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Behavioral Finance: The Impact Of Socio-Demographic Factors On Investment Biases

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Abstract

This study examines the impact of sociodemographic factors (age, gender, occupation, and investment experience) on investment biases (overconfidence, risk aversion, and anchoring bias) and their mediating role in investment decisions among investors in Karachi, Pakistan. A quantitative research approach was employed, utilizing a structured questionnaire to collect data from 213 respondents across various industries. Statistical analysis, including the Kruskal-Wallis H test, Mann-Whitney U test, Ordinal Regression, and Mediation Analysis using PROCESS Macro, was conducted to identify significant relationships between sociodemographic factors, behavioral biases, and investment decisions. The results reveal that younger investors exhibit higher overconfidence, whereas older investors display a stronger anchoring bias. Men tend to be more overconfident, while women rely more on past reference points, increasing their anchoring bias. Investment experience significantly influences risk aversion and anchoring bias but does not impact

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overconfidence. Mediation analysis confirms that overconfidence and anchoring bias significantly mediate investment decisions, whereas risk aversion does not. The findings highlight the need for targeted financial literacy programs to mitigate behavioral biases. Policymakers and financial advisors can use these insights to design interventions promoting rational investment decision-making. This study contributes to behavioral finance by providing empirical evidence on how sociodemographic factors shape investment biases and decision-making, particularly in an emerging market context.

| **Keywords** | Behavioral finance, investment biases, overconfidence, risk aversion, anchoring bias, sociodemographic factors, investment decisions. |

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INTRODUCTION

Behavioral finance is an emerging field that combines economics and cognitive psychology to explain why people make irrational financial decisions (Rasool & Safiullah, 2019). Behavioral finance studies how people's psychological factors, emotions, sociodemographic factors, and cognitive biases influence their financial decisions, often leading them to irrational choices. This contrasts with contemporary or traditional finance, which always makes assumptions for people to act logically (Iram et al., 2024; Barberis & Thaler, 2003; Kahneman, 2011).

Shafi (2014) explains investment as the flow of money used for profitable endeavors, which is essential to the expansion and development of the economy. It boosts capital expenditure and strengthens the economy. Many entrepreneurs worry about financial decision-making because they want to earn profits and face fewer losses (Dang et al., 2019 as cited in Iram et al., 2023). Wijaya et al. (2024) propose that making a rational investment decision involves taking risks to make money. However, their restricted knowledge hinders their rational behavior. Individual characteristics and systematic factors are the key variables influencing investors' financial decisions (Wijaya et al., 2024). An Individual's money management, confidence, and financial literacy may all be considered when evaluating their decision-making skills (Shaikh et al, 2019). Although investment returns can fluctuate, one can succeed by conducting thorough research and gathering relevant data (Khan, 2020). Investment decisions and cognitive biases come hand in hand, cognitive biases as Tversky and Kahneman, (1974) suggest are mental heuristics and shortcuts that result in systematic errors in decision-making and frequently arise from inadequacies in an individual's ability to process information.

The recent study tried to explore how key sociodemographic factors such as age, gender, occupation, and investment experience contribute to investment biases, such as patterns of deviance from rationality in judgment and investment decision-making particularly overconfidence, risk aversion, and anchoring bias. Understanding these biases and their mediating role in investment decision-making is essential for improving financial literacy and investment strategies (Thaler, 2015; Shiller, 2020; Lo, 2017).

SOCIODEMOGRAPHIC FACTORS AND BEHAVIORAL BIASES

Overconfidence is the behavioral finance bias defined as an overestimation of creating value. As Barber & Odean (2001) set forth, overconfident individuals believe they are more capable and skilled than they are, meaning they overestimate their predictive abilities. The root cause of overconfidence is self-attribution bias (Ghulam et al., 2019). According to Iram et al. (2023), overconfident heuristics refer to aggressive decisions made by investors who overstate their competence, are biased in their forecasting, and rely more on the precision of information. This can lead to overconfidence in financial decision-making and less reliance on professional advice. Overconfidence exists across all demographic groups (Bhandari & Deaves, 2020), and the strength or intensity would differ with age, gender, & nature of the task. They argued that although there may be some truth to the adage "time heals all wounds," overconfident investors, who consistently overestimate their grasp of the value of financial securities will, due to this overconfidence and their attention which has shifted towards their valuation, augments the review and appraisal processes, resulting in escalation of opinions and trading (Brad et al., 2001). Overconfident investors hold riskier portfolios than supplementary rational investors and find that

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men and women alike reveal overconfident behaviors, though men are on the high end of the overconfidence spectrum.

Psychological and/or behavioral biases is one of the unique characteristics of behavioral finance and a major aspect of individual investor decision-making (Jameel & Siddiqui, 2019). These biases can significantly influence market efficiency and individual wealth accumulation, warranting further investigation. Risk acceptance varies between individuals and one of these factors is gender. Similarly, research suggests that gender significantly impacts behavior, as men exhibit higher levels of overconfidence than women (Baker & Yi, 2016; Feng & Seasholes, 2005), who are more risk-averse and conservative in their investment decisions (Barber & Odean, 2011). Risk-taking levels are different for men and women, as women are pessimistic in and about financial markets, and this leads to behavioral biases like overconfidence and risk aversion. According to Tabassum et al., (2021) gender differences in financial risk, men tend to invest in more riskier investments than men. The study revealed indeed a very strong wealth position-based stereotyping despite the prevailing traditional stereotype of man and women. According to Zahera & Bansal, (2019) men are more risk-tolerant and overconfident than women for investments as they hold conservative positions in the financial markets.

