereby more confident investors tend to perceive the less risky financial risks, and this in turn causes them to trade more often. Moreover, financial literacy has a significant moderating effect, with higher financial literacy resulting in a weaker mediation. These results have significant implications for financial regulators, brokerage firms, and investor education programs in emerging markets. Keywords: Overconfidence, Trading Frequency, Risk Perception, Financial Literacy, Moderated Mediation, Pakistan Stock Exchange, Retail Investors.

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1. Introduction

1.1 Background of the Study

The accelerated democratization of financial markets with digital trading platforms has seen an unprecedented influx of retail investors across the globe. Pakistan has witnessed a phenomenal growth in stock market participation, with the retail investor base in the Pakistan Stock Exchange (PSX) growing by a phenomenal 300 percent in the past five years; hence, the figure of 0.9 million stock market participants in 2024, as compared to 0.22 million in 2019 (State Bank of Pakistan, 2024) [1]. The increase in new, often inexperienced, retail investor has posed some significant questions about the quality of their trading decisions and the behavioral biases that affect their behavior.

Out of the diverse cognitive biases that have been reported in the behavioral finance literature, overconfidence is one of the strongest and most impactful (Moore and Healy, 2008 [2], Yao, 2025) [3]. Systematic overconfident investors overestimate their own knowledge and trading abilities, and their future price prediction capacity. According to a considerable amount of literature, it has been confirmed that overconfidence causes excessive trading, or as it has been referred to, overtrading, which further causes low net returns because of high transaction costs and bad market timing (Barber and Odean, 2001 [4], Odean, 1999) [5].

These trends are confirmed by recent empirical evidence in emerging markets. Khan (2025) [6] discovered that overconfidence has a positive effect on trading frequency, with highly confident investors making up to 20 trades in a month, with a more risky profile, and returns that are variable. Shunmugasundaram and Sinha (2025) [7] established that behavioral biases affect investment decisions in the serial mediation of overconfidence and disposition effects. Moreover, Jain (2023) [8] developed that risk perception partially mediates the correlation between overconfidence bias and investment decision-making in individual equity investors.

In the Pakistani context specifically, Gilani (2025) [9] investigated the association between investor overconfidence, risk perception, and stock market volatility, finding that investor overconfidence has a significant effect on risk perception, which then enhances market volatility. Malik (2024) [10] investigated the effects of cognitive and emotional biases on investment decisions of PSX retail investors, using risk perception as a mediator. These studies underscore the importance of learning the behavioral biases in new financial markets.

1.2 Rationale

It is important to realize the connection between overconfidence and frequency of trading due to four reasons. One, too much trading destroys the wealth of investors in the form of commissions, bid-ask spreads, and bad judgment. Second, a brokerage firm and fintech trading applications frequently create interfaces that promote trading frequently, which could be exploited to make a profit by taking advantage of overconfidence bias (Sushmitha and Sobha Rani, 2025) [11]. Third, in Pakistan, financial regulators are formulating investor protection guidelines and need evidence-based policies to guide policy formulation. Fourth, the buffering effect of financial literacy on overconfidence has important implications for investor education programs (Raut and Kumar, 2023) [12].

1.3 Research Gap

Despite the rich body of literature regarding overconfidence and trading in the Western markets, multiple gaps are evident in the literature. Firstly, it has a significant geographical distance with most studies being conducted on developed markets such as the United States, the United Kingdom, and European nations with very minimal empirical data about emerging markets such as Pakistan where the investor demographics, regulatory regimes, and financial literacy levels, and the cultural attitudes towards risk are significantly different than those in the West (Barber and Odean, 2001; Glaser and Weber, Second, the mediating mechanisms between overconfidence and trading frequency are not studied in the literature theoretically because risk perception has been infrequently tested as a mediator in a consistent and equal framework, although theoretical reasoning suggests that overconfidence has a behavioral impact by reducing the risk of risk perception (Jain 2023; Malik 2024). Third, the moderation gap, since the moderating effect of financial literacy on the connection between overconfidence and trading frequency has rarely been investigated, even though the moderating effect of financial literacy is theoretically supposed to act as a buffer to the impact of the cognitive biases (Raut and Kumar, 2023; Ahmad and Shah, 2020) [13]. Fourth, the methodology lacks a gap because prior research has been largely dependent on data on brokerage accounts and trading history to measure actual trading behavior, with few studies using primary data gathered via surveys to measure psychological constructs like overconfidence, risk perception, and financial literacy directly among the investors (Sushmitha & Sobha Rani, 2025; Yao, 2025). These intersecting gaps are filled in the current study through the proposed and empirically tested moderated mediation model in the Pakistani context, which extends the behavioral finance theory to a poorly studied emerging market.

