

HERDING BEHAVIOR AND RISK APPETITE AMONG RETAIL INVESTORS IN PAKISTAN: A MODERATED MEDIATION STUDY

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Abstract

The rapid expansion of mobile trading applications has significantly changed the investment behavior of retail investors by providing easy access to stocks, forex, and cryptocurrency markets. However, this digital access has also increased the influence of behavioral biases on investment decision-making. This study examined the effect of herding behavior on risk appetite among retail investors in Pakistan, with anchoring heuristic as a mediating variable and overconfidence as a moderating variable. Data were collected from 335 retail investors who were active users of mobile trading applications and were investing or attempting to invest in stocks, forex, and cryptocurrencies. A structured questionnaire was used to collect responses, and the data were analyzed through SPSS using reliability, validity, regression, mediation, moderation, and moderated mediation analyses. The findings revealed that herding behavior positively influenced investors' risk appetite, indicating that retail investors became more willing to take financial risks when they followed the actions and opinions of others. The results further showed that anchoring heuristic mediated the relationship between herding behavior and risk appetite. Furthermore, herding behavior was positively associated with risk appetite both directly and indirectly via anchoring heuristic, which was reinforced by overconfidence. The study adds to the behavioral finance body of evidence by providing a conceptual model of the interaction among social influence, cognitive bias and investor confidence and how they all collectively influence risk-taking in digital investment platforms. The findings also provide practical insights for investors, financial advisors, trading platforms, and policymakers to promote more informed and responsible investment decisions.

Introduction

Financial decision-making has become increasingly complex due to the rapid growth of digital investment platforms, easy access to market information, and the rising participation of individual investors in financial markets (Barber et al., 2022). In recent years, mobile trading applications have significantly transformed the investment landscape by allowing retail investors to buy, sell, monitor, and manage financial instruments through smartphones (Kalra & Singh, 2023). This digital transformation has made financial markets more accessible, especially for individual investors who previously had limited access to formal investment channels. In Pakistan, retail investors are increasingly using mobile trading applications to invest or attempt to invest in different financial instruments, including stocks, forex, and cryptocurrencies (Ahmed & Siddiqui, 2023). Although these platforms provide convenience and market access, they also expose investors to high uncertainty, fast market movements, and psychologically influenced investment decisions (Venkatesh et al., 2021).

The classical theories of finance consider the investor to be a rational decision maker and as an investor he takes care to analyze the information provided before taking investment decisions. This perspective assumes that investors will be objective in determining risk and return and then choose their investments based on maximizing their return. But, according to behavioral finance, investors don't always act rationally (Thaler, 2021). Rather, they make choices based on emotions, thought patterns, peer pressure, and psychological "rules of thumb" (Pompian, 2022). However, it is not always possible to use appropriate analysis when investing in real market conditions, particularly in volatile and uncertain conditions. They can also be influenced by prevailing market trends, emulate actions of other investors, rely on initial information or become overly confident about their investment skills (Prosad et al., 2020). Such habitist tendencies can have a significant impact on their risk appetite and investment choices.

Risk Appetite is the willingness of an investor to take financial risk with a view to gaining more

profit. Volatile or uncertain financial instruments are likely to be invested in by investors of high risk appetite, while investors of low risk appetite tend to seek safer investment options (Grable & Rabbani, 2023). Risk appetite is a significant aspect to be explored in the case of mobile trading app as people are always presented with price fluctuations, investment signals, online discussions, the opinion of others and market news. This could lead investors to make hasty and impulsive decisions without thorough analysis (Ozik et al., 2021). The situation is amplified in emerging markets such as Pakistan, where retail investors might possess varying degrees of financial literacy, investment experience, and access to information.

One of the most crucial of these behavioural aspects affecting investment choices is herding behaviour. Herding behavior is the action or decision of investors that are made based on the judgment of other investors (Litimi et al., 2019). A herding effect can happen in financial markets when investors see others entering or exiting a specific stock, currency or cryptocurrency and follow their lead. This behavior tends to be more pronounced when investors are uncertain, when they do not trust their own information, or when they think that most investors have more information (Economou et al., 2023). Social media, online trading forums, investment communities, market influencers, and live trading alerts are among other factors that can reinforce herding in mobile trading settings (Yousaf et al., 2022). Individual investors might feel compelled to join others when they seem to be all going in the same direction.

People's risk taking preferences can be largely influenced by herd-mentality. The higher the number of investors who invest in one financial instrument, the less risky and more profitable it seems to investors (Clements et al., 2020). This social confirmation may impact their eagerness to take risks. For instance, if numerous investors are buying into a cryptocurrency that is trending or a stock, a particular investor may feel more at ease taking chances since the decision appears popular and socially validated. Herding behavior can thus lead retail investors to have a higher risk appetite even in a risky or volatile investment where

uncertainty exists (Gupta et al., 2021). Hence, the understanding of herding behavior and risk appetite is crucial in order to explain investor's decision making in digital financial markets.

