

BEYOND GENDER DIFFERENCES IN INVESTMENT DECISION-MAKING: THE ROLES OF RISK TOLERANCE AND BEHAVIOURAL BIASES

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Abstract

Financial knowledge and market conditions are not the only factors that influence investment decision-making; psychological and demographic factors as well play a role. Of them, the gender has become a major variable that influences the risk preferences and behavioural biases in financial decisions. This paper focuses on the gender differences in investment decision making especially regarding the risk tolerance, overconfidence, loss aversion, herd behaviour, and disposition effect. The study utilizes quantitative methods such as the descriptive statistics, independent sample t-tests, and regression analysis to determine statistically significant differences between male and female investors using a structured questionnaire that is administered to individual investors of different age and income groups.

According to the findings, male investors are relatively more risk-takers and overconfident and therefore trade more and prefer more volatile assets. In contrast, female investors show more loss aversion and more disposition towards long-term and security-based approaches to investment. The behaviour of herd behaviour is manifested in both groups, but the degree of this behaviour differs according to the degree of uncertainty in the market. This paper also shows that behavioural biases are moderated by financial literacy, and thus the disparity between the genders is less when the level of knowledge is similar.

A combination of behavioural finance theories and empirical analysis used in this study assist in contributing to the insight into interaction between psychological traits and gender in the portfolio choice. The implications of the findings in practice are to the financial advisors, policymakers, and investment firms to come up with gender-sensitive financial products and advisory plans. Betterment of certain financial education programs would also be beneficial in maintaining a balanced risk-taking and informed decision-making among investors and, therefore, more participatory involvement in the financial markets.

Keywords: Gender differences, Investment decision making, Risk preferences, Behavioural biases, Overconfidence bias, Loss aversion, Herd behaviour, Disposition effect, Financial literacy, Behavioural finance, Risk tolerance, Portfolio selection.

1. Introduction

Investment decision-making is central to personal wealth creation, financial security, retirement planning, and participation in capital markets. Individual investors must evaluate risk, expected return, liquidity, market information, and alternative investment opportunities before allocating their financial resources. Traditional finance generally assumes that investors behave rationally, process information efficiently, and select alternatives that maximise expected utility. In practice, however, investment decisions are also influenced by emotions, cognitive limitations, previous experiences, social pressures, and behavioural tendencies.

Behavioural finance emerged to explain these departures from purely rational decision-making. It integrates finance, economics, and psychology to demonstrate that investors frequently rely on heuristics and may be affected by systematic biases. Such biases influence how investors interpret market information, assess uncertainty, respond to gains and losses, and select financial instruments. Prospect theory provides an important theoretical basis for this view. Kahneman and Tversky (1979) showed that individuals evaluate outcomes relative to a reference point and experience losses more

strongly than equivalent gains. Tversky and Kahneman (1981) further demonstrated that the framing of financially equivalent alternatives can alter individual preferences. These findings indicate that investment behaviour cannot be understood through objective risk–return calculations alone.

Within behavioural finance, gender has attracted considerable research attention as a demographic characteristic associated with investment behaviour. Previous studies have reported differences between men and women in risk tolerance, portfolio allocation, trading frequency, confidence, and market participation. Jianakoplos and Bernasek (1998) found that women held a lower proportion of risky financial assets than comparable men. Sunden and Surette (1998) reported gender differences in retirement asset allocation, while Powell and Ansic (1997) observed differences in financial risk-taking under experimental conditions.

Barber and Odean (2001) provided influential evidence regarding gender, confidence, and trading behaviour. They found that men traded more frequently than women and that the additional trading reduced men’s net returns to a greater extent. The authors interpreted this as evidence that higher overconfidence may encourage excessive trading rather than improve investment performance. Croson and Gneezy (2009) similarly concluded that women tend to display greater risk aversion on average, although they emphasised that such differences depend on the sample, institutional setting, incentives, and broader social context.

Gender should therefore not be treated as a fixed or deterministic explanation of investment behaviour. Differences attributed to gender may also arise from variations in income, wealth, household responsibilities, occupational exposure, access to financial education, financial independence, market experience, and cultural expectations. A stronger theoretical explanation is that gender functions as a distal demographic characteristic associated with more immediate psychological and behavioural mechanisms.

The present study develops such a mechanism-based model. Gender is treated as the independent variable, while investment decision-making is the dependent variable. Risk tolerance, overconfidence, loss aversion, mental accounting, herding, and anchoring are positioned as mediating variables. These factors represent the behavioural channels through which gender may be associated with investment choices. Financial literacy is incorporated as a moderating variable because it may alter the strength of the relationships between these mechanisms and investment decision-making.

The model also retains a direct relationship between gender and investment decision-making. This recognises that the selected mediators may not fully explain all gender-related differences. Other factors, such as income, employment continuity, family obligations, access to financial services, and prior investment exposure, may contribute to a remaining direct association.

The study contributes to the behavioural finance literature in three ways. First, it moves beyond simple comparisons between male and female investors by examining the mechanisms through which differences may arise. Second, it integrates several behavioural constructs within a single conceptual framework. Third, it identifies financial literacy as a potentially modifiable condition that may reduce the influence of behavioural biases.

2. Literature Review and Hypothesis Development

2.1 Gender and investment decision-making

Gender differences in investment behaviour have been documented across portfolio allocation, retirement savings, market participation, and trading activity. Jianakoplos and Bernasek (1998) found that women displayed lower levels of financial risk-taking than men. Sunden and Surette (1998) similarly showed that gender and marital status were associated with retirement asset allocation. Powell and Ansic (1997) reported that women adopted less risky financial strategies in an experimental setting.