1.4 Problem Statement

In Pakistan, retail investors are increasingly trading online, but the psychological factors and the underlying processes behind the overtrading phenomenon are not well understood. Retail participation in the Pakistan Stock Exchange has been experiencing a dramatic increase, with individual investors increasing by nearly 300 percent since 2019, and retail investors increasing since 2019, which was about 0.22 million moving to over 0.9 million in 2024 (State Bank of Pakistan, 2024). Although this has been a fast-growing trend, it has been shown that most of these new investors do not have sufficient financial literacy, with the State Bank of Pakistan

(2023) reporting that only 26 percent of Pakistani adults exhibit basic financial literacy. One of the strongest and most damaging cognitive biases reported in the field of behavioral finance is overconfidence, which causes investors to overrate their skills in trading and predicting market trends (Moore and Healy, 2008; Yao, 2025). Studies have continually shown that overconfident investors make more trades, pay more transaction costs, and make lower net returns (Barber and Odean, 2001; Odean, 1999). Recent findings in the Pakistani context further affirm that overconfidence is a key factor in investor behavior (Gilani 2025; Khan 2025). Nevertheless, it is still unknown whether overconfidence contributes to the frequency of trading between Pakistani retail investors, and what is the psychological mechanism through which this effect is achieved.

In addition to that, whether or not financial literacy can offset the impact of overconfidence on risk perception and subsequent trading frequency is unknown. Theoretically, risk perception (an individual assessment of the subjective amount of financial losses) (Weber 2002) [14] is one of the most important mediating mechanisms; however, no research has directly examined this process in terms of Pakistani retail investors (Jain 2023; Malik 2024). Financial literacy as a moderating factor between overconfidence and risk perception and trading frequency is not studied in Pakistan (Raut and Kumar, 2023; Ahmad and Shah, 2020). The lack of empirical data poses the biggest problems to the Securities and Exchange Commission of Pakistan and the State Bank of Pakistan, both of which are formulating investor protection guidelines based on no evidence that are context-specific (State Bank of Pakistan, 2024). In their absence, regulators are unable to develop evidence-based policies, brokerage firms do not know how to develop ethical interfaces, financial educators cannot develop interventions that are specifically designed, and retail investors are susceptible to wealth-destroying overtrading. Thus, the present research attempts to fill these significant gaps by exploring the impact of overconfidence on the frequency of trading by using the mediating effect of risk perception and the moderating effect of financial literacy amongst Pakistani retail investors.

1.5 Research Objectives

No.	Objective
RO1	To examine the direct effect of overconfidence on trading frequency among Pakistani retail investors.
RO2	To test the mediating role of risk perception in the relationship between overconfidence and trading frequency.
RO3	To test the moderating role of financial literacy on the mediated relationship of this study.
RO4	To provide policy recommendations for financial regulators and brokerage firms in Pakistan based on empirical findings.

1.6 Research Questions

No.	Question
RQ1	Does overconfidence significantly increase trading frequency among retail investors?
RQ2	Does risk perception mediate the relationship between overconfidence and trading frequency?
RQ3	Does financial literacy moderate the indirect effect of overconfidence on trading frequency through risk perception?

1.7 Significance and Scope of the Study

This study has great importance at the academic, regulatory, industrial, and individual investor levels. In terms of scholarly research, this study adds to the body of literature on behavioral finance by hypothesizing and testing a moderated mediation model that mediates overconfidence on the frequency of trading via risk perception, with financial literacy as a boundary condition. Regulatory-wise, this research can be of critical empirical insight to the Securities and Exchange Commission of Pakistan (SECP) and the State Bank of Pakistan (SBP), which are now in the process of coming up with investor protection guidelines. Industrially, these findings can be used by brokerage firms and fintech trading apps to create ethical interfaces. As a personal investor, this research will create awareness of the cost of overconfidence and overtrading that is not obvious.

This study will be geographically limited to three major metropolitan cities of Pakistan: Karachi, Lahore, and Islamabad. The paper focuses on retail investors who actively trade in the Pakistan Stock Exchange using digital platforms in terms of the population. This quantitative cross-

sectional study has a methodological research design that uses primary data collected in the form of a structured questionnaire with 5-point Likert scales.