The other behavioural bias in the investment decision making process is the "anchoring heuristic. Anchoring heuristic is a cognitive bias that involves sticking to a first impression when deciding (Furnham & Boo, 2021). In the financial markets, investors can fix their beliefs on past prices, past returns, predictions, opinions from others, or rumours from the market. After establishment of an anchor, investors can still choose to stick to it even after receiving fresh information. An investor, for instance, might think a stock is worth investing in because it was more expensive in the past, or a cryptocurrency will see a price rise after it reached a certain cost (Mussweiler & English, 2022). These reference points may have an impact on investors' expectations and risk-taking behaviour.

Anchoring heuristic could be the reason for the influence of herding behavior on risk appetite. Retail investors' behavior may also be influenced by that of others, including the use of the same reference points as the majority (Phan et al., 2020). For example, if there are numerous investors who anticipate a specific price for a stock or cryptocurrency, an individual investor can also anchor on the anticipated price. This anchor can give the investor more confidence and a willingness to take risk. This process can trigger the formation of anchors in the minds of the investors, and this can consequently shape their risk appetite. Hence, the relationship between herding behavior and risk appetite should be mediated by anchoring heuristic, which is assumed to play the role of a psychological mechanism.

Another important behavioural factor that may affect investment decisions is overconfidence, apart from anchoring. Overconfidence is a phenomenon that occurs when investors think they know better, have more skill, and the ability to have more control over investment results (Merkle, 2017; Rehan & Umer, 2022). Investors who are overconfident can think that they have superior forecasting skills or that they can handle risk more effectively. This confidence may inspire investors to

take greater financial risks. With mobile trading, overconfidence is intensified because investors can access trading tools, charts, news, and investment information on the go (Barber & Odean, 2023). When they make quick profits or a successful investment, they may have even greater confidence in their ability to invest.

The link between herding and risk taking can be reinforced by overconfidence. Overconfident investors might be more inclined to take aggressive action in the market since they believe they can spot winning opportunities and prevent losses (Chaudhary, 2021). Such investors can not only follow the crowd, but might choose to make bigger, riskier investments. Likewise, Overconfidence may also strengthen the indirect effect of herding behavior on risk appetite through heuristic (Zaiane & Abaoub, 2022). Investors with too high a level of confidence can anchor more heavily on selected anchors because they feel their judgements and expectations are right. Thus, overconfidence can be an important moderator in determining when and when not herding behavior is associated with increased risk appetite.

The population of interest in this study consists of retail investors in Pakistan who are active users of mobile trading apps and those who have been investing or attempting to invest in financial instruments in the form of stocks, forex, and cryptocurrencies. This population is important because mobile trading app users are directly exposed to digital investment environments where behavioral biases may strongly influence decision-making. Unlike institutional investors, retail investors often make decisions with limited resources, limited professional advice, and varying levels of financial literacy (Riaz et al., 2021). As a result, they may be more vulnerable to herding behavior, anchoring heuristic, and overconfidence.

Literature Review

Herding behavior and risk appetite

Herding behavior is a tendency of investors to mimic the behavior, opinion, or decision of other investors, instead of conducting their own independent analysis (Litimi et al., 2019). Herding can take place in financial markets where investors are likely to engage in more similar trading patterns as a group, follow the market trends, or rely on the

recommendations of peers, influencers, or online trading communities (Economou et al., 2023). This behavior is more likely to occur in the context with uncertainty, the lack of information, market volatility and limited investor experiences (Vo & Phan, 2019). If investors have no idea which investment to go for, they could believe that the average motion of others carries higher information (Bekiros et al., 2021). Herding behavior can intensify in the case of mobile trading apps, as investors are constantly in touch with the real market, online discussion forums, investment groups, and social media opinions (Yousaf et al., 2022). Retail investors may notice that a lot of people are buying a specific stock, currency, or cryptocurrency and choose to do the same (Bouri et al., 2021). This imitation could happen even if the investor is not very knowledgeable about the financial instrument or about the risks involved. When the actions of crowd are visible on digital platforms, they can give the impression that they are more secure and lucrative investments (Phan et al., 2020). The herd mentality effect can affect investors' risk tolerance by increasing their financial risk-taking willingness (Gupta et al., 2021). Investors might feel that others share their investment decisions and have reduced fears of potential losses (Clements et al., 2020). This social validation could minimize risk perception and boost confidence in risky investment choices. If a lot of investors are investing in a cryptocurrency that is trending or a speculative stock, the individual investor may be more willing to invest as it seems common and acceptable (Yousaf & Ali, 2021). Herding can thus lead investors to make more risky decisions than they would make on their own. Moreover, the herding behavior can lead to a psychological belief that the majority is right (Galariotis et al., 2020). Retail investors might assume that when many investors are investing in a specific financial instrument, the investment has a strong potential (Chaffai & Medhioub, 2021). This belief can make them more likely to take risks, particularly in a market where quick money can be made. But, sometimes these decisions are not taken after due consideration. Instead, they could be motivated by imitation, fear of missing out, and social influence (Philippas et al., 2020). As a result,

it is anticipated that herding behavior will positively influence the retail investors' risk appetite in Pakistan (Riaz et al., 2021).