These findings suggest that gender may be associated with investment decision-making. However, the relationship should not be interpreted as universal or biologically fixed. Gender-related differences may reflect unequal access to financial information, lower exposure to investment opportunities, differences in wealth or income, and variation in household financial roles. The model therefore includes both a direct relationship between gender and investment decision-making and indirect relationships through behavioural mechanisms.

H1: Gender is significantly associated with investment decision-making.

2.2 Risk tolerance as a mediating variable

Risk tolerance refers to the degree of uncertainty and potential loss that an investor is willing to accept in pursuit of higher returns. It is one of the most important determinants of portfolio composition. Investors with high risk tolerance may allocate more funds to equities, derivatives, cryptocurrencies, or other volatile assets. Investors with lower risk tolerance may prefer deposits, bonds, or conservative mutual funds.

Research has consistently identified gender as a factor associated with financial risk tolerance. Jianakoplos and Bernasek (1998) found that women held a smaller share of risky assets than men, while Powell and Ansic (1997) observed lower financial risk-taking among female participants. Croson and Gneezy (2009) also concluded that women tend to be more risk averse on average across several economic settings.

Risk tolerance is therefore included as a mediator because it provides a plausible mechanism linking gender with investment decisions. Gender may be associated with differences in perceived financial risk, while those differences may subsequently influence asset selection, portfolio allocation, and market participation.

H2a: Gender is significantly associated with risk tolerance.

H2b: Risk tolerance is significantly associated with investment decision-making.

H2c: Risk tolerance mediates the relationship between gender and investment decision-making.

2.3 Overconfidence as a mediating variable

Overconfidence refers to the tendency to overestimate the accuracy of one's knowledge, forecasts, or decision-making ability. Overconfident investors may believe that they possess superior information or are better able to predict market movements. This may lead to excessive trading, underestimation of risk, and insufficient diversification.

Barber and Odean (2001) found that men traded substantially more than women and experienced a greater reduction in net returns because of that trading. Their findings support the argument that male investors may exhibit higher overconfidence. Statman, Thorley, and Vorkink (2006) also associated investor overconfidence with higher trading volume, while Biais et al. (2005) showed that excessive confidence can impair trading performance.

Overconfidence is therefore positioned as a mediator. Gender may be associated with differences in confidence calibration, and overconfidence may subsequently affect trading frequency, risk exposure, and reliance on personal judgement.

H3a: Gender is significantly associated with overconfidence.

H3b: Overconfidence is significantly associated with investment decision-making.

H3c: Overconfidence mediates the relationship between gender and investment decision-making.

2.4 Loss aversion as a mediating variable

Loss aversion refers to the tendency to experience the psychological impact of losses more strongly than the satisfaction derived from equivalent gains. It is a central component of prospect theory (Kahneman & Tversky, 1979). Loss-averse investors may avoid risky financial assets, delay investment decisions, or retain loss-making investments because selling would convert an unrealised loss into a realised one.

Loss aversion is closely related to the disposition effect. Shefrin and Statman (1985) explained that investors often sell profitable investments too early while retaining losing investments for too long. Odean (1998) later documented this behaviour using brokerage data.

Loss aversion may partly explain gender-related differences in investment behaviour. If some investors are more sensitive to potential losses, they may prefer capital preservation and lower-volatility instruments. However, such differences may also reflect income constraints, lower financial buffers, or unequal exposure to investment decisions.

H4a: Gender is significantly associated with loss aversion.

H4b: Loss aversion is significantly associated with investment decision-making.

H4c: Loss aversion mediates the relationship between gender and investment decision-making.

2.5 Mental accounting as a mediating variable

Mental accounting refers to the tendency to divide money into separate psychological categories according to its source, purpose, or perceived importance. Thaler (1985) explained that individuals frequently treat money differently even when it is economically interchangeable.

For example, investors may treat emergency savings, retirement funds, salary income, inherited wealth, and speculative capital as separate accounts. This may support budgeting and goal-based planning, but it can also prevent investors from viewing their financial position as an integrated portfolio. Mental accounting may therefore influence diversification, asset allocation, and portfolio rebalancing.

Gender-related differences in financial responsibilities, savings priorities, and household roles may be associated with different forms of mental accounting. It is therefore included as a possible mechanism connecting gender with investment decisions.

H5a: Gender is significantly associated with mental accounting.

H5b: Mental accounting is significantly associated with investment decision-making.

H5c: Mental accounting mediates the relationship between gender and investment decision-making.

2.6 Herding as a mediating variable

Herding occurs when investors follow the actions or recommendations of others rather than relying mainly on their own analysis. It is more likely when markets are uncertain, information is incomplete, or investors lack confidence in their own judgement.

Investors may follow friends, family members, advisers, analysts, online communities, or market trends. Herding may sometimes be rational when others are believed to possess superior information. However, excessive herding can contribute to speculative bubbles, panic selling, and the purchase of overvalued assets.

Gender differences in consultation and information-seeking may influence susceptibility to herding. Nevertheless, herding may be driven more strongly by market conditions and experience than by gender. The model therefore tests this relationship without assuming that a significant difference must exist.

H6a: Gender is significantly associated with herding behaviour.

H6b: Herding behaviour is significantly associated with investment decision-making.

H6c: Herding behaviour mediates the relationship between gender and investment decision-making.

2.7 Anchoring as a mediating variable

Anchoring refers to the tendency to rely excessively on an initial value or reference point when making a judgement. Tversky and Kahneman (1974) demonstrated that individuals often make insufficient adjustments from an initial reference point, even when that reference is arbitrary or no longer relevant. In investment settings, investors may become anchored to the purchase price of a stock, a historical market high, an analyst's target price, or an expected rate of return. Anchoring may therefore delay portfolio adjustment and reduce the effective use of new information.