2. Literature Review

2.1 Theoretical Foundation

The paper is based on four theoretical views that are complementary to each other. First, there is the Prospect Theory (Kahneman and Tversky, 1979) [15] that outlines how people analyze potential profits and losses in relation to a reference point and are loss-averse, and this implies that overconfident people tend to perceive less risk because they think that they can avoid losses by trading skillfully. Second, Overconfidence Bias Theory (Oskamp, 1965 [16] Moore and Healy, 2008) is defined as the systematic overestimation of knowledge, abilities, and the accuracy of judgments by people, which can be distinguished in three forms, namely, overestimation, overplacement, and overprecision. Third, Risk Perception Theory (Weber 2002; Sitkin and Pablo, 1992) [17] suggests that risk perception is a subjective appraisal of the likelihood and magnitude of the possible losses, and the overconfidence affects the risk perception by creating illusion of control and false optimism. Fourth, there is Financial Literacy Theory (Lusardi and Mitchell, 2014) [18], which postulates that financial literacy involves knowledge and comprehension of financial concepts, such as risk diversification, compounding, and market functioning. The combination of the four theories offers a holistic picture of the role of overconfidence in determining the frequency of trading based on the perception of risk and the moderating effect of financial literacy on that association.

2.2 Hypothesis-Wise Literature Review

H1: Overconfidence and Trading Frequency

Overconfident investors assume that they have better information, analytical ability, and timing than other investors (Glaser and Weber, 2007) [19]. Barber and Odean (2001) discovered that those who traded the most made significantly lower net returns than those who traded less frequently. Khan (2025) discovered that overconfidence had a positive impact on trading frequency. As shown by Sushmitha and Sobha Rani (2025), ease of trading significantly enhances overconfidence and frequency of trading. Yao (2025) showed that excessive trading results from overconfidence. Gilani (2025) discovered that overconfidence by investors considerably influences the risk perception and stock market volatility in Pakistan.

H1: Overconfidence has a positive and significant effect on trading frequency.

H2: The Mediating Role of Risk Perception

The perception of risk by overconfidence applies to the illusion of control (Langer, 1975) [20], unrealistic optimism (Weinstein, 1980) [21], and confirmation bias (Ricciardi, 2008) [22]. Jain (2023) discovered that risk perception mediates, in part, overconfidence bias and investment decision-making. Malik (2024) affirmed that risk perception mediates between thinking bias and investment decisions. The study by Gilani (2025) established that the relationship between investor overconfidence and stock market volatility is mediated by risk perception.

H2: Risk perception mediates the positive relationship between overconfidence and trading frequency.

H3: The Moderating Role of Financial Literacy

Financially literate people know that it is not easy to accurately predict the market and that there are transaction costs associated with trading (Lusardi and Mitchell, 2014). Raut and Kumar (2023) showed that online trading intention has a significant moderator of financial literacy. Alshebami et al. (2022) [23] discovered that social influence is related to saving behavior through financial literacy. Ahmad and Shah (2020) showed that the relationship between overconfidence and investment performance is mediated by financial literacy.

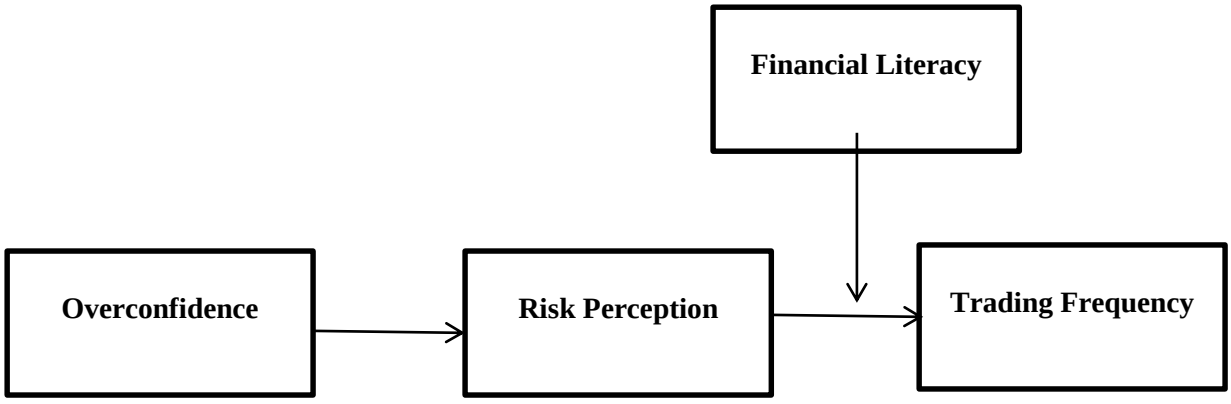
H3: Financial literacy moderates the indirect effect of overconfidence on trading frequency through risk perception, such that the mediated relationship is weaker for individuals with high financial literacy.