H1: *Herding behavior is positively related to risk appetite.*

Mediating effect of anchoring heuristic

Anchoring heuristic is a mental shortcut which involves the initial information a person hears in their decision-making process (Furnham & Boo, 2021). After the creation of an anchor, the person can then use it as a reference and might not update his/her judgements when new information presents itself (Mussweiler & Englich, 2022). There are several ways that investors may form their expectations in investment decision making, such as reference to previous prices, past returns, expert expectations, social media forecasts, peer recommendations, and market forecasts (Cen et al., 2020). These anchors affect the risk-reward ratio, expectations of return, and forecast of market action (Ahmad, 2020). Anchoring can have a profound impact on retail investors in financial markets, as they may be trading under conditions of uncertainty and incomplete information (Phan et al., 2020). For instance, if a stock's price has recently been elevated and then dropped down, the investor could think that the stock is undervalued. Likewise, the number of cryptocurrency investors who have experienced a past peak price can be anticipated to see their coin price return to that level again and set their expectations accordingly (Bouri et al., 2021). These anchors can cause investors to disregard new market information, shift market fundamentals, or true levels of risk. Therefore, the anchoring heuristic phenomenon may affect the behavior of risk taking (Massa & Yadav, 2021).

The relationship between herding behavior and risk appetite can be mediated by anchoring heuristic (Prosad et al., 2020). Herding behavior results in the investors' encounter with prevailing market sentiment, widely accepted price goals, investment trends, and the general expectations of the market (Economou et al., 2023). The tendency of following the herd can also mean that investors will take the same benchmarks as most people (Sahi et al., 2020). For example, if a large number of investors are anticipating a certain stock or

cryptocurrency to hit a specific price, an individual investor might also take that anticipated price as a benchmark. This anchor can then make the investor's risk taking bolder as the anticipated return seems lucrative (Rehan & Umer, 2022). This process affects herding behavior in the first place, which affects the formation of anchors (Vo & Phan, 2019). When investors follow other investors, they depend on the crowd-based information as their primary source of information (Litimi et al., 2019). These anchors then influence their risk and return perception (Galariotis et al., 2020). When the anchor indicates that returns are likely to be high, investors are more likely to be willing to take risks. Hence, the psychological mechanism in herding behavior that has a repercussion on the risk appetite is explained by anchoring heuristic (Chaffai & Medhioub, 2021). The herding phenomenon may affect investors' risk-related decisions not directly by raising risk appetite, but indirectly by providing reference points (Khan et al., 2021). This mediation is especially significant in the context of the mobile trading app users (Kalra & Singh, 2023). Digital platforms offer constant access to market prices, charts, analysts' perspectives, the predictions of influencers and peer discussions (Ozik et al., 2021). These sources may build firm mental anchors for investors (Cen et al., 2020). Herd behaviour can make investors feel more secure in making risky investments in the presence of such anchors (Bekiros et al., 2021). Hence, it is expected that the relationship between herding behavior and risk appetite among the retail investors in Pakistan shall be mediated by anchoring heuristic (Yousaf et al., 2022).

H2: *Anchoring heuristic mediates the relationship between herding behavior and risk appetite.*

Moderating effect of overconfidence

Investment decision-making is one of the most studied areas of behavioral finance where overconfidence is the most prevalent bias studied (Barber & Odean, 2023). A tendency towards overestimate knowledge, judgment, skills and predicting future outcomes (Merkle, 2019). Financial markets are markets where overconfident investors feel that they can understand the information contained in the market more

accurately than other investors, can recognize profitable opportunities more efficiently, and have the ability to control the outcome of their investment (Zaiane & Abaoub, 2022). Such investors might be reluctant to invest and might overestimate the correctness of their own judgment and decisions (Chaudhary, 2021). Mobile trading applications that are used by retail investors could be particularly susceptible to overconfidence (Barber et al., 2022). Mobile trading platforms have instant access to trading tools, market charts, financial news and real-time prices (Venkatesh et al., 2021). These features can be useful but can also lead to the creation of an illusion of control (Pompian, 2022). Investors might be convinced that they are able to analyze markets more effectively and make trades more rapidly because they can monitor markets around the clock. Investors may think that they can manage risk better than others because they have the ability to monitor markets throughout the day, and make trades rapidly. If past successful trades have helped build this confidence, even if success was due to luck or market conditions, it may be further reinforced by them (Statman, 2019).

Herding behaviour can be moderated by herding confidence on the risk appetite side (Chaudhary, 2021). The herding effect is likely to have a greater impact on investors with excessive confidence because they think they can correctly pick profitable herd trends and profit from them (Merkle, 2019). Watching others invest in a specific currency, forex pair or stock can lead to overconfidence, and investors attempt to buy more or more risky stocks than they would if they had not seen anyone else invest (Zaiane & Abaoub, 2022). They might think that they have time to get into and out of the market when they want to, and hence be more willing to take financial risks (Barber & Odean, 2023). However, investors who are less overconfident may be more cautious when they see herding behavior (Statman, 2019). They might do some following, but they might also be conscious of the potential losses (Pompian, 2022). Hence, the impact of herding behavior on risk appetite could be more significant in high overconfidence and less significant in low overconfidence (Gupta et al., 2021). This means

that there is a shift in the relationship strength between herding behaviour and risk appetite (Prosad et al., 2020).

H3a: Overconfidence moderates the link between herding behavior and risk appetite.