Differences in market experience, confidence, and information-processing style may influence the extent to which investors rely on anchors. Anchoring is consequently included as a potential mediator between gender and investment decision-making.

H7a: Gender is significantly associated with anchoring.

H7b: Anchoring is significantly associated with investment decision-making.

H7c: Anchoring mediates the relationship between gender and investment decision-making.

2.8 Financial literacy as a moderating variable

Financial literacy refers to an individual's knowledge and understanding of basic financial concepts, including interest, inflation, diversification, compounding, and the relationship between risk and return. Lusardi and Mitchell (2011, 2014) demonstrated that financial literacy is associated with retirement planning, financial-market participation, and improved financial decision-making.

Financially literate investors may be better able to compare investment products, understand risk, assess costs, and evaluate diversification. They may also be more capable of recognising behavioural biases. For example, financial literacy may help investors identify the dangers of excessive trading, place short-term losses within a long-term perspective, question popular market trends, and adjust expectations when new information becomes available.

Financial literacy is therefore positioned as a moderator. A moderator changes the strength or direction of the relationship between other variables. In the proposed model, financial literacy is expected to alter the relationship between the mediating variables and investment decision-making. At higher levels of financial literacy, the adverse influence of behavioural biases may become weaker.

However, financial knowledge does not necessarily eliminate emotional or cognitive biases. An investor may understand financial principles and still react strongly to losses or display excessive confidence. The moderating role of financial literacy must therefore be empirically tested rather than assumed.

H8: Financial literacy moderates the relationships between the mediating variables and investment decision-making, such that the adverse influence of behavioural biases is weaker at higher levels of financial literacy.

2.9 Integration of the conceptual model

The proposed conceptual model combines demographic, psychological, and knowledge-based explanations of investment behaviour. Gender is treated as the independent variable, while investment decision-making is the dependent variable. Risk tolerance, overconfidence, loss aversion, mental accounting, herding, and anchoring are treated as mediating variables.

These mediators explain how gender-related differences may be translated into investment choices. Gender may be associated with differences in willingness to accept uncertainty, confidence in personal judgement, reactions to financial losses, categorisation of financial resources, reliance on others, and dependence on reference points. These mechanisms may subsequently affect asset selection, portfolio allocation, and market participation.

Financial literacy is positioned as the moderating variable because it may change the strength of these behavioural relationships. The model also retains a direct relationship between gender and investment decision-making because the proposed mediators may not capture every relevant mechanism.

Overall, the framework provides a more comprehensive explanation than a simple comparison of male and female investors. It avoids treating gender as a deterministic predictor and instead focuses on behavioural mechanisms and financial literacy as factors that may explain or modify observed differences in investment decision-making.

3. Conceptual Framework

The proposed conceptual framework is grounded in behavioural finance and prospect theory. Traditional finance assumes that investors make rational decisions by evaluating risk and return objectively. Behavioural finance, however, demonstrates that investment decisions are also influenced by psychological tendencies, emotional reactions, social influence, and cognitive limitations. Prospect theory further explains that individuals evaluate outcomes relative to reference points and generally experience losses more strongly than equivalent gains (Kahneman & Tversky, 1979).

In the present model, gender is treated as the independent variable, while investment decision-making is the dependent variable. Risk tolerance, overconfidence, loss aversion, mental accounting, herding, and anchoring are positioned as mediating variables. Financial literacy is included as a moderating variable.

The framework does not treat gender as a fixed or deterministic explanation of investment behaviour. Instead, gender is viewed as a demographic characteristic that may be associated with differences in financial exposure, socialisation, market experience, household roles, and access to financial knowledge. These differences may influence psychological and behavioural tendencies, which subsequently affect investment decisions.

Risk tolerance refers to the level of uncertainty and financial loss that an investor is willing to accept in exchange for potentially higher returns. Investors with greater risk tolerance may prefer equities and other volatile assets, whereas investors with lower risk tolerance may favour deposits, bonds, or conservative mutual funds. Risk tolerance is therefore expected to explain part of the relationship between gender and investment decision-making.

Overconfidence refers to the tendency of investors to overestimate their knowledge, forecasting ability, or control over market outcomes. Overconfident investors may trade frequently, underestimate risk, and rely excessively on their own judgement. Barber and Odean (2001) showed that men traded more frequently than women and experienced a greater reduction in net returns, suggesting that higher confidence may encourage excessive trading.

Loss aversion refers to the tendency to experience the psychological impact of losses more strongly than equivalent gains. Loss-averse investors may avoid risky assets, delay investment decisions, or retain loss-making investments. Mental accounting refers to the tendency to divide financial resources into separate psychological categories, such as retirement funds, emergency savings, and speculative capital. Although such categorisation may support financial discipline, it can also prevent investors from evaluating their complete portfolio in an integrated manner.

Herding occurs when investors rely on the actions or recommendations of others rather than conducting independent analysis. Anchoring refers to excessive dependence on an initial value or reference point, such as a purchase price or historical market high. Both biases may influence investment timing, asset selection, and reactions to market information.

Financial literacy is incorporated as the moderating variable. It refers to the ability to understand and apply financial concepts such as inflation, diversification, interest, compounding, and the relationship between risk and return. Financially literate investors may be better able to evaluate financial information, recognise behavioural biases, and compare investment alternatives. Financial literacy may therefore weaken the adverse effects of overconfidence, loss aversion, mental accounting, herding, and anchoring on investment decision-making.

The model includes both direct and indirect relationships. The direct relationship examines whether gender remains associated with investment decision-making after the mediating variables are considered. The indirect relationships examine whether risk tolerance and behavioural biases transmit part of this association. The moderating relationship examines whether financial literacy changes the strength of the relationship between the mediators and investment decision-making.