2.3 Summary of Hypotheses

Hypothesis	Statement
H1	Overconfidence → (+) Trading frequency
H2	Risk perception mediates (Overconfidence → Trading frequency)
H3	Financial literacy moderates the indirect effect (weaker for high financial literacy)

2.4 Research Model

The research model follows Preacher and Hayes (2008) [24] moderated mediation framework (Model 7).



3. Research Methodology

The research design used in this study is a quantitative, cross-sectional, and explanatory research design. The target group is the retail investors, who are avid users of the Pakistan Stock Exchange on the digital platforms in Karachi, Lahore, and Islamabad. Primary data were gathered through a mix of purposive and snowball sampling of 350 eligible respondents aged at least 18 years, with an active trading account, and who had completed at least five trades over the last three months. A structured online questionnaire was used to collect data in March and April 2026.

The questionnaire included 25 questions that assessed overconfidence (5 items based on Moore and Healy, 2008), risk perception (5 items based on Weber et al., 2002), financial literacy (5 items based on Lusardi and Mitchell, 2014), frequency of trading (5 items based on Barber and Odean, 2001), and demographic data (5 items Everything was based on a 5-point Likert scale (1 Strongly Disagree, 5 Strongly Agree). On a pilot test of 50 respondents, Cronbach's alpha values of the questionnaire were found to range between 0.78 and 0.88.

Analysis of data was done with the help of SPSS version 26 and SPSS Model 7 (PROCSS Macro). Bootstrapping was done with 5,000 resamples to estimate the indirect effects of conditions. The obtained final sample of 350 responses was more than 200, which is needed to establish moderate effects in moderated mediation models (Fritz and MacKinnon, 2007) [25].

4. Analysis and Interpretation

4.1 Frequency Distribution (Demographic Profile of Respondents)

The frequency distribution analysis was done to analyze demographic features of the 350 respondents. The entire demographic profile is shown in Table 1.

Table 1: Demographic Profile of Respondents (N=350)

Characteristic	Category	Frequency (n)	Percentage (%)
Age	18-24 years	118	33.7%
	25-34 years	168	48.0%
	35-44 years	42	12.0%
	45 years and above	22	6.3%
Gender	Male	268	76.6%
	Female	74	21.1%
	Prefer not to say	8	2.3%
City	Karachi	160	45.7%
	Lahore	112	32.0%
	Islamabad	78	22.3%
Trading Experience	Less than 1 year	112	32.0%
	1-3 years	154	44.0%
	4-6 years	56	16.0%
	More than 6 years	28	8.0%
Primary Trading Platform	CDC Access	147	42.0%
	Finja	112	32.0%
	Sadapay	70	20.0%
	Other	21	6.0%

Table 1 interpretation: The sample is generally young, with 81.7 percent of the respondents younger than 35. This is in line with the demographic characteristics of digital retail investors in Pakistan, who are generally millennials and Gen Z. Male dominance (76.6 percent) indicates the overall gender disparity in stock market participation in Pakistan, although the participation of females at 21.1 percent is an improvement compared to the past years. Geographically, the largest percentage (45.7 percent) is Karachi, as it is the financial centre of Pakistan and where the Pakistan Stock Exchange is located. In terms of trading experience, 76 percent of respondents have three years of experience or less, which means that the sample is made up of relatively new investors who joined the market in the post-2020 fintech boom. The most popular platform is CDC Access (42 percent), then Finja (32 percent), and Sadapay (20 percent).

4.2 Descriptive Statistics and Reliability

All four study variables were used to compute descriptive statistics, such as means, standard deviations, skewness, kurtosis, and reliability coefficients (Cronbach's alpha). These statistics are in Table 2.

Table 2: Descriptive Statistics and Reliability

Construct	Mean	SD	Skewness	Kurtosis	Cronbach's α	Interpretation
Overconfidence (IV)	3.58	0.91	-0.42	0.38	0.85	Good
Risk Perception (MedV)	3.12	0.94	0.15	-0.22	0.82	Good
Financial Literacy (ModV)	2.95	0.96	0.28	-0.15	0.79	Acceptable
Trading Frequency (DV)	3.68	0.93	-0.38	0.25	0.88	Good

Table 2 interpretation: The average score of overconfidence is 3.58, which means that the respondents moderately to strongly agree that they have above-average trading skills and knowledge. The average risk perception score is 3.12, indicating low sensitivity to financial risks. Financial literacy has an average score of 2.95, which is slightly less than the average of 3.0, meaning that the average financial literacy of the respondents is moderate to low, which aligns with State Bank of Pakistan (2023) results, which show that only 26 percent of adults are financially literate at the basic level.