The indirect relationship among herding behavior and risk appetite through anchoring heuristic may be moderated by overconfidence (Massa & Yadav, 2021). Overconfident investors may rely more strongly on anchors formed from crowd behavior because they believe their judgments are correct. When people are overconfident and form anchors from the crowd, they may become more prone to using those anchors because they believe they are correct (Sahi et al., 2020). For instance, the market crowd is expecting a crypto or stock to hit a certain price, and an investor may take a price as a definitive benchmark (Bouri et al., 2021). This can lead to an increase in the risk appetite of the investor due to the fact that the anchor establishes a great sense of expectation for future gains (Cen et al., 2020). But less overconfident investors might be more likely to doubt anchors or to revise their anchors when new information appears (Mussweiler & Englich, 2022). As a result, herding

Conceptual Model

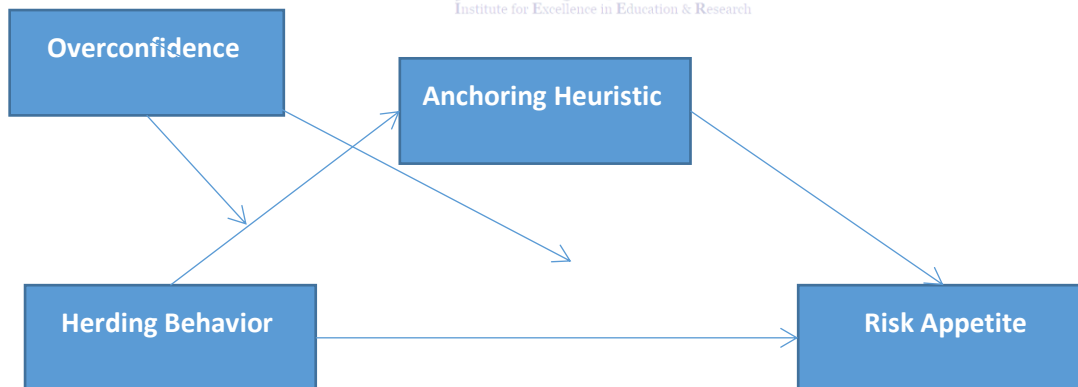


Figure 2.1: Research Model

Methodology

Population of the Study

The population of the study consisted of retail investors in Pakistan who were active users of mobile trading applications. These investors were either already investing or trying to invest in

behavior could have a greater indirect effect on risk appetite via the anchoring heuristic for the high overconfident investors (Philippas et al., 2020). In such a way, herding behavior can reinforce the psychological mechanism that leads to risk appetite (Khan et al., 2021). The moderated mediation relationship of the role of social influence, reference points and self-confidence is significant in the context of retail investors in Pakistan as mobile trading app users are surrounding in a swift digital environment (Riaz et al., 2021). When investors are too invested in the market because they are overconfident in making a profitable move, they may be more prone to taking risks. Investors can buy in when others are buying, form anchors based on popular market opinions, and then take more risks when they are overconfident in their investment capabilities (Ahmad, 2020). Thus, the indirect relationship between herding behavior and risk appetite via the anchoring heuristic (Kalra & Singh, 2023) is expected to be moderated by overconfidence.

H3b: Overconfidence moderates the indirect effect of herding behavior on risk appetite via anchoring heuristic.

financial instruments such as stocks, forex, and cryptocurrencies. This population was selected because mobile trading app users were directly exposed to real-time market information, price alerts, social trading influence, and digital investment decisions.

Table 3.1: *Summary of demographic characteristics (N=335)*

Demographic	Category	Frequency	%
Gender	Male	241	71.9
	Female	94	28.1
Age	18-25	112	33.4
	26-35	134	40.0
	36-45	61	18.2
	Above 45	28	8.4
Education	Intermediate	47	14.0
	Bachelor	163	48.7
	Master/MPhil	108	32.2
	Other	17	5.1
Trading experience	Less than 1 year	89	26.6
	1-3 years	124	37.0
	4-6 years	78	23.3
	More than 6 years	44	13.1
Financial instrument	Stocks	98	29.3
	Forex	76	22.7
	Cryptocurrency	87	26.0
	More than one	74	22.1
Mobile app usage	Daily	178	53.1
	Weekly	94	28.1
	Monthly	38	11.3
	Occasionally	25	7.5
	Total	335	100.0

Table 3.1 presents the details of demographic characteristics of the respondents. The majority of the retail investors (71.9%) were males compared to females (28.1%) across the 335 sample. As for the age group of the respondents, 40.0% were found to be in the age group of 26-35 years, followed by the age group of 18-25 years with 33.4%, which indicates that the respondents were mainly young and middle-aged investors. As far as education is concerned, the majority of the respondents had obtained bachelor's degree (48.7%) followed by Master/MPhil qualification (32.2%) which suggests that the respondents were reasonably educated and can comprehend investment decisions. As far as trading experience

is concerned, the highest number of respondents (37.0%) had 1-3 years of trading experience, followed by less than 1 year (26.6%), indicating that most traders were either new or moderately experienced investors. Stocks represented the largest investment category at 29.3%, followed by cryptocurrency, forex, and more than one financial instrument. Lastly, over half of the respondents had used the trading apps on their mobile devices on a daily basis (53.1%) and more than one-quarter accessed them weekly (28.1%), thus indicating that the sample was appropriate for the study of herding behavior, anchoring heuristic, overconfidence and risk appetite in relation to the usage of mobile trading applications.