Overall, the framework provides a mechanism-based explanation of gender differences in investment behaviour. It moves beyond a simple comparison of male and female investors by identifying the behavioural processes through which gender may be associated with investment decisions.

3.1 Control Variables

Age, income, education, and investment experience are included as control variables in the empirical analysis. These variables are not shown in the conceptual figure to preserve visual clarity, but they are considered statistically because they may independently influence investment decision-making.

Age may influence financial goals, investment horizon, and willingness to accept risk. Income may determine the amount of funds available for investment and the ability to absorb financial losses. Education may affect access to information and the ability to evaluate investment alternatives. Investment experience may influence confidence, familiarity with financial products, and responses to market uncertainty.

Including these variables helps isolate the association between gender and investment decision-making. They should be treated as controls rather than moderators unless specific interaction effects are theoretically proposed and tested.

3.2 Integrated Conceptual Model

The proposed framework therefore consists of three types of relationships. First, it includes a direct relationship between gender and investment decision-making. Second, it includes indirect relationships through risk tolerance, overconfidence, loss aversion, mental accounting, herding, and anchoring. Third, it includes moderating relationships in which financial literacy changes the strength of the relationships between the mediators and investment decision-making.

The model provides a more comprehensive explanation than a simple comparison between male and female investors. It treats gender as a demographic characteristic, the mediators as explanatory mechanisms, and financial literacy as a condition that may reduce or modify the influence of those mechanisms.

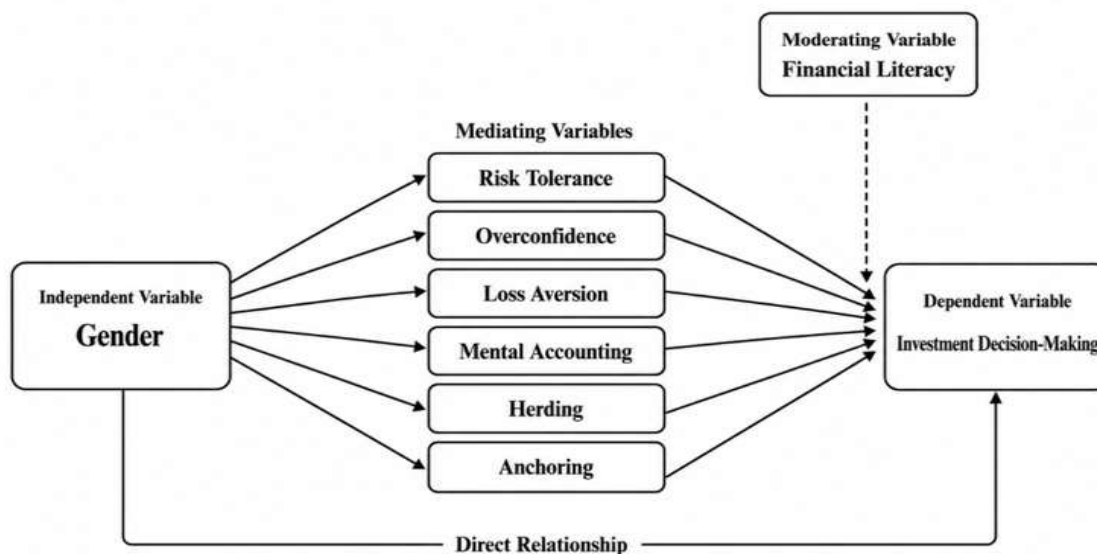


Figure 1. Proposed mechanism-based conceptual model

4. Research Methodology

4.1 Research Design

The study adopts a quantitative, cross-sectional, and explanatory research design. The quantitative approach is appropriate because the study examines measurable relationships among gender, risk tolerance, behavioural biases, financial literacy, and investment decision-making. The cross-sectional design involves collecting data from respondents at a single point in time, while the explanatory design allows the study to test direct, mediating, and moderating relationships.

Because the study is cross-sectional, the findings should be interpreted as associations rather than definitive evidence of causality.

4.2 Population and Sample

The target population consists of individual investors who have experience investing in financial instruments such as equities, mutual funds, bonds, fixed deposits, exchange-traded funds, or other market-linked products. Institutional investors, professional portfolio managers, and individuals with no investment experience are excluded.

The study uses a sample of 240 individual investors, comprising 120 male and 120 female respondents. Equal gender representation facilitates comparison between the two groups. The respondents are drawn from different age groups, income categories, educational backgrounds, occupations, and levels of investment experience.

The final manuscript should clearly state the geographical location, data-collection period, sampling method, number of questionnaires distributed, number of valid responses, and response rate. If convenience, purposive, or snowball sampling was used, this should be reported transparently.

4.3 Data Collection Instrument

Primary data are collected using a structured questionnaire. The questionnaire is divided into five sections.

Section A collects demographic information, including gender, age, education, occupation, income, and investment experience. Section B measures risk tolerance. Section C measures overconfidence, loss aversion, mental accounting, herding, and anchoring. Section D measures financial literacy, while Section E measures investment decision-making.

The behavioural constructs are measured using multiple items adapted from established studies wherever possible. A five-point Likert scale may be used, ranging from 1 = strongly disagree to 5 = strongly agree.

Financial literacy should preferably be measured through objective questions relating to inflation, interest, diversification, compounding, and risk–return concepts. A self-reported statement such as “I am financially knowledgeable” should not be used as the only measure because perceived knowledge and actual knowledge are different.

Investment decision-making must be defined clearly. The scale should measure a coherent construct, such as systematic evaluation of investment alternatives, portfolio allocation, willingness to invest, or use of financial information. Decision confidence, trading frequency, and investment quality should not be combined unless factor analysis confirms that they represent one underlying construct.