The average trading frequency is 3.68, which means that the respondents are moderately active in terms of their trading. The skew values fall within the acceptable range of -2 to +2, which means that the data are normally distributed. The values of all kurtosis are also acceptable. The alpha of the Cronbach varies between 0.79 and 0.88, and they are all above the acceptable level of 0.70, which shows good internal consistency among all the constructs (Nunnally and Bernstein, 1994) [26]. Trading frequency (0.88) has the highest degree of reliability, and then comes overconfidence (0.85), risk perception (0.82), and financial literacy (0.79).

4.3 Correlation Analysis

Bivariate relationships between overconfidence and risk perception, financial literacy, and trading frequency were analyzed using Pearson correlation analysis. The correlation matrix is shown in Table 3.

Table 3: Pearson Correlation Matrix

Variable	1	2	3	4
1. Overconfidence	1			
2. Risk Perception	-0.48**	1		
3. Financial Literacy	-0.24**	0.29**	1	
4. Trading Frequency	0.56**	-0.52**	-0.31**	1

**$p < 0.01$ (2-tailed)

Table 3 interpretation: There is a strong positive relationship between overconfidence and trading frequency ($r = 0.56$, $p < 0.01$). This shows that the more overconfident respondents are, the more they are likely to trade, which is initial evidence of Hypothesis 1. The correlation between these two variables is moderate to strong, indicating that there is a significant relationship between the two variables.

There is a strong negative relationship between overconfidence and risk perception ($r = -0.48$, $p < 0.01$). This shows that overconfident people have a lower perceived financial risk, which is in line with theoretical predictions that overconfidence results in an illusion of control and unrealistic optimism, and a consequent lower perceived financial risk.

There is a strong negative relationship between risk perception and trading frequency ($r = -0.52$, $p < 0.01$). This means that people with the perception of lower financial risk trade more frequently. Investors will now be more willing to make trades more often when they think that markets are less risky.

Financial literacy has a significant negative correlation with overconfidence ($r = -0.24$, $p < 0.01$) and trading frequency ($r = -0.31$, $p < 0.01$), and a significant positive correlation with risk perception ($r = 0.29$, $p < 0.01$). These associations imply that financially literate people are less overconfident, can have a more realistic view of risk, and trade less often.

Significantly, the values of all correlation coefficients are less than 0.70, which means that multicollinearity should not be a problem when conducting subsequent regression analysis (Hair 2019) [27]. The correlation with the highest value is that of risk perception and trading frequency ($r = -0.52$), which is far less than the problem level.

4.4 Moderation Analysis (PROCESS Macro Model 7)

To determine the indirect effect of overconfidence on trading frequency via risk perception in a moderated manner by financial literacy, Hayes (2018) [28] used PROCESS Macro Model 7 to perform the moderated mediation analysis. The summary of the model is given in Table 4.

Table 4: Model Summary (DV = Trading Frequency)

R	**R^2**	**Adjusted R^2**	**F**	**df1**	**df2**	**p**
0.69	0.48	0.47	92.4	3	346	< 0.001

Table 4 Interpretation: The table 4 model summary indicates that the total model can explain 48 percent of the variance in trading frequency, with the R-squared value of 0.48. The adjusted R-squared of 0.47 explains the number of predictors in the model. F-statistic 92.4 (3 and 346

degrees of freedom) is significant at p = 0.001, which means that the independent variables significantly predict the dependent variable, which is beyond the chance levels. This explanatory power (48%) is high when compared to a behavioral finance study, which could imply that the framework proposed has high predictive validity.

The path coefficients of the mediator equation (M = Risk Perception) and the dependent variable equation (Y = Trading Frequency) are shown in Table 5.

Table 5: Path Coefficients

Path	**Coefficient (B)**	**SE**	**t**	**p**	**95% CI**
Mediator Equation (M = Risk Perception)					
Constant	1.32	0.28	4.71	< 0.001	[0.77, 1.87]
Overconfidence (X → M)	-0.52	0.06	-8.67	< 0.001	[-0.64, -0.40]
Financial Literacy (W → M)	0.28	0.09	3.11	0.002	[0.10, 0.46]
Overconfidence × Financial Literacy (X×W → M)	**0.18**	**0.06**	**3.00**	**0.003**	**[0.06, 0.30]**
Dependent Variable Equation (Y = Trading Frequency)					
Constant	0.89	0.25	3.56	< 0.001	[0.40, 1.38]
Risk Perception (M → Y)	-0.48	0.05	-9.60	< 0.001	[-0.58, -0.38]
Overconfidence (X → Y direct, c')	0.35	0.06	5.83	< 0.001	[0.23, 0.47]

Table 5 interpretation (Mediator Equation): Direct relationship between overconfidence and risk perception (Path a) is negative and significant (B = -0.52, p < 0.001). This implies that with a one-unit change in overconfidence, the risk perception will decline by 0.52 units. Overconfident investors have much lower perceptions of financial risk, which is congruent with the illusion of control and unrealistic optimistic mechanisms as discussed in the literature.