Sample Size and Sampling Methods

Since a complete sampling frame of retail investors using mobile trading apps in Pakistan was not available, convenience sampling was employed. Data were collected from 335 retail investors who met the study criteria. The respondents were required to be above 18 years of age, active users of mobile trading applications, and involved or interested in trading stocks, forex, or cryptocurrencies.

Institutional investors and individuals with no experience of mobile trading were excluded from the study. The data were collected through a structured questionnaire distributed online through investor forums, WhatsApp trading groups, Facebook groups, LinkedIn, and other social media platforms.

Measurement

The study used a structured questionnaire to measure the main variables. The questionnaire consisted of two sections. The first section collected demographic information, including gender, age, education, trading experience, type of financial instrument, and frequency of mobile trading app usage. The second section measured the study variables, including herding behavior, anchoring heuristic, overconfidence, and risk appetite. All items were measured on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

Herding behavior

Herding behavior was measured through five items adopted from Khan et al. (2017). These items assessed the extent to which retail investors

Results**Table 4.1:** *Summary of reliability statistics*

Sr.	Study variables	Items	Alpha
1	Herding Behavior	5	.872
2	Anchoring Heuristic	5	.746
3	Overconfidence	5	.889
4	Risk Appetite	13	.714

Table 4.1 shows the scale reliability of the study variables. As per findings, overconfidence has reported a highest alpha value of .889. Likewise, herding behavior was reported to be .872, anchoring heuristic was reported to be .746 and

followed the decisions, opinions, and trading actions of other investors while investing through mobile trading applications.

Anchoring heuristic

Anchoring heuristic was measured through five items adopted from Khan et al. (2017). These items evaluated the extent to which investors relied on initial prices, past values, previous returns, and reference points while making investment decisions.

Overconfidence

Overconfidence was measured through five items adopted from Khan et al. (2017). These items captured investors' belief in their own investment knowledge, skills, judgment, and ability to predict market movements.

Risk appetite

Risk appetite was evaluated using a slightly modified version of the Grable and Lytton (1999) Risk Tolerance Scale. The scale was calibrated to fit the mobile trading context, following Lim and Tan (2023). It measured investors' willingness to take financial risk while investing in stocks, forex, and cryptocurrencies through mobile trading applications.

Data analysis technique

The data were analyzed using analysis tool SPSS. Descriptive statistics were used for demographic information, while Cronbach's alpha was applied to test reliability. Correlation, regression, mediation, moderation, and moderated mediation analyses were conducted through SPSS PROCESS Macro to test the proposed hypotheses.

risk appetite was reported to be .714. Hence, the values of all study variables are above cut-off of .70, representing that the scale are used in this study is reliable and appropriate for further analysis (Hair et al., 2019).

Scale Validity Test

The Kaiser-Meyer-Olkin (KMO) test, Bartlett's Test of Sphericity and factor loading values were used to test the validity of the scale. The KMO values should be greater than .60, Bartlett's Test P-value should be small ($p < .05$), and factor loading values should be greater than .50 for acceptable validity (Kaiser, 1974; Hair et al., 2019). All the study variables were found to have valid results.

Table 4.2: Scale Validity Results

Sr.	Variables	Items	KMO	BTS	df	P	Factor Loading Range	Decision
1	Herding Behavior	5	.821	486.214	10	.000	.672-.851	Appropriate
2	Anchoring Heuristic	5	.703	265.438	10	.000	.584-.768	Appropriate
3	Overconfidence	5	.849	548.976	10	.000	.701-.883	Appropriate
4	Risk Appetite	13	.742	791.365	78	.000	.531-.779	Appropriate

As shown in Table 4.2, the KMO values ranged from .703 to .849, which were above the recommended threshold of .60. Bartlett's Test of Sphericity was significant for all variables at $p < .05$, showing that the data were suitable for factor analysis. Moreover, all factor loading values were above the minimum acceptable value of .50; therefore, all items were retained for further analysis.

Table 4.3: Summary of Regression Coefficients

Variable	B	SE	β	t	p
Constant	.312	.029		10.759	.000
HB	.142	.028	.268	5.071	.000

Note. Dependent variable: Risk Appetite. SE = Standard Error. β = Standardized coefficient. *** $p < .01$. ** $p < .001$.

The results in Tables 4.3 showed that herding behavior significantly and positively predicted risk appetite ($B = .142$, $SE = .028$, $\beta = .268$, $t = 5.071$, $p < .001$). The model explained 7.2% of the variance in risk appetite ($R^2 = .072$). The p-value is less than .05, thus, H1 was accepted. The results support the idea that stronger retail investors' herding propensity is highly related to a higher level of financial risk-taking in mobile trading settings.

Mediation test

Table 4.4: Summary of Mediation Analysis (Path Coefficients)

Path	Links	B	SE	t	p
a	Herding Behavior → Anchoring Heuristic	.127	.026	4.885	.000
b	Anchoring Heuristic → Risk Appetite	.098	.024	4.083	.000
c	Herding Behavior → Risk Appetite (Total)	.142	.028	5.071	.000

Regression analysis

Regression analysis was conducted to investigate how herding behavior influenced risk appetite. In the model, herding behavior was treated as the independent variable, while risk appetite was treated as outcome variable. The main objective was that, to examine herding behavior could significantly predict the risk appetite level of retail investors who use mobile trading applications.