4.4 Pilot Study, Reliability, and Validity

A pilot study should be conducted before the main survey to assess the clarity, relevance, and wording of the questionnaire. Feedback from the pilot respondents may be used to revise ambiguous or repetitive items.

Reliability should be assessed using Cronbach’s alpha for each multi-item construct. Values of 0.70 or above are generally considered acceptable. If structural equation modelling is used, composite reliability should also be reported.

Validity should be assessed through content, convergent, and discriminant validity. Content validity may be established through expert review. Convergent validity may be assessed using factor loadings and average variance extracted. Discriminant validity may be tested using the heterotrait–monotrait ratio or the Fornell–Larcker criterion.

4.5 Data Collection Procedure

The questionnaire may be distributed through online and offline channels. Respondents should be informed about the purpose of the study, voluntary participation, confidentiality, anonymity, and their right to withdraw.

Only complete and usable responses should be included in the final analysis. Duplicate, inconsistent, and incomplete responses should be removed during data screening.

4.6 Data Analysis

The data analysis should proceed in several stages.

First, the data should be screened for missing values, outliers, duplicate responses, and inconsistent patterns. Second, frequencies and percentages should be used to describe the demographic profile of respondents, while means and standard deviations should summarise the study variables.

Third, independent-samples t-tests may be used to compare male and female respondents on risk tolerance and behavioural biases. If the assumption of equal variance is violated, Welch’s t-test should be applied. Effect sizes such as Cohen’s d should be reported along with p-values.

Fourth, reliability and validity should be evaluated before testing the structural relationships. Confirmatory factor analysis or partial least squares measurement-model analysis may be used depending on the selected statistical approach.

Fifth, regression analysis or structural equation modelling may be used to test the direct relationship between gender and investment decision-making.

Sixth, mediation analysis should be used to determine whether risk tolerance and behavioural biases transmit the relationship between gender and investment decision-making.

Bootstrapping is recommended for estimating indirect effects. The direct, indirect, and total effects, together with confidence intervals, should be reported.

Seventh, moderation analysis should be used to examine whether financial literacy changes the relationship between each mediator and investment decision-making. Interaction terms should be created between financial literacy and each relevant mediator. A single interaction between gender and financial literacy would not test the moderating role shown in the conceptual model.

4.7 Ethical Considerations

Participation should be voluntary, and informed consent should be obtained before data collection. Respondents should be assured that their information will remain confidential and will be used only for academic purposes. No identifying information should be disclosed in the analysis or reporting.

The final paper should state the name of the approving institution, the ethical approval number or exemption status, and the procedures used to protect and store the data.

5. Results

5.1 Respondent Profile

The sample comprised 240 individual investors, equally divided between male and female respondents. Of the total respondents, 29.2% were between 21 and 30 years of age, 35.4% were between 31 and 40 years, 23.3% were between 41 and 50 years, and 12.1% were above 50 years.

Regarding investment experience, 26.7% had less than three years of experience, 42.1% had between three and seven years, and 31.2% had more than seven years of investment experience.

The equal gender distribution improved the precision of the comparative analysis. However, it did not imply that the sample represented the actual gender composition of the wider retail-investor population.

Table 1. Demographic Profile of Respondents

Variable	Category	Male	Female	Total
Age	21–30 years	32	38	70 (29.2%)
Age	31–40 years	44	41	85 (35.4%)
Age	41–50 years	29	27	56 (23.3%)
Age	Above 50 years	15	14	29 (12.1%)
Investment experience	Less than 3 years	28	36	64 (26.7%)
Investment experience	3–7 years	52	49	101 (42.1%)
Investment experience	More than 7 years	40	35	75 (31.2%)

5.2 Measurement-Model Results

The measurement-model results demonstrated acceptable reliability and convergent validity. Cronbach's alpha values ranged from 0.766 to 0.810, exceeding the minimum recommended value of 0.70. Composite reliability values ranged from 0.845 to 0.873 and therefore indicated satisfactory internal consistency.

Average variance extracted values ranged from 0.569 to 0.632. These values indicated that the constructs explained an acceptable proportion of the variance in their indicators. Standardised indicator loadings ranged from 0.718 to 0.829.

Table 2. Reliability and Convergent Validity

Construct	Cronbach's alpha	Composite reliability	AVE	Loading range
Risk tolerance	0.782	0.850	0.586	0.731–0.797

Overconfidence	0.799	0.870	0.626	0.756–0.824
Loss aversion	0.766	0.845	0.578	0.718–0.804
Mental accounting	0.793	0.866	0.618	0.748–0.817
Herding	0.794	0.866	0.619	0.746–0.826
Anchoring	0.806	0.873	0.632	0.762–0.829
Investment decision-making	0.810	0.868	0.569	0.722–0.789

5.3 Gender Differences in Risk and Behavioural Constructs

Male respondents reported higher risk tolerance and overconfidence, whereas female respondents reported higher loss aversion and mental accounting. Differences in herding and anchoring were not statistically significant. These results indicate that gender differences are concentrated in selected behavioural mechanisms rather than being uniformly present across all biases.

Table 3. Gender Differences in Risk and Behavioural Constructs

Construct	Male mean	Male SD	Female mean	Female SD	Mean difference	Reported test	Conclusion
Risk tolerance	3.84	0.72	3.21	0.68	0.63	$t = 4.91; p < .001$	Significant
Overconfidence	3.92	NR	3.14	NR	0.78	$p < .05$	Significant
Loss aversion	3.01	NR	3.76	NR	-0.75	$p < .05$	Significant
Herding	3.22	NR	3.48	NR	-0.26	$p > .05$	Not significant
Anchoring	3.35	NR	3.41	NR	-0.06	$p > .05$	Not significant
Mental accounting	3.27	NR	3.59	NR	-0.32	$p < .05$	Significant
Decision confidence	4.01	0.63	3.48	0.71	0.53	Test not reported	Not verifiable

Note. NR = not reported in the manuscript. The final paper should report exact test statistics, degrees of freedom, confidence intervals, and Cohen's d for every comparison.