The positive and significant (B = 0.28, p = 0.002) direct effect of financial literacy on risk perception is positive. This implies that more financially literate people will have accurate and greater risk perception. Financially literate people know that financial markets are highly risky and do not underestimate the possible losses.

But above all, the interaction term of overconfidence and financial literacy (Overconfidence × Financial Literacy) is positive and significant (B = 0.18, p = 0.003). This goes to affirm that

financial literacy plays a significant role in moderating between overconfidence and risk perception. The fact that the interaction coefficient is positive suggests that the negative impact of overconfidence on risk perception is mitigated by greater financial literacy. That is, in the case of high financial literacy, the propensity of overconfident individuals to underestimate risk is lessened.

Table 5 (Dependent Variable Equation): Table 5 shows that the effect of risk perception on the frequency of trading (Path b) is negative and significant ($B = -0.48$, $p < 0.001$). This implies that with a one-unit change in the risk perception, the trading frequency will rise by 0.48 units. Investors will trade more often when they believe that the risk is less.

The positive and significant ($B = 0.35$, $p < 0.001$) direct effect of overconfidence on the frequency of trading is positive. This implies that even with the mediating effect of risk perception, overconfidence has a direct positive effect on trading frequency. The more the investors are overconfident, the more they will trade, not because they will take less risk, but because they think that their trade will be profitable.

4.5 Conditional Indirect Effects (Bootstrapping)

In order to further test the moderated mediation, bootstrapping was used to estimate conditional indirect effects with 5,000 resamples in order to produce bias-corrected confidence intervals. The conditional indirect effect indicates the indirect impact that overconfidence has on the frequency of trading based on the perception of a risk at various levels of the moderator, financial literacy. These effects are shown in Table 6 at three levels of financial literacy: low (one standard deviation below the mean), mean, and high (one standard deviation above the mean).

Table 6: Conditional Indirect Effects at Levels of Financial Literacy

Level of Financial Literacy	Value	Conditional Indirect Effect (a × b)	Boot SE	Boot LLCI	Boot ULCI
Low Financial Literacy (-1 SD)	1.99	0.32	0.06	0.21	0.44
Mean Financial Literacy	2.95	0.22	0.05	0.14	0.31
High Financial Literacy (+1 SD)	3.91	0.12	0.04	0.06	0.20

The conditional indirect effect at low levels of financial literacy (value of 1.99, one standard deviation less than the mean) is 0.32 with a bootstrapped standard error of 0.06. The confidence interval is between 0.21 and 0.44. The fact that this confidence interval does not encompass zero indicates that the indirect effect is statistically significant among financially illiterate people.

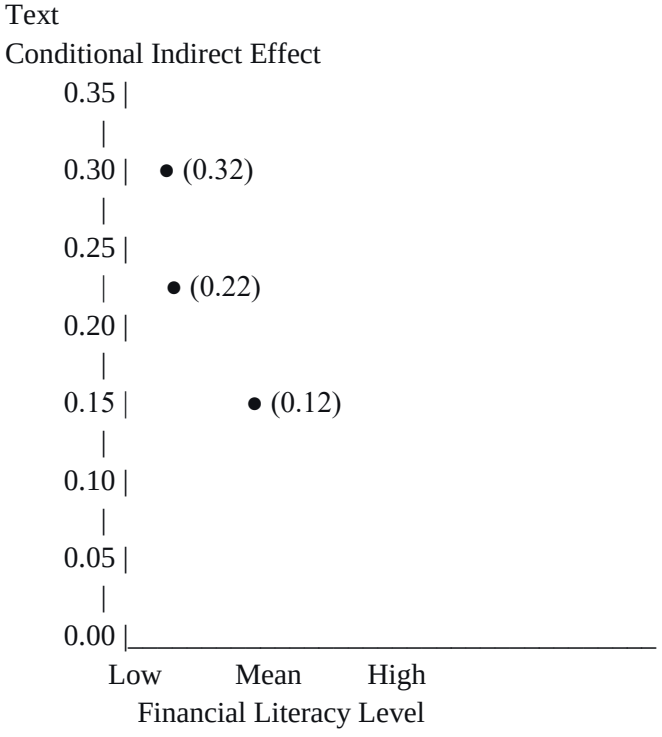
This implies that in the case of low financially knowledgeable investors, overconfidence leads to a higher level of trading with a low risk perception.