The relationship between herding behavior and risk appetite was examined by using mediation analysis. A mediation analysis was used to assess the mediating role of anchoring heuristic in the relationship between herding behavior and risk appetite. Herding behaviour was the independent variable, anchoring heuristic was the mediator, and risk appetite was the dependent variable. PROCESS Macro Model 4 (Hayes, 2018) was used for analysis with 5,000 bootstrapped samples at a 95% confidence interval (CI) that was bias-corrected.

<i>c'</i>	Herding Behavior → Risk Appetite (After Mediator)	.130	.027	4.037	.000
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Note. HB = Herding Behavior; AH = Anchoring Heuristic; RA = Risk Appetite. SE = Standard Error. Path *c* = total effect; Path *c'* = direct effect after mediator inclusion. ****p* < .001.

Table 4.5: Summary of Indirect Effect of Herding Behavior on Risk Appetite via Anchoring Heuristic

Indirect Effect	Effect	Boot SE	Boot LLCI	Boot ULCI	Decision
HB → AH → RA	.012	.004	.005	.020	Supported

Note. Bootstrap samples = 5,000; CI = 95% Bias-Corrected Confidence Interval. LLCI = Lower Limit CI; ULCI = Upper Limit CI. HB = Herding Behavior; AH = Anchoring Heuristic; RA = Risk Appetite.

As shown in Table 4.4, herding behavior had a significant positive effect on anchoring heuristic (Path a: *B* = .127, *SE* = .026, *t* = 4.885, *p* < .001), indicating that investors with stronger herding tendencies were more likely to rely on anchoring-based reference points while making investment decisions. Similarly, anchoring heuristic had a significant positive effect on risk appetite (Path b: *B* = .098, *SE* = .024, *t* = 4.083, *p* < .001), showing that investors who relied more on initial prices, past values, or reference points were more willing to take financial risks. The total effect of herding behavior on risk appetite was also significant (Path c: *B* = .142, *SE* = .028, *t* = 5.071, *p* < .001), confirming that herding behavior positively predicted risk appetite. After the inclusion of anchoring heuristic as a mediator, the direct effect of herding behavior on risk appetite remained significant (Path *c'*: *B* = .130, *SE* = .027, *t* = 4.037, *p* < .001). This indicates that anchoring heuristic partially mediated the relationship between

herding behavior and risk appetite. Furthermore, the bootstrapped indirect effect of herding behavior on risk appetite through anchoring heuristic was positive and significant (Effect = .012, Boot SE = .004, 95% CI [.005, .020]). Since the confidence interval did not include zero, the indirect effect was statistically significant. Therefore, H2 was supported. These findings suggest that herding behavior increases investors' risk appetite not only directly but also indirectly by encouraging investors to rely on anchoring heuristic during investment decision-making.

Moderation test

To investigate if overconfidence moderated the direct relationship between herding behavior and risk appetite, moderation analysis was done with the help of PROCESS Macro Model 1 (Hayes, 2018). Herding behaviour was the independent variable, risk appetite was the dependent variable and overconfidence was the moderating variable. All continuous variables were mean-centered to eliminate multicollinearity and then an interaction term (Herding Behavior × Overconfidence) was created. Bootstrapped samples were selected with 5000 samples at 95% confidence interval.

Table 4.6: Summary of Moderation Analysis

Predictor	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	LLCI	ULCI
HB	.138	.029	4.759	.000	.081	.195
OC	.094	.026	3.615	.000	.043	.145
HB × OC (Interaction)	.072	.023	3.130	.002**	.027	.117

Note. Dependent variable: Risk Appetite. HB = Herding Behavior; OC = Overconfidence. SE = Standard Error. LLCI = Lower Limit CI; ULCI = Upper Limit CI. ***p* < .01. ****p* < .001.

The results in Table 4.6 reveal that the main effect of herding behavior on risk appetite remained significant (*B* = .138, *SE* = .029, *t* = 4.759, *p* < .001, CI [.081, .195]). The main effect of overconfidence was also significant (*B* = .094, *SE* = .026, *t* = 3.615, *p* < .001, CI [.043, .145]). Critically, the interaction

term between herding behavior and overconfidence was positive and statistically significant (*B* = .072, *SE* = .023, *t* = 3.130, *p* = .002, CI [.027, .117]). This indicates that the effect of herding behavior on risk appetite is significantly stronger among investors with higher levels of overconfidence. Since the interaction effect is significant and the confidence interval excludes zero, H3a is supported.

Moderated Mediation test

Moderated mediation analysis was conducted using PROCESS Macro Model 8 (Hayes, 2018) with 5,000 bootstrapped samples at a 95% bias-corrected confidence interval. In this model, herding behavior was the independent variable, anchoring heuristic the mediator, overconfidence

the moderator, and risk appetite the dependent variable. The index of moderated mediation (IMM) was examined to determine whether overconfidence significantly altered the strength of the indirect effect of herding behavior on risk appetite through anchoring heuristic.