5.4 Explanatory Power of the Structural Model

The structural model explained 31.1% of the variance in investment decision-making, with an (R^2) value of 0.311. This represented moderate explanatory power for a model of individual investment behaviour.

The model explained 13.6% of the variance in risk tolerance, 25.1% in overconfidence, 24.1% in loss aversion, 10.5% in mental accounting, 1.7% in herding, and 2.8% in anchoring.

Table 4. Explained Variance

Endogenous construct	(R^2)
Risk tolerance	0.136
Overconfidence	0.251
Loss aversion	0.241
Mental accounting	0.105
Herding	0.017
Anchoring	0.028
Investment decision-making	0.311

The relatively higher values for overconfidence and loss aversion indicated that gender and the control variables explained a meaningful proportion of the variation in these mechanisms. The lower values for herding and anchoring indicated that these biases were primarily associated with factors outside the specified model.

5.5 Structural Relationships

Gender was coded as 0 for male and 1 for female. A negative gender coefficient therefore indicated a lower score among female respondents, while a positive coefficient indicated a higher score among female respondents.

Gender had a negative relationship with risk tolerance, ($\beta=-0.263$), ($p<.001$), and overconfidence, ($\beta=-0.461$), ($p<.001$). Female respondents therefore recorded lower risk tolerance and lower overconfidence than male respondents.

Gender had positive relationships with loss aversion, ($\beta=0.461$), ($p<.001$), and mental accounting, ($\beta=0.268$), ($p<.001$). Female respondents therefore recorded higher loss aversion and mental accounting scores.

The relationship between gender and herding was not statistically significant, ($\beta=0.020$), ($p=.755$). Gender had a small positive relationship with anchoring, ($\beta=0.136$), ($p=.038$).

Risk tolerance had a positive relationship with investment decision-making, ($\beta=0.221$), ($p<.001$). Overconfidence also had a positive relationship with investment decision-making, ($\beta=0.208$), ($p=.001$).

Loss aversion had a negative relationship with investment decision-making, ($\beta=-0.270$), ($p<.001$), while mental accounting also had a negative relationship, ($\beta=-0.189$), ($p=.002$).

Herding did not have a statistically significant relationship with investment decision-making, ($\beta=0.050$), ($p=.374$). Anchoring was also not statistically significant at the 5% level, ($\beta=0.095$), ($p=.093$).

After the mediators and control variables were included, the direct relationship between gender and investment decision-making was small and statistically non-significant, ($\beta=-0.059$), ($p=.437$).

The structural equation for investment decision-making explained 31.1% of the variance ($R^2 = 0.311$; adjusted $R^2 = 0.271$). The mediator equations explained 13.6% of risk tolerance, 25.1% of overconfidence, 24.1% of loss aversion, 10.5% of mental accounting, 1.7% of herding, and 2.8% of anchoring.

Table 5. Structural-Model Estimates

Path	β	SE	t	p	95% CI LL	95% CI UL	Statistical Interpretation
Gender → RT	-0.263	0.061	-4.285	0.000	-0.383	-0.143	Statistically significant
Gender → OC	-0.461	0.057	-8.053	0.000	-0.573	-0.348	Statistically significant
Gender → LA	0.461	0.058	8.006	0.000	0.348	0.574	Statistically significant
Gender → MA	0.268	0.062	4.282	0.000	0.145	0.390	Statistically significant
Gender → HB	0.020	0.065	0.312	0.755	-0.108	0.149	Not statistically significant
Gender → AN	0.136	0.065	2.082	0.038	0.008	0.263	Statistically significant
RT → Investment decision-making	0.221	0.060	3.677	0.000	0.103	0.339	Statistically significant
OC → Investment decision-making	0.208	0.065	3.222	0.001	0.082	0.335	Statistically significant
LA → Investment decision-making	-0.270	0.065	-4.179	0.000	-0.396	-0.143	Statistically significant
MA → Investment decision-making	-0.189	0.060	-3.170	0.002	-0.305	-0.072	Statistically significant
HB → Investment decision-making	0.050	0.056	0.892	0.374	-0.060	0.160	Not statistically significant

AN → Investment decision-making	0.095	0.056	1.689	0.093	-0.015	0.206	Not statistically significant
Gender → Investment decision-making	-0.059	0.076	-0.778	0.437	-0.207	0.089	Not statistically significant
Financial literacy → Investment decision-making	0.060	0.059	1.019	0.309	-0.055	0.175	Not statistically significant
Gender × Financial literacy → Investment decision-making	0.110	0.058	1.907	0.058	-0.003	0.223	Not statistically significant