The financial industry has evolved drastically with the advent of tech-driven platforms and wider access to investment opportunities. Their participation continued through diversification across different asset classes, such as stocks, bonds, mutual funds, and cryptocurrencies, resulting in evolving investor behavior and bias manifestations (Malmendier & Tate, 2015; Shiller, 2020). E-commerce platforms, including brokerage, have shaped decision-making models based on making information more accessible and removing information asymmetrically, but irrational behaviors like anchoring and overconfidence still affect trading (Lo, 2017; Fenton-O'Creevy et al., 2018). As financial markets become more dynamic and global, it is urgent to evaluate how sociodemographic variables affect the behavioral biases of different types of investors (Kumar & Goyal, 2015; Baker & Ricciardi, 2014). These biases not only affect individual investors but have broader consequences for market stability and the well-being of financial institutions. Market inefficiencies, price bubbles, and the sub-optimal allocation of assets arise due to behavioral anomalies (Fama, 1970; De Bondt & Thaler, 1985) and are captured by the efficient market hypothesis (EMH).

In this study, we explore the effects of sociodemographic factors (age, gender, occupation, investment experience) on behavioral biases (overconfidence, loss aversion, anchoring bias) and their mediating role in investment decision-making. This analysis is to understand the sociodemographic factors that play a potentially important role in behavioral finance to better engage in investment decision-making aligned with everyone as well as develop approaches to enhance financial literacy and customize investment styles based on one's characteristics and psychological tendencies (Iram, N., Rasool, W., & Safiullah, M. 2024).

The current study serves to examine the relationship of sociodemographic factors (age, gender, occupation, investment experience) with behavioral biases (risk aversion, overconfidence, anchoring bias) and the impact of these biases on investment decisions, as well the mediating role of biases between sociodemographic factors and investment decisions among investors in Karachi, Pakistan

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RESEARCH QUESTIONS

How do sociodemographic variables impact risk aversion, overconfidence, and anchoring bias?

How do behavioral biases (Overconfidence, Risk aversion, and Anchoring bias) impact investment decisions?

How do behavioral biases mediate the relationship between sociodemographic factors and investment decisions?

What effects do sociodemographic factors have on the investment decisions of individuals in Karachi, Pakistan?

SIGNIFICANCE OF THE STUDY

This study contributes to the field of behavioral finance by examining the effects of sociodemographic characteristics, including age, gender, occupation, and investment experience, on investment biases, specifically overconfidence, risk aversion, and anchoring bias and investment decisions among investors in Karachi, Pakistan. The findings of this research are significant for multiple stakeholders: For Individual Investors: Investors can make more strategic and informed financial decisions by identifying and reducing illogical decision-making behaviors with the aid of an understanding of behavioral biases. For Financial Advisors and Wealth Managers: Professionals can promote individualized financial planning by using the study's insights to help them customize investment recommendations based on individual characteristics. For Policymakers and Regulators: The study emphasizes how socioeconomic factors influence financial decision-making, which can direct the creation of financial literacy campaigns and investor education programs. For Academic Research: By concentrating on several sociodemographic variables at once, this study closes a gap in behavioral finance literature and offers a comprehensive understanding of investor behavior. The current study contributes to market efficiency, better financial decision-making techniques, and the economic growth of Pakistan and other countries by identifying how these variables affect investment biases.

LITERATURE REVIEW

Behavioral finance explores how psychological influences and sociodemographic factors impact investor behavior, diverging from traditional economic theories that assume rational decision-making. The study found that investment biases such as overconfidence, risk aversion, and anchoring bias have a profound impact on financial decisions, and they often result in suboptimal outcomes (Barberis & Thaler, 2003; Kahneman, 2011). With the increasing complexity of the financial markets, the need to understand how sociodemographics such as age, gender, occupation, and investment experience come into play has also been increasing (Thaler, 2015; Shiller, 2020). Evidence from recent studies highlights the role of behavioral finance in anticipating market trends, optimizing investment strategies, and designing policy interventions to curtail irrational financial behavior (Lo, 2017; Lusardi & Mitchell, 2017). Investment refers to the cash deposit being utilized for profitable purposes, which is needed for economic growth and development. It also encourages capital expenditure and fortifies the economy (Shafi, 2014). Investing is a risk-taking activity designed to make money. While returns from investment may vary, one may do well after various research and analysis (Khan, 2020). Behavioral finance, on the other hand, is an emerging field that combines economics and cognitive psychology to explain why people make irrational financial decisions. It focuses on the impact of market participant characteristics and information structure on investment decisions

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Frequency Of Journal: Bi-Annual
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and market results (Shafi, 2014). The behavioral and psychological aspects of investing decision-making are combined in behavioral finance, which also explains the behavioral biases—such as cognitive and affective—that lead to various anomalies in the financial market. Rehan and Umer (2017) show that emotional and cognitive factors significantly influence the decision-making process of investors. People lose a lot of money on their investments when they misinterpret readily available financial information (Qamar & Lodhi, 2023).

THEORETICAL FRAMEWORK

PROSPECT THEORY

Kahneman and Tversky (1979) introduced prospect theory, which indicates the process by which investors decide in uncertain situations. According to the theory, psychological influences frequently lead investors to make decisions that are not rational. Investors always want to maximize their wealth, even though they might not be able to assess the accessible chances or available information, they rely on a certain judgmental process typically on their intuition, optimism, and past experiences that are influenced by a variety of cognitive and emotional factors (Qamar & Lodhi, 2023). Saleem et al. (2018) suggest that investors often simplify their judgments to attain their satisfaction, even when such decisions are not objectively rational, instead of making sensible choices. A pattern of variation in judgment that arises under certain circumstances is known as behavioral bias. It can occasionally result in inaccurate judgment, illogical interpretation, perceptual distortion, or what is generally referred to as irrationality (Bashir et al., 2013). The combination of investors' emotional and cognitive biases in investment decision-making leads to stock market anomalies. Surely, such irregularities affect both market returns and individual investors' decision-making as well. In general, these inconsistencies are associated with certain categories of security, leading to short- or long-term underperformance or outperform (Abideen et al., 2023).