Table 4.7: Conditional Indirect Effects of HB→AH→RA at Different Levels of Overconfidence

Level of Overconfidence	Effect	Boot SE	Boot LLCI	Boot ULCI
Low Overconfidence (-1 SD)	.008	.003	.003	.015
Moderate Overconfidence (Mean)	.012	.004	.005	.020
High Overconfidence (+1 SD)	.018	.005	.009	.028

Note. Bootstrap samples = 5,000; CI = 95% Bias-Corrected Confidence Interval. LLCI = Lower Limit CI; ULCI = Upper Limit CI. SD = Standard Deviation.

Table 4.8: Summary of Index of Moderated Mediation

Index	B	Boot SE	Boot LLCI	Boot ULCI	Decision
HB→AH→RA via OC	.005	.002	.002	.009	Supported

Note. *b* = Index of Moderated Mediation. Bootstrap samples coefficient= 5,000; CI = 95% Bias-Corrected Confidence Interval. LLCI = Lower Limit CI; ULCI = Upper Limit CI. HB = Herding Behavior; AH = Anchoring Heuristic; RA = Risk Appetite; OC = Overconfidence.

Table 4.7 presents the conditional indirect effects at three levels of overconfidence. The indirect effect of herding behavior on risk appetite through anchoring heuristic was positive and significant at all three levels: low overconfidence (Effect = .008, Boot SE = .003, 95% CI [.003, .015]), moderate overconfidence (Effect = .012, Boot SE = .004, 95% CI [.005, .020]), and high overconfidence (Effect = .018, Boot SE = .005, 95% CI [.009, .028]). The results of the three levels of confidence exclude zero, thus providing evidence that the indirect pathway is consistent across overconfidence levels. This is further illustrated, in the systematic manner, by the increase of the indirect effect from low (.008) to high (.018) level of overconfidence. The index for the presence of moderated mediation in Table 4.8 was positive and statistically significant (B = .005, Boot SE = .002, 95% CI [.002, .009]) with the 95% CI not containing zero. This confirms that the indirect effect of herding behavior on risk appetite through anchoring heuristic varied significantly across different levels of overconfidence. Hence, hypothesis H3b was supported.

Discussion

The present study examined the role of herding behavior in shaping the risk appetite of retail investors in Pakistan who use mobile trading applications for investing in stocks, forex, and cryptocurrencies. This study also explored the anchoring heuristic as a mediator and overconfidence as a moderator for this relationship. The results confirmed the behavioral finance theory, which states that investors rarely make fully rational decisions, but rather their investment decisions are guided by psychological biases, social influences, and mental shortcuts (Thaler, 2021; Pompian, 2022). The results showed that herding behavior had a positive effect on the risk appetite of the retail investors. The result is in line with Litimi et al. (2019) who suggested that investors might follow other investors in uncertain financial markets. Likewise, Gupta et al. (2021) revealed that herding behavior raises risk tolerance among retail investors especially during volatile market conditions. This finding is also corroborated by Yousaf et al. (2022), who found that the social media frenzy and online market activities amplify herd effect in cryptocurrency trading. Thus, when retail stockholders perceive others participating in similar financial instruments, they may become more willing to take financial risks in mobile trading environments. The mediating effect of the anchoring heuristic further elucidated the psychological process by

which herding behavior affects risk appetite. The results indicated that investors who engage in the herd behavior effect might also use other collective behaviour, such as historical price levels, anticipated price levels, market predictions, and the opinions of popular investors. This is in line with Furnham and Boo (2021) that anchored influences financial information judgment by having people overlook initial information. Likewise, Phan et al. (2020) reported anchoring effect on investment decisions in developing countries. Also, in Cen et al. (2020), the authors found that anchoring has a significant impact on equity market judgments and investor expectations. Therefore, anchoring heuristic served as an important mechanism through which herding behavior encouraged investors to take greater financial risks. Results further revealed that the relationship between herding and risk appetite was enhanced by overconfidence. This result corroborates Barber and Odean (2023), who showed that investors with overconfidence have higher self-perceived investment competences and execute a higher number of trades. Likewise, Chaudhary (2021) concluded that overconfidence has a significant impact on investment decision making and risk taking. Driven by a sense of control over the market's outcome, overconfident investors are also more active in trading, according to the study conducted by Zaiane and Abaoub (2022). So over-confident retail investors may be more susceptible to herd-thinking and are more likely to engage in greater financial risk with their mobile trading app.

Additionally, the moderated mediation analysis revealed that the indirect effect of herding behavior on risk appetite via anchoring heuristic was enhanced by overconfidence. This implies that investors who are too confident may take the anchor more seriously, as it is influenced by crowd behavior and market sentiment. This finding aligns with those of Prosad et al. (2020) who noted that the behavioral biases are likely to be interacting during the investment decision-making process. Likewise, Massa and Yadav (2021) proposed that the role of reference points in investor decision-making and risk-taking behavior in the market. Thus, the results suggest that investors are more

prone to leverage on herd-related anchors into increased risk-taking when they are overconfident. In general, the study results showed that retail investors' risk appetite is not only affected by financial information but also by sociological and psychological information. In Pakistan, where retail investors are increasingly using mobile trading applications to make their investments, herding behaviour, anchoring heuristic and overconfidence are important factors influencing risky investment decisions. This study corroborates the findings of Kalra and Singh (2023), who noted that behavioral biases are accentuated on digital trading platforms by retail investors, and Riaz et al. (2021), who observed that behavioral biases play a significant role in investor decision making in Pakistan.