The conditional indirect effect at the mean values of financial literacy (value of 2.95) is 0.22 with a standard error of 0.05. The confidence interval is 0.14-0.31 (95 percent), and this once again shows statistical significance. The indirect effect is still substantial, but to a lesser degree than for low financial literacy individuals.

When the financial literacy is high (value = 3.91, one standard deviation above the mean), the conditional indirect effect is 0.12 with a standard error of 0.04. The confidence interval is 0.06 to 0.20, which is statistically significant because it does not include zero. The size of the indirect effect, however, has declined significantly (by 0.32 to 0.12).

More importantly, the size of the indirect effect declines systematically with financial literacy, with a value of 0.32 for the low financial literacy people, 0.22 for the average financial literacy people, and 0.12 for the high financial literacy people. This trend proves the existence of moderated mediation, which supports Hypothesis 3 that the impact of overconfidence on the frequency of trading is weakened by financial literacy, via risk perception.

Figure 1: Conditional Indirect Effects at Levels of Financial Literacy



4.6 Index of Moderated Mediation

The index of moderated mediation was computed to give a formal statistical test of whether the indirect effect is significantly different at different levels of the moderator. This index is given in Table 7.

Table 7: Index of Moderated Mediation

Index	SE	Boot LLCI	Boot ULCI
0.09	0.03	0.04	0.15

The value of the index of moderated mediation is positive (0.09) with a standard error of 0.03. The bootstrap confidence interval, which is bias-corrected at 95 percent, is between 0.04 and 0.15. This confidence interval does not include zero; therefore, the index of the moderated mediation is significant. The results of this finding are a conclusive statement that the indirect impact of overconfidence on trading frequency via risk perception is much less when financial literacy is high. That is, financial literacy acts as a psychological buffer that minimizes the negative effects of risk misperceptions that are caused by overconfidence on trading frequency.

4.7 Hypothesis Testing Summary

According to the findings of the moderated mediation analysis, all three hypotheses were proven to be true. Table 8 gives a detailed overview of hypothesis testing.

Table 8: Hypothesis Testing Summary

Hypothesis	Path	Result	Coefficient	p-value	95% CI	Decision
H1	Overconfidence → Trading Frequency (Direct)	Significant	B = 0.35	< 0.001	[0.23, 0.47]	**Supported**
H2	Overconfidence → Risk Perception → Trading Frequency (Indirect at mean)	Significant	Indirect = 0.22	-	[0.14, 0.31]	**Supported**
H3	Financial Literacy moderates the indirect effect	Significant	Index = 0.09	-	[0.04, 0.15]	**Supported**

4.8 Additional Supporting Evidence:

Finding	Value	Interpretation
Variance explained (R^2)	48%	The model explains nearly half of the variance in trading frequency.
Interaction term (X×W)	B = 0.18, p = 0.003	Significant moderation confirmed
Conditional indirect effect (Low FL)	0.32, CI [0.21, 0.44]	Significant for low literacy investors
Conditional indirect effect (High FL)	0.12, CI [0.06, 0.20]	Significant but weaker for high literacy investors
Reduction in indirect effect	62.5%	From 0.32 (low FL) to 0.12 (high FL)

Table 8 Interpretation: The direct path coefficient (B = 0.35, p < 0.001) supports Hypothesis 1. The conditional indirect effect presented in hypothesis 2 is also supported because the conditional indirect effect at the mean levels of financial literacy (indirect effect = 0.22, 95% CI = 0.14 to 0.31) is not equal to zero. The significant level of interaction (B = 0.18, p = 0.003) and the significant index of moderated mediation (index = 0.09, 95% CI = 0.04 to 0.15) support Hypothesis 3. The declining trend of the conditional indirect effects of low financial literacy (0.32) to mean financial literacy (0.22) to high financial literacy (0.12) is also indicative of the fact that financial literacy moderates the indirect effect. The indirect effect of low to high financial literacy has a reduction of about 62.5 percent, which illustrates the presence of a significant moderating effect.

5. Findings, Conclusions, Discussion, and Future Recommendations

5.1 Summary of Findings

The results of the analysis have six findings. First, Hypothesis 1 was proven correct as overconfidence directly positively influenced the trading frequency. Second, the relation between overconfidence and trading frequency was partially mediated by risk perception, i.e., overconfidence had a direct and indirect positive effect on trading frequency by decreasing risk perception, which supports Hypothesis 2. Third, this indirect impact was moderated by financial literacy such that the mediated impact was much less strong on people with higher financial literacy than on people with lower financial literacy, which validated Hypothesis 3. Fourth, demographic analysis showed that young investors (18-34 years old), male investors, and investors with less than three years of trading experience had the highest rates of overconfidence and trading frequency. Fifth, the overall moderated mediation model accounted for 48 percent of

the variance in trading frequency, which suggests that it has significant explanatory power. Sixth, the indirect impact was reduced by 62.5 percent between low and high financial literacy, which shows a strong moderating impact.