THEORY OF OVERCONFIDENCE

Overconfidence is a psychological bias that leads an investor to overestimate the significance of a parameter. Saleem et al. (2018) state that overconfidence occurs when investors overestimate their abilities and the accuracy of the information they have; it can result in an overabundance of optimism regarding anticipated returns. Because of this tendency, the expected utilities may be reduced even though sensible investors trade. Madaan and Singh (2019) countered that overconfidence is also a good predictor of individual investors' investing performance and thus is called a judgmental error in which individuals exaggerate their abilities, knowledge, or perception of information, or increase the perceived likelihood that a specific outcome will occur. The literature has identified several factors, including bounded rationality, intuitions, cognitive and emotional biases, demographic factors, financial knowledge, past experiences, regulatory factors, information availability, gender biases, and so on, that may affect an investor's decision-making process. Of these, cognitive and emotional biases are thought to be the most significant because they affect an investor's performance, goals, and strategies (Qamar & Lodhi, 2023).

THEORY OF RISK AVERSION

Risk aversion occurs when investors choose an option that offers higher returns than other opportunities at a lower risk from alternatives because they want to minimize risk and avoid uncertainty (Tabassum et al., 2021). This indicates that risk aversion harms investors' trading levels and portfolios. The fear of risk causes investors to

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invest less or occasionally make poor decisions, which hurts investors' wealth because of this prosperity.

A widely accepted theory is the concept of risk aversion, indicating that women tend to be more cautious about taking risks compared to men. This implies that women tend to opt for secure, low-risk investments like bonds or savings accounts over riskier choices such as stocks. Jianakoplos and Bernasek (1998) investigate this distinction in their research titled "Are Women More Risk Averse?" They observe that women invest in fewer high-risk assets in their investment portfolios than men, even when considering their overall wealth and other variables. Preferring stability can result in lesser potential gains but can provide added protection in times of market decline. Socialization is frequently credited as the basis for this theory, with customary gender roles promoting women to prioritize carefulness and future stability.

THEORY OF ANCHORING BIAS

A bias known as "anchoring" occurs when an investor places an undue amount of reliance on a small number of well-established variables or points of reference because they find it difficult to incorporate new information into their existing framework (Javed and Marghoob, 2017). A cognitive bias known as anchoring explains why most people tend to base their decisions mostly on initial information (SCHULZ, 2023). Rehan et al. (2021) states that investors are engaged in anchoring and project the future value of a financial instrument using irrelevant information, emotional variables, and other unimportant factors like speculation and incorrect beliefs.

SUPPORTING PERSPECTIVE

Investment biases come in many forms. For example, overconfidence causes investors to overestimate their own knowledge and skills (Barber & Odean, 2001; Malmendier & Tate, 2015) and trade and take risks excessively. Risk-taking behavior on the other hand also has an impact on individual or institutional diversification of the portfolios, where the diversified portfolios would rather be held by less risk-averse individuals but well-established companies, ultimately affecting the liquidity and trade costs in the securities market (Bhandari & Deaves, 2020; Nguyen et al., 2021). Anchoring bias affects investors by causing them to reference past points heavily when assessing stock value and acting on that value through trading (Tversky & Kahneman, 1974; Hwang & Satchell, 2010). These biases differ between demographic groups, however, calling for a deeper analysis of sociodemographic aspects and their combination with investor psychology (Gibson et al., 2022; Kim et al., 2019).

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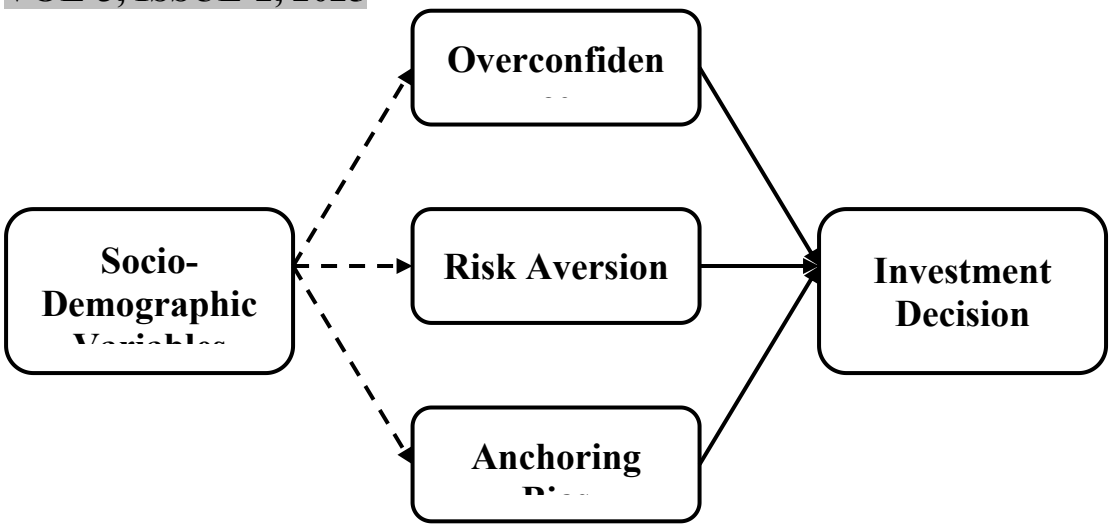

FIGURE 1 CONCEPTUAL MODEL

HYPOTHESIS DEVELOPMENT

SOCIO-DEMOGRAPHIC VARIABLES AND OVERCONFIDENCE

Overconfidence in investment behavior is often shaped by a variety of socio-demographic characteristics, including age, gender, occupation, and investment experience. Recent studies have consistently shown that younger investors are more prone to overconfidence, primarily due to impulsive decision-making and limited exposure to market downturns. For instance, Wijaya et al. (2025) highlight that age-related differences in financial behavior correlate with misjudged investment timing and excessive trading. Similarly, Bushra et al. (2024) found that younger investors tend to overrate their financial knowledge, often leading to miscalculated risks. In terms of gender, males consistently exhibit a higher tendency towards overconfidence in their ability to predict market trends compared to females, a trend confirmed in the recent empirical study by Gupta and Goswami (2024). This gendered difference is aligned with earlier foundational work by Barber and Odean (2001), who demonstrated that men traded 45% more frequently than women and consequently incurred lower net returns. Moreover, occupation also plays a role: professionals in finance or entrepreneurial roles, as discussed by Almansour et al. (2025), tend to overestimate their judgment due to frequent engagement in financial decision-making. These insights collectively suggest that socio-demographic attributes substantially influence overconfidence in investment behavior.