Implications

Practical implication

The findings of this study offer several practical implications for retail investors, financial advisors, trading platforms, and policymakers. First, retail investors really should not just go along with the crowd, without doing their own independent analysis, because that kind of behavior can expose them to unnecessary financial risk. It is important for investors to assess investment information carefully prior to making any investment decisions, particularly when this information is provided by social media, trading groups, or popular market trends through mobile trading applications. Second, investors should not overvalue or undervalue the initial price of a stock, the historical performance of a stock, or public expectations of a stock's price. The anchoring heuristic effect can affect investors' risk-taking decisions, so they should update their decisions frequently to adjust to the market. It is especially crucial for volatile markets like Forex and Cryptocurrencies, where prices can fluctuate quickly. Third, it is important to have a control on over-confidence in investment decision making. Retail investors who are overconfident in their forecasting ability may take excessive investment risks. Financial advisors and investment educators, therefore, should create training modules to educate investors on the concept of typical behavioral biases, risk management strategies, and the significance of diversified investment choices.

In the fourth, mobile trading app developers should be mindful of adding the responsible trading features to their platforms. These can be warnings, learning information, reminders to cool down, and notifications of impending risky transactions. The benefits of these features include helping to decrease impulsive investing, and provide more rational investing behavior. Last but not the least, the regulators and financial institutions in Pakistan need to initiate investor education programs on behavioural finance. Many retail investors might not have formal financial knowledge, so being able to identify herding, anchoring and overconfidence can help to inform them before they make a risky investment decision.

Theoretical Implications

Present research adds to behavioral finance literature by explanation how social influence, cognitive bias, and investor confidence together shape risk-taking behavior in digital trading settings. Traditional finance theories hold that investors are rational decision makers based on information. The results, however, do lend weight to the behavioral finance theory that individuals' investment decisions can be influenced by cognitive biases, social influences and emotions. The study also contributes to the literature on herding because it introduces the concept of risk appetite to the herding literature. The significance of herding in the decisions of accepting financial risk of investors had been discussed in previous research, but this research focuses on herding as a catalyst to investors' willingness to take financial risk in decisions. This will give a better insight into the role of social influence in retail investors' risk-taking behavior. Moreover, the study provides contributions in identifying the mediating mechanism of anchoring heuristic. This suggests that herding behavior may affect investors through cognitive reference points taken from the market crowd in addition to direct social pressure. This adds to the theoretical account of interaction of behavioral biases in investment decisions. The study also provides an empirical illustration of overconfidence literature, as it demonstrates overconfidence as a boundary condition. When the effect of herding behavior is stronger, it is due to overconfidence. This is a contribution to the

moderated mediation theory by demonstrating that the indirect effect of herding behaviour on risk appetite via anchoring heuristic could differ based on the level of overconfidence of the investors. In general, the study concludes in an integrated theoretical framework that integrates the herding behavior, anchoring heuristic, overconfidence and risk appetite. This model is relevant for the understanding of behavior of retail investors in emerging markets like Pakistan for digital financial transactions.

Limitations and avenues for future research

While this study offers valuable insights, there are some limitations. The study was conducted with the retail investors of Pakistan with mobile trading applications. Thus, the results are not necessarily representative of institutional investors or investors from other countries. Further research could explore other emerging and developed markets with similar interdependencies. Secondly, the study employed a convenience sampling technique due to the lack of a complete sampling frame of people who use mobile trading apps. While this method was appropriate for targeting the respondents, future research could employ probability sampling as well as stratified sampling to gain greater generalizability. Thirdly, the study relied on self-reported questionnaire data. The answers given by the respondents might have been socially desirable or they might not have been able to accurately measure their own behavioral biases. Survey data might be used in conjunction with trading behavior in future studies to obtain more objective results. Furthermore, this research was on herding behavior, anchoring heuristic, overconfidence and risk appetite. Other behavioural biases like loss aversion, regret aversion, availability bias, confirmation bias, etc. can be included in future studies to gain a better understanding of retail investor behaviours. Finally, the study adopted a cross sectional design which involved taking data at one time. Longitudinal designs could be used in future studies to explore changes in behavioral biases and risk appetite over time, particularly during periods of extreme volatility markets.

Conclusion

This study concluded that herding behavior plays an important role in increasing the risk appetite of

retail investors using mobile trading applications in Pakistan. The findings showed that investors who follow the actions and opinions of others are more likely to take financial risks. The study further confirmed that anchoring heuristic partially mediates this relationship, indicating that herding behavior influences risk appetite by encouraging investors to rely on reference points such as past prices, expected returns, and market opinions. Moreover, overconfidence strengthened both the direct and indirect effects of herding behavior on risk appetite, showing that overconfident investors are more likely to act on herd signals and take higher investment risks. Overall, the study supports the behavioral finance perspective and highlights the need for investor education, responsible trading practices, and greater awareness of psychological biases in digital investment environments.

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