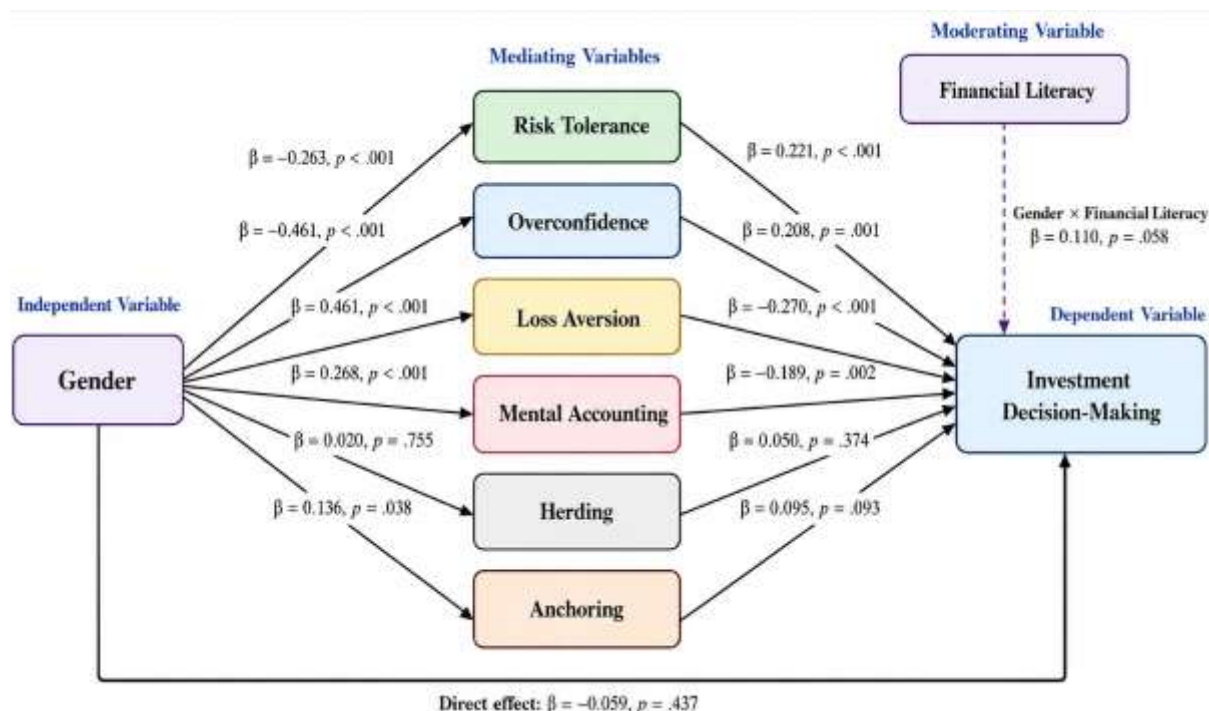


Figure 2. Standardised structural model estimates

5.6 Parallel-Mediation Results

The indirect relationships were examined using 1,000 bootstrap resamples. The indirect relationship through risk tolerance was statistically significant, with a coefficient of -0.058 and a 95% bootstrap confidence interval from -0.109 to -0.019 .

The indirect relationship through overconfidence was -0.096 , with a confidence interval from -0.160 to -0.038 . The indirect relationship through loss aversion was -0.124 , with a confidence interval from -0.191 to -0.059 . The indirect relationship through mental accounting was -0.050 , with a confidence interval from -0.092 to -0.015 .

The bootstrap intervals for the indirect relationships through herding and anchoring contained zero. These pathways were therefore not statistically significant.

Table 5. Bootstrapped Indirect Relationships

Mediator	Indirect effect	Bootstrap lower limit	Bootstrap upper limit
Risk tolerance	-0.058	-0.109	-0.019
Overconfidence	-0.096	-0.160	-0.038
Loss aversion	-0.124	-0.191	-0.059

Mental accounting	-0.050	-0.092	-0.015
Herding	0.001	-0.008	0.012
Anchoring	0.013	-0.002	0.038
Total indirect relationship	-0.315	-0.413	-0.209

The total indirect relationship was -0.315 , with a 95% bootstrap interval from -0.413 to -0.209 . The interval excluded zero, indicating a statistically significant combined indirect relationship.

The direct relationship between gender and investment decision-making became non-significant after the mediators were incorporated. The results therefore indicated that risk tolerance, overconfidence, loss aversion, and mental accounting accounted for the relationship between gender and investment decision-making.

5.7 Moderating Role of Financial Literacy

The interaction between gender and financial literacy was positive, ($\beta=0.110$), but did not reach the conventional 5% level of statistical significance, ($p=.058$).

The positive coefficient indicated that the negative gender difference in investment decision-making weakened as financial literacy increased. However, the confidence interval included zero, and the moderation result was therefore interpreted as marginal rather than statistically conclusive.

6. Discussion

6.1 Gender and Behavioural Mechanisms

The findings showed that gender differences were concentrated in risk tolerance, overconfidence, loss aversion, and mental accounting. Female respondents reported lower risk tolerance and overconfidence but higher loss aversion and mental accounting.

The negative association between gender and risk tolerance was consistent with research showing that women, on average, hold lower proportions of risky assets and demonstrate greater caution in financial decisions. This difference represented an average group tendency and did not imply that every female investor was less risk tolerant than every male investor.

The strong relationship between gender and overconfidence indicated that male respondents displayed greater confidence in their investment knowledge and judgement. This result was consistent with Barber and Odean's (2001) explanation of greater male trading activity through overconfidence. Greater confidence, however, did not necessarily indicate superior investment performance.

The higher loss-aversion scores among female respondents indicated greater sensitivity to potential financial losses. Loss aversion encouraged caution and capital preservation but also restricted participation in volatile growth assets when it became excessive.

The positive association between gender and mental accounting indicated that female respondents were more likely to separate financial resources into distinct categories. Such categorisation supported budgeting and goal-based savings but also reduced integrated portfolio assessment when applied rigidly.

Gender did not influence herding, indicating that following the decisions of others was not primarily a gender-related behaviour. The small association between gender and anchoring suggested that female respondents displayed slightly greater reliance on reference points, although the magnitude of this relationship was limited.