H_1: Sociodemographic variables have a significant impact on Overconfidence

SOCIO-DEMOGRAPHIC VARIABLES AND RISK AVERSION

Risk aversion, a key behavioral trait in financial decision-making, is significantly influenced by socio-demographic factors such as age, gender, occupation, and investment experience. A study by Kathpal et al. (2024) found that female investors are generally more risk-averse than males, attributing this to cautious financial behavior rooted in long-term financial security considerations. Bushra et al. (2024) similarly reported that risk tolerance increases with experience, suggesting that novice investors are less willing to engage in high-risk investments due to unfamiliarity with market volatility. Saivasan and Lokhande (2022) noted that occupational exposure plays a significant role: individuals in finance-related fields exhibit lower risk aversion due to their routine dealings with uncertainty and risk-based assessments. These findings align with earlier foundational work by Jianakoplos and Bernasek

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(1998), who empirically established that women, regardless of income or education, prefer less risky assets in their investment portfolios. The intersection of these socio-demographic traits particularly gender and professional background contributes to varied levels of risk perception and aversion among investors.

H_2: Sociodemographic variables have a significant impact on Risk Aversion

SOCIO-DEMOGRAPHIC VARIABLES AND ANCHORING BIAS

Anchoring bias, which occurs when individuals overly rely on initial information or historical reference points during financial decision-making, is strongly shaped by socio-demographic characteristics. Bushra et al. (2024) found that older investors are more prone to anchoring, as they tend to stick with outdated market references and resist adjusting their expectations to new market realities. Gender also plays a critical role women are more susceptible to anchoring than men, often relying on historical price levels to assess current investment value (Kathpal et al., 2024). Saivasan and Lokhande (2022) observed that investment experience mitigates anchoring, as seasoned investors develop strategies to override emotional or heuristic judgments. Additionally, Gupta and Goswami (2024) noted that occupational background influences anchoring, with professionals in stable, non-financial sectors exhibiting higher anchoring due to limited exposure to dynamic market environments. These findings corroborate earlier work by Tversky and Kahneman (1974), who originally conceptualized anchoring as a cognitive shortcut affecting judgment under uncertainty. Overall, these socio-demographic factors shape how strongly individuals adhere to reference points, thus influencing the degree of anchoring bias exhibited.

H_3: Sociodemographic variables have a significant impact on Anchoring Bias

SOCIO-DEMOGRAPHIC VARIABLES AND INVESTMENT DECISION

Investment decisions are often a reflection of underlying socio-demographic attributes, including age, gender, occupation, and investment experience, which shape preferences, perceptions of risk, and behavioral tendencies. Puspita et al. (2023) observed that younger investors are more likely to engage in aggressive investment strategies, while older individuals tend to prefer conservative options such as fixed income securities. The gender gap in financial decision-making also remains prominent, with men often displaying higher risk appetite and quicker execution of trades, whereas women exhibit cautious behavior with longer evaluation times (Bushra et al., 2024). Furthermore, occupational background has been linked with decision quality; for instance, investors in financial services are found to engage in more diversified and informed investing compared to those in education or healthcare sectors (Kathpal et al., 2024). Investment experience contributes to greater confidence and improved decision quality, as experienced investors are better equipped to process complex information and anticipate market trends (Chavali & Mohanraj, 2016). These socio-demographic differences cumulatively affect the rationale, timing, and type of investments made, demonstrating that personal and professional traits are crucial in shaping financial behavior.

H_4: Sociodemographic variables have a significant impact on Investment decisions

OVERCONFIDENCE AND INVESTMENT DECISION

Overconfidence significantly influences investment decision-making by causing investors to overestimate their knowledge, skills, and judgment accuracy, leading to aggressive and sometimes irrational financial choices. Wijaya et al. (2025) found that overconfident investors tend to trade more frequently, driven by an inflated sense of control over market outcomes, often resulting in higher transaction costs and

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Annual Methodological Archive Research Review

suboptimal returns. Similarly, Bushra et al. (2024) observed that male investors in particular exhibit overconfidence, resulting in speculative trading behavior and low diversification in portfolios. Gupta and Goswami (2024) further demonstrated that overconfidence is positively correlated with investment activity, as individuals with inflated self-perception are more likely to take risks, believing their information is superior. This is consistent with Barber and Odean's (2001) foundational study, which showed that overconfident investors particularly men engaged in excessive trading, reducing net returns. Collectively, these findings suggest that overconfidence skews decision-making toward higher activity and risk, often neglecting the realistic assessment of market volatility or external advice.

H_5: Overconfidence has a significant impact on Investment decisions

RISK AVERSION AND INVESTMENT DECISION

Risk aversion plays a crucial role in shaping how individuals approach investment decisions, particularly when choosing between high-risk and low-risk assets. Recent research by Shabbir et al. (2024) shows that risk-averse investors prefer safe and stable instruments such as bonds or savings over volatile equities, thereby minimizing exposure to market uncertainty. Similarly, Bushra et al. (2024) found that female investors and older participants tend to exhibit stronger risk aversion, which leads to conservative investment choices and reduced participation in high-return opportunities. Saivasan and Lokhande (2022) highlighted that risk-averse individuals often delay investment decisions or limit their involvement in financial markets altogether due to fear of loss and lack of confidence in uncertain environments. Earlier foundational work by Jianakoplos and Bernasek (1998) reinforced this pattern, demonstrating that greater risk aversion correlates with a lower proportion of risky assets in investment portfolios. These insights emphasize that risk-averse investors typically make decisions with the primary goal of capital preservation, often at the cost of growth and return maximization.