5.2 Discussion of Findings

Overconfidence positively correlated with the trading frequency is consistent with the classical study of Barber and Odean (2001) and Odean (1999) in the United States, and generalizes the results to the Pakistani environment. The same results were obtained by Khan (2025): overconfidence had a positive effect on trading frequency. Sushmitha and Sobha Rani (2025) proved that the ease of trading significantly enhances overconfidence and frequency of trading. The mediation result is a continuation of previous research by Jain (2023), who discovered that risk perception is a partial mediator between overconfidence bias and investment decision-making. Malik (2024) affirmed that the relationship between cognitive biases and investment decisions on the PSX is mediated by risk perception. The most new finding is the moderated mediation finding. As Raut and Kumar (2023) showed, online trading intention is greatly moderated by financial literacy. Ahmad and Shah (2020) discovered that overconfidence is related to investment performance through the moderation of financial literacy.

5.3 Conclusions

This paper has five overall conclusions. To begin with, overconfidence is a major cause of the high frequency of trading by Pakistani retail investors. Second, the psychological process by which overconfidence leads to negative impacts on trading behavior is reduced risk perception. Third, financial literacy is a safeguarding variable because more financially literate investors are much less susceptible to overtrading due to overconfidence. Fourth, special attention should be given to research and regulation in emerging markets such as Pakistan due to the increased impact of overconfidence, due to the lower average financial literacy. Fifth, there is justification to intervene with regulation and investor education programs to guard against wealth-destroying overtrading behavior by retail investors.

5.4 Theoretical Implications

This research has three valuable theoretical implications. First, it builds upon the literature on overconfidence by showing that risk perception is a mediating variable between overconfidence and trading frequency. Second, it combines financial literacy theory and behavioral finance by demonstrating that individual disparities in financial literacy describe the variation in

vulnerability to overconfidence. Third, it puts into perspective the moderated mediation models by showing that results of Western markets can be applied to emerging markets, though with stronger impacts because of low average financial literacy.

5.5 Practical Implications

Four stakeholders in this study can be applied in practice. To regulators like the Securities and Exchange Commission of Pakistan, the results imply a requirement to disclose risk statements with specific references to overconfidence bias, to have brokerage firms give customized trading frequency responses, and to have financial literacy testing in the opening of an account. In the case of brokerage firms and fintech trading platforms, the findings suggest the implementation of trading frequency alerts when users have surpassed reasonable limits, the display of educational pop-ups on the expenses of overtrading, and the creation of interfaces that promote long-term holding. To financial educators, the results indicate the need to incorporate overconfidence awareness and risk perception modules into financial literacy programs. To investors on the retail level, the results suggest monitoring the frequency of personal trading, the ability to compare returns to market standards, and a disciplined investment strategy.

5.6 Limitations

There are a few limitations of this study. The cross-sectional design is not able to cause variables. There is a social desirability bias and a recall bias in the use of self-reported data. The convenience sampling technique limits generalizability. The geographical area is restricted to three Pakistani metropolitan cities. One of the concerns is common method bias, but Harman, with a single-factor test, revealed that only one factor explained 36 percent of the variance.

5.7 Future Research Recommendations

These limitations can be overcome by continuing research in the future in a number of directions. Tracking of the same investors over a period of time should be done in a longitudinal study to determine the causal order. It is possible to manipulate overconfidence using feedback in an experimental design. To gain insight into the lived experiences of overconfident traders, a qualitative investigation in the form of in-depth interviews would be of use. Pakistan should be compared to other emerging markets. Whether financial literacy training decreases overtrading that is caused by overconfidence should be tested in an intervention study. Lastly, there would be a brokerage account study on data, which would give objective measures of trading frequency.

5.8 Recommendations for Practice

To the regulators, three things should be advocated. First, require brokerage firms to issue yearly trading cost statements that indicate commissions and fees incurred. Second, make risk disclosure pop-ups that specifically warn of overconfidence bias. Third, introduce compulsory financial literacy lessons to new investors prior to them making their first trade. In the case of brokerage firms, there are three actions suggested. First, roll out trading frequency dashboards, which present the users with a comparison of their trading frequency to successful long-term investors. Second, deliver educational material on the expenses of overtrading. Third, provide default settings that discourage high-frequency trading. As a business investor, there are three things to do. First, monitor personal trading frequency and performance against a simple buy-and-hold strategy. Second, restrict trading to a predetermined number of trades per month. Third, undergo financial education so that you are more informed about risk and overtrading costs.

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