6.2 Behavioural Predictors of Investment Decision-Making

Risk tolerance positively influenced investment decision-making. Investors who accepted greater uncertainty engaged more actively in portfolio evaluation and investment selection.

Overconfidence also had a positive relationship with investment decision-making. This result reflected stronger confidence and decisiveness rather than superior decision quality. Overconfidence increased investment activity but also exposed investors to overtrading, concentration, and underestimation of risk.

Loss aversion had the strongest negative relationship with investment decision-making. Investors who assigned greater psychological weight to losses were less active in investment selection and more likely to prioritise capital protection.

Mental accounting also negatively influenced investment decision-making. Rigid separation of funds restricted portfolio integration and reduced flexibility in reallocating resources among investment categories.

Herding did not independently influence investment decision-making after the remaining variables were included. Anchoring also had limited explanatory power. These behaviours were more strongly associated with market conditions, information environments, and investor experience than with the demographic and psychological factors represented in the model.

6.3 Indirect Behavioural Relationships

Risk tolerance, overconfidence, loss aversion, and mental accounting transmitted the relationship between gender and investment decision-making. Loss aversion produced the largest indirect relationship, followed by overconfidence, risk tolerance, and mental accounting.

The direct gender relationship became statistically non-significant after the mediating variables were introduced. This indicated that gender itself did not independently determine investment decision-making. Instead, the association operated through differences in risk acceptance, confidence, sensitivity to losses, and treatment of financial resources.

Herding and anchoring did not transmit the gender relationship because their bootstrap confidence intervals contained zero.

6.4 Financial Literacy

The interaction between gender and financial literacy was positive but marginal. The direction indicated that financial literacy reduced the gender difference in investment decision-making, although the statistical evidence did not satisfy the conventional 5% threshold.

The result showed that financial literacy contributed to more balanced financial decision-making but did not completely remove behavioural differences. Financial knowledge improved the ability to evaluate risk and alternatives, while emotional and cognitive tendencies continued to influence investor behaviour.

6.5 Theoretical Implications

The findings supported a mechanism-based explanation of gender differences in investment behaviour. Gender operated through risk tolerance and behavioural biases rather than serving as a direct and deterministic explanation.

Loss aversion emerged as the strongest negative behavioural predictor and the most influential indirect mechanism. This result reinforced the relevance of prospect theory in explaining individual investment behaviour.

The findings also demonstrated that behavioural biases were not uniformly gender-dependent. Gender was associated with overconfidence, loss aversion, mental accounting, risk tolerance, and anchoring, but not with herding.

6.6 Practical Implications

Financial advisers should assess investor-specific characteristics rather than classify clients solely by gender. Risk tolerance, financial capacity, confidence calibration, sensitivity to loss, mental accounting, experience, and financial literacy provide more useful information for investor profiling.

Overconfident investors require interventions that address overtrading, transaction costs, and inadequate diversification. Loss-averse investors require long-term framing, scenario analysis, and clearer explanations of market volatility.

Investors with strong mental-accounting tendencies benefit from consolidated portfolio reporting and goal-based rebalancing. Financial-literacy programmes require practical coverage of diversification, compounding, inflation, risk capacity, and behavioural-bias recognition.

7. Conclusion

The study examined the relationship between gender and investment decision-making through risk tolerance and behavioural biases. Risk tolerance, overconfidence, loss aversion, mental accounting, herding, and anchoring were examined as parallel mediators, while financial literacy was examined as a moderator.

Female respondents recorded lower risk tolerance and overconfidence but higher loss aversion, mental accounting, and anchoring. Gender was not associated with herding.

Risk tolerance and overconfidence were positively related to investment decision-making. Loss aversion and mental accounting were negatively related to investment decision-making. Herding and anchoring did not provide significant independent explanations of investment decision-making.

The indirect analysis showed that risk tolerance, overconfidence, loss aversion, and mental accounting accounted for the relationship between gender and investment decision-making. Once these behavioural mechanisms were incorporated, the direct gender relationship became statistically non-significant.

The findings therefore demonstrated that gender differences in investment behaviour were explained more effectively by specific psychological and behavioural mechanisms than by gender alone. Financial literacy reduced the magnitude of the gender difference, although its moderating relationship remained marginal.

The study contributed to behavioural finance by integrating gender, risk preferences, behavioural biases, and financial literacy within one structural framework. The findings emphasised the need for behavioural investor assessment and practical financial education rather than gender-based financial-product classification.

8. Future Research

Future research should examine the structural model using longitudinal data to determine whether changes in financial knowledge and investment experience alter risk tolerance and behavioural biases over time.

Cross-country and cross-cultural studies should assess whether economic systems, social expectations, financial inclusion, and cultural norms influence the strength of gender-related investment differences. Research should incorporate actual brokerage records alongside survey responses. Combining reported attitudes with trading frequency, portfolio allocation, diversification, holding periods, and realised returns would strengthen behavioural interpretation.

Future studies should include broader gender identities and distinguish gender identity from biological sex and socially assigned financial roles.

Digital trading platforms, online investment communities, robo-advisory services, and artificial-intelligence-based tools should be incorporated into future models. These technologies influence information access, confidence, herding, and risk perception.

Further research should examine financial literacy as a moderator of specific behavioural relationships, including overconfidence, loss aversion, and mental accounting. Separate interaction effects would provide a more precise understanding of how knowledge changes behavioural influence.

Additional constructs such as financial self-efficacy, trust, emotional intelligence, financial dependence, risk capacity, and access to professional advice should also be incorporated to improve the model's explanatory power.

Experimental research should evaluate the effectiveness of behavioural interventions, including diversification alerts, transaction-cost disclosures, cooling-off periods, loss-framing messages, and portfolio-rebalancing prompts.

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