H_6: Risk Aversion has a significant impact on Investment decisions

ANCHORING BIAS AND INVESTMENT DECISION

Anchoring bias influences investment decisions by causing individuals to rely excessively on initial reference points such as historical prices or outdated benchmarks when evaluating financial options. Bushra et al. (2024) found that investors often cling to past price levels, leading them to delay selling underperforming assets or resist purchasing rising stocks due to perceived overvaluation. Kathpal et al. (2024) emphasize that such anchoring tendencies are particularly prevalent among less experienced or older investors, who find comfort in familiar patterns, even when market dynamics have changed. Gupta and Goswami (2024) noted that anchoring leads to irrational portfolio allocations, as decisions are not made based on current valuations or objective data but rather on emotional and cognitive fixations. This aligns with Tversky and Kahneman's (1974) foundational theory, which identified anchoring as a heuristic that impairs judgment under uncertainty by limiting one's ability to update beliefs in light of new information. Consequently, anchoring bias can result in missed opportunities or prolonged poor investments, hindering optimal decision-making in dynamic financial markets.

H_7: Anchoring Bias has a significant impact on Investment decisions

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Annual Methodological Archive Research Review

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SOCIO-DEMOGRAPHIC VARIABLES, OVERCONFIDENCE AND INVESTMENT DECISION

Socio-demographic variables indirectly shape investment decisions by influencing levels of overconfidence, which in turn affects financial behavior. Bushra et al. (2024) identified that young and male investors exhibit significantly higher overconfidence, often resulting in excessive trading and suboptimal portfolio performance. This overconfidence, shaped by demographic traits, leads to riskier financial decisions, as such investors tend to ignore professional advice and rely heavily on their perceived market intuition (Kathpal et al., 2024). Gupta and Goswami (2024) further confirmed that investment experience does not always reduce overconfidence**,** meaning even seasoned investors can develop a false sense of market control. This supports earlier findings by Barber and Odean (2001), who demonstrated that male investors trade 45% more frequently due to overconfidence, ultimately earning lower net returns than their female counterparts. Thus, overconfidence acts as a cognitive mechanism through which age, gender, and experience influence the direction and aggressiveness of investment decisions, especially in emerging markets where financial education levels vary.

H_8: Overconfidence mediates the impact of sociodemographic variables on Investment decisions.

SOCIO-DEMOGRAPHIC VARIABLES, RISK AVERSION AND INVESTMENT DECISION

Risk aversion operates as a mediating channel through which socio-demographic factors shape investment decisions, particularly influencing conservative or risk-averse financial behavior. Shabbir et al. (2024) reported that women and older investors exhibit stronger risk aversion, resulting in a preference for safer investment options such as bonds or fixed deposits. Bushra et al. (2024) also emphasized that novice investors and those from non-finance occupations tend to avoid volatile assets due to their limited risk tolerance, impacting the scope and timing of their investment decisions. Saivasan and Lokhande (2022) found that risk-averse individuals often delay or avoid investment opportunities, especially in uncertain market conditions, limiting their potential for wealth accumulation. These findings are consistent with Jianakoplos and Bernasek (1998), who revealed that demographics like gender and age significantly impact risk preferences, and these preferences subsequently influence portfolio choices. Overall, the evidence supports that risk aversion mediates how demographic factors translate into cautious or delayed investment behaviors, though its mediating strength may vary by context and individual experience.

H_9: Risk Aversion mediates the impact of sociodemographic variables on Investment decisions.

SOCIO-DEMOGRAPHIC VARIABLES, ANCHORING BIAS AND INVESTMENT DECISION

Anchoring bias acts as a mediating force through which socio-demographic traits influence investment decisions, especially when investors rely heavily on initial or historical reference points. According to Bushra et al. (2024), female and older investors are more susceptible to anchoring, often delaying important financial decisions due to attachment to past price benchmarks or outdated market signals. Kathpal et al. (2024) observed that anchoring bias is amplified in individuals with less market exposure, such as those in non-financial professions or those with limited investment experience, which constrains adaptability in volatile markets. Gupta and

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Goswami (2024) further added that occupational stability increases the likelihood of anchoring, as such individuals often base decisions on familiar and conservative financial heuristics. These patterns are consistent with the original theory by Tversky and Kahneman (1974), which explains anchoring as a judgmental heuristic that can cause systematic errors, especially when decision-makers fail to sufficiently adjust from an initial reference point. Therefore, anchoring bias serves as a critical cognitive pathway through which socio-demographic attributes shape cautious or misaligned investment behavior.

H_{10}: Anchoring Bias mediates the impact of sociodemographic variables on Investment decisions.

CONCEPTUALIZATION

Behavioral finance integrates psychological theories with conventional financial models to explain why investors often act irrationally, diverging from the rational agent assumption in traditional finance. The Prospect Theory by Kahneman and Tversky (1979) has been pivotal in explaining how individuals assess gains and losses based on reference points, rather than final outcomes, thereby giving rise to heuristics such as overconfidence, risk aversion, and anchoring. While earlier studies such as Barber and Odean (2001) demonstrated that overconfidence leads to excessive trading, recent empirical work by Bushra et al. (2024) and Kathpal et al. (2024) reaffirms that demographic traits like gender and age still shape the intensity of these biases in modern markets. Moreover, Gupta and Goswami (2024) highlighted that behavioral biases act as key mediators between demographic factors and financial outcomes, suggesting that socio-demographics play a foundational role in bias formation. However, most studies isolate individual demographic variables (e.g., age or gender) or focus solely on direct effects, ignoring the mediating pathways of behavioral biases on investment decisions. Therefore, this study addresses this gap by proposing a comprehensive conceptual model where socio-demographic variables influence investment decisions through the mediating effects of overconfidence, risk aversion, and anchoring bias. This integrated approach advances the understanding of how investor characteristics and cognitive biases interact, particularly in emerging markets like Pakistan, and calls for more nuanced financial literacy frameworks targeting these behavioral dimensions (Saivasan & Lokhande, 2022; Abideen et al., 2023).

METHODOLOGY

This study which adopts a primary quantitative research design focuses on the sociodemographic variables (gender, age, occupation, investment experience) that affect behavioral biases (overconfidence, risk aversion and anchoring bias) and mediating role of behavioral biases in the relation between sociodemographic factors and investment decisions (Almansour et al, 2025; Wijaya et al, 2025; Gupta & Goswami, 2024; Zahera & Bhansal 2017; Alquraan et al 2016) in Karachi Pakistan.

RESEARCH DESIGN

This approach was chosen as it enabled the collection and analysis of numeric data to analyze hypotheses and understand statistical relationships between variables. To understand the relationship between behavioral biases and sociodemographic factors affecting an investment decision, the study used explanatory and descriptive methodology. The study focused on employees from different sectors, such as banking, finance, IT, healthcare, and education, as well as self-employed professionals and entrepreneurs because they are usually involved in financial planning and investing decisions for their own development or pension schemes and

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Publisher Name : COLLABORATIVE EDUCATIONAL LEARNING INSTITUTE
Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

are therefore considered a relevant group for biases in investment decision-making. A convenience sampling method was employed to collect data due to the availability and accessibility of participants in the specified area. The sample size was 212 respondents, ensuring sufficient representation for statistical analysis. Primary data was collected through a structured questionnaire designed based on existing literature and adapted in the context of sociodemographic variables' impact on behavioral biases while making investment choices. The questionnaire consists of five sections: Demographic Information: Questions related to the participant's gender, age, occupation, investment experience, etc. Overconfidence: Questions measuring overconfidence in individuals. Risk Aversion: Questions measuring risk aversion in individuals. Anchoring Bias: Questions measuring anchoring bias in individuals. Decision-making scenarios: Questions related to making investment decisions. Participants' answers were recorded using a five-point Likert scale, with 1 denoting "strongly disagree" and 5 denoting "strongly agree." Before the final data collection, a small group of respondents pre-tested the questionnaire to make sure it was clear, valid, and reliable.

SAMPLING

The data collected was analyzed using Statistical Package for Social Sciences (SPSS) software. The analysis included the Kruskal-Wallis H Test, a non-parametric statistical test used to determine whether there are statistically significant differences between three or more independent groups (samples) on a continuous or ordinal dependent variable. It is the non-parametric alternative to the one-way ANOVA (Analysis of Variance) and is used when the assumptions of ANOVA (e.g., normality of data, homogeneity of variance) are not met. Mann-Whitney U Test: a non-parametric statistical test that compares two independent groups on an ordinal or continuous dependent variable. When the t-test's presumptions, such as the normality of the data, are not fulfilled, this non-parametric substitute for the independent samples t-test is employed. Ordinal Regression Analysis: Ordinal logistic regression is a statistical research tool that is used when the researcher inspects the impact of one dependent variable (ordinal variable means it has a meaningful order but differs in levels) on one or more independent variables. It aids in determining patterns that are not already known and interpreting what impact independent variables have on dependent variables. Mediation Analysis: (using PROCESS Macro by Andrew F. Hayes) a statistical technique used to determine whether a third variable, known as the mediator, mediates the relationship between an independent variable (IV) and a dependent variable (DV). Understanding the method or mechanism by which one variable affects another is beneficial. By gaining informed consent from each participant, the study has complied with ethical research standards. The confidentiality and anonymity of the responses were guaranteed to the participants. Respondents could've discontinued participation at any time without facing any repercussions because it was entirely voluntary. The information was also only utilized for academic purposes.

RESULTS AND DISCUSSION

The current research's focal point is on whether behavioral biases (overconfidence, risk aversion, and anchoring bias) and investment decisions exhibit any significant difference across sociodemographic variables in individuals and analyzing their mediating role in the relationship between sociodemographic factors and investment decisions focusing on investors of Karachi city. The statistical tests conducted are the

ISSN (E) 3007-3197
ISSN (P) 3007-3189
Publisher Name : COLLABORATIVE EDUCATIONAL LEARNING INSTITUTE
Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

VOL-3, ISSUE-2, 2025

Kruskal-Wallis H test, Mann-Whitney U test, Ordinal Regression, and Mediation Analysis (using PROCESS Macro by Andrew F. Hayes) they help identify significant differences across various grouping variables i.e. Age, Gender, Occupation, and Investment Experience (Wijaya et al., 2025; Gupta & Goswami, 2024; Alquraan et al., 2016) to investment decision of individuals of Karachi and the impact of behavioral biases i.e. Overconfidence, Risk aversion, and Anchoring bias (Almansour et al., 2025; Wijaya et al., 2025; Gupta & Goswami, 2024; Zahera & Bhansal 2017; Alquraan et al., 2016)

KRUSKAL-WALLIS TEST (GROUPING VARIABLE: AGE)

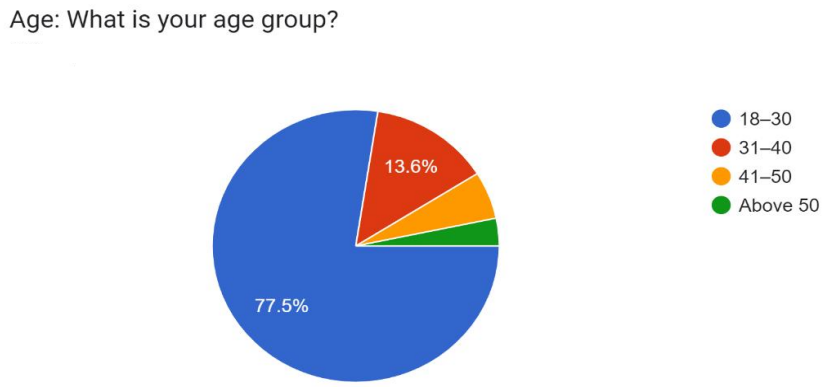

FIGURE 2 KRUSKAL-WALLIS TEST

This test evaluates whether different age groups show statistically significant differences in risk aversion (RA), overconfidence (OC), anchoring bias (AB), and investment decisions (ID).

Variable	Kruskal-Wallis H	df	p-value	Interpretation
RA (Risk Aversion)	1.123	3	0.771	No significant difference in risk aversion across age groups.
OC (Overconfidence)	14.692	3	0.002	A significant difference in overconfidence across age groups.
AB (Anchoring Bias)	22.816	3	0.000	Significant difference in anchoring bias across age groups.
ID (Investment Decisions)	3.114	3	0.374	No significant difference in investment decisions across age groups.

TABLE 1 KRUSKAL-WALLIS TEST FOR INVESTMENT BIASES AND DECISIONS BY AGE

Overconfidence and Anchoring Bias significantly vary across different age groups, suggesting that age influences cognitive biases in investment decisions. However, risk aversion and overall investment decisions do not significantly differ with age.

ISSN (E) 3007-3197
ISSN (P) 3007-3189
Publisher Name : COLLABORATIVE EDUCATIONAL LEARNING INSTITUTE
Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

VOL-3, ISSUE-2, 2025

MANN-WHITNEY U TEST (GROUPING VARIABLE: GENDER)

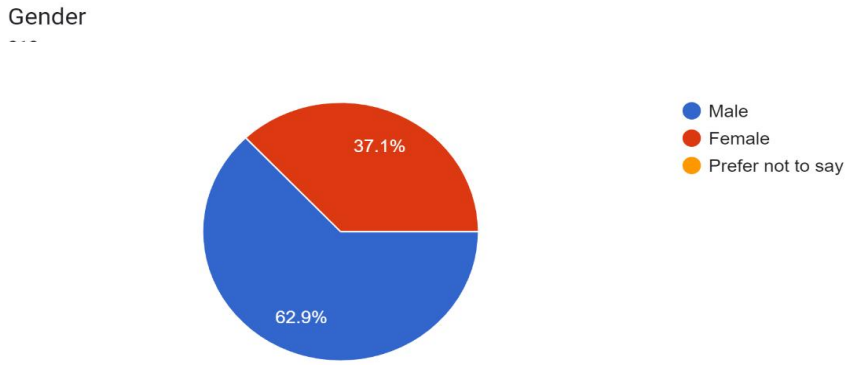

FIGURE 3 MANN-WHITNEY U TEST

This test directly compares men and women to identify gender-based differences.

Variable	Mann-Whitney U	Z	p-value	Interpretation
RA (Risk Aversion)	5027.000	-0.477	0.633	No significant gender difference in risk aversion.
OC (Overconfidence)	4268.500	-2.285	0.022	Significant gender difference in overconfidence.
AB (Anchoring Bias)	4294.000	-2.263	0.024	Significant gender difference in anchoring bias.
ID (Investment Decisions)	4437.000	-1.879	0.060	No significant gender difference in investment decisions.

TABLE 2 MANN-WHITNEY U TEST FOR INVESTMENT BIASES AND DECISIONS BY GENDER

Men and women significantly differ in Overconfidence (OC) and Anchoring Bias (AB), with men likely exhibiting higher overconfidence in investment decisions. Risk Aversion (RA) and Investment Decisions (ID) do not show significant gender-based differences. Since your research question focuses on whether men are more overconfident than women, this result supports your hypothesis, as there is a significant gender-based difference in overconfidence levels.

KRUSKAL-WALLIS TEST (GROUPING VARIABLE: OCCUPATION)

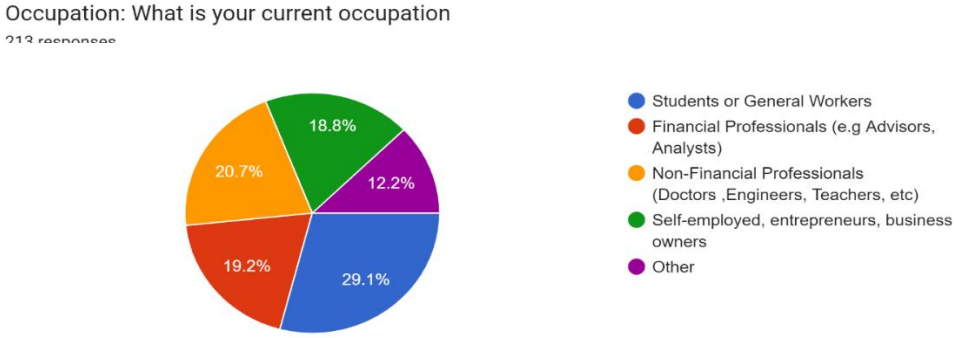

FIGURE 4: KRUSKAL-WALLIS TEST

ISSN (E) 3007-3197
ISSN (P) 3007-3189
Publisher Name : COLLABORATIVE EDUCATIONAL LEARNING INSTITUTE
Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

VOL-3, ISSUE-2, 2025

This test assesses whether investment biases vary based on occupation.

Variable	Kruskal-Wallis H	df	p-value	Interpretation
RA (Risk Aversion)	1.775	3	0.620	No significant difference in risk aversion across occupations.
OC (Overconfidence)	3.404	3	0.333	No significant difference in overconfidence across occupations.
AB (Anchoring Bias)	9.639	3	0.022	Significant difference in anchoring bias across occupations.
ID (Investment Decisions)	1.568	3	0.667	No significant difference in investment decisions across occupations.

TABLE 3 KRUSKAL-WALLIS TEST FOR INVESTMENT BIASES AND DECISIONS BY OCCUPATION

Occupation does not significantly impact overconfidence, meaning job type does not influence overconfident behavior in investment decisions. Anchoring Bias is significantly different across occupations, meaning certain professions may be more prone to relying on past reference points when making investment decisions. No major differences in risk aversion or overall investment decision-making across occupations.

KRUSKAL-WALLIS TEST (GROUPING VARIABLE: INVESTMENT EXPERIENCE)

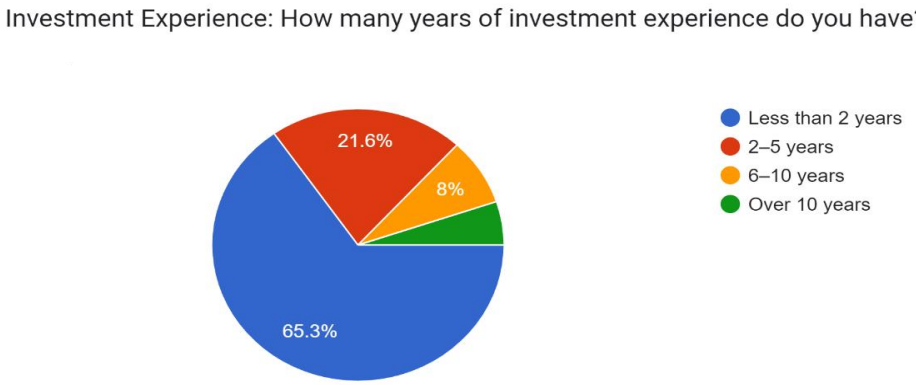

FIGURE 5 KRUSKAL-WALLIS TEST

This test checks whether investors with different levels of experience show cognitive biases.

Variable	Kruskal-Wallis H	df	p-value	Interpretation
RA (Risk Aversion)	14.048	4	0.007	A significant difference in risk aversion across experience levels.
OC (Overconfidence)	9.205	4	0.056	No statistically significant difference in overconfidence.
AB (Anchoring Bias)	11.086	4	0.026	A significant difference in anchoring bias across experience levels.

ISSN (E) 3007-3197
ISSN (P) 3007-3189
Publisher Name : COLLABORATIVE EDUCATIONAL LEARNING INSTITUTE
Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

ID (Investment Decisions)	3.034	4	0.552	No significant difference in investment decisions.

TABLE 4 KRUSKAL-WALLIS TEST FOR INVESTMENT BIASES AND DECISIONS BY INVESTMENT EXPERIENCE

More experienced investors differ significantly in risk aversion and anchoring bias, but not in overconfidence. This suggests that experience affects how people perceive risk and past reference points but does not necessarily reduce overconfidence in investment decisions. Investment experience does not significantly impact general investment decision-making.

REGRESSION ANALYSIS

`	**P – Value**	**Interpretation**
Risk Aversion **(RA)** and Investment Decisions	**p = - 0.003**	Significant Negative Impact
Overconfidence **(OC)** and Investment Decisions	**p = 0.019**	Partially Significant Positive Impact
Anchoring Bias **(AB)** and Investment Decisions	**p = - 0.05**	Strong Significant Negative Impact

TABLE 5: IMPACT OF INVESTMENT BIASES ON INVESTMENT DECISIONS

Risk Aversion (RA) impacts negatively on investment decisions, leading to more conservative behavior. Overconfidence (OC) impacted partially positively on investment decisions, being significant at some levels, and presentation of risk-taking in some investors. Anchoring Bias (AB) has a strong but negative significant impact, meaning investors rely on past values, reducing poor investment decisions The model is statistically significant (p = 0.000) and explains nearly 47.4% of investment decisions.

MEDIATION ANALYSIS

Path	**Effect**	**SE**	**t / BootSE**	**p-value**	**LLCI**	**ULCI**	**Mediation**
Direct Effect (SDV → ID)	-0.0390	0.0788	-0.4946	0.6214	-0.1943	0.1164	No direct effect
Total Indirect Effect (SDV → RA, OC, AB → ID)	-0.0511	0.0448	-	-	-0.1392	0.0358	Partial mediation (mixed effects)
Indirect Effect via	-0.0224	0.0194	-	-	-0.0664	0.0105	No mediation

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Publisher Name : COLLABORATIVE EDUCATIONAL LEARNING INSTITUTE
Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

VOL-3, ISSUE-2, 2025

RA (SDV → RA → ID)							(Confidence Interval includes zero)
Indirect Effect via OC (SDV → OC → ID)	0.0368	0.0233	-	-	0.0015	0.0906	Significant mediation
Indirect Effect via AB (SDV → AB → ID)	-0.0655	0.0283	-	-	-0.1284	-0.0184	Significant mediation

TABLE 6: MEDIATION EFFECTS OF INVESTMENT BIASES BETWEEN SOCIODEMOGRAPHIC VARIABLES AND INVESTMENT DECISIONS

The direct effect (-0.0390, p = 0.6214) is not significant (p > 0.05). This suggests that SDV does not directly impact investment decisions but may work through mediators. The total indirect effect (-0.0511) is not fully significant as its Confidence Interval (-0.1392, 0.0358) includes zero. However, individual biases show different effects, so we check them separately. The indirect effect of SDV → RA → ID is not significant (-0.0224, BootLLCI = -0.0664, BootULCI = 0.0105). Since the confidence interval includes zero, RA does not mediate the relationship. The indirect effect of SDV → OC → ID is significant (0.0368, BootLLCI = 0.0015, BootULCI = 0.0906). Since the confidence interval does not include zero, Overconfidence partially mediates the relationship. The indirect effect of SDV → AB → ID is significant (-0.0655, BootLLCI = -0.1284, BootULCI = -0.0184). Since the confidence interval does not include zero, Anchoring Bias fully mediates the relationship negatively. Overconfidence and Anchoring Bias significantly mediate the relationship between Sociodemographic Variables and Investment Decisions. Risk Aversion does not significantly mediate the relationship. The direct effect of SDV on ID is not significant, meaning investment biases play a crucial mediating role.

FINDINGS

This study examined the impact of sociodemographic factors (age, gender, occupation, and investment experience) on investment biases (overconfidence, risk aversion, and anchoring bias) and their mediating role in investment decisions among investors in Karachi, Pakistan. The findings revealed notable differences in investment biases according to various sociodemographic traits. Investment behavior was found to be influenced by age, with older investors showing higher anchoring bias and younger investors showing more overconfidence. Gender-based differences were also evident, as men displayed higher degrees of overconfidence while women relied more on prior reference points, leading to a greater anchoring bias. Investment experience was found influential in the formation of biases and had significant impact on risk aversion and anchoring bias, but no significant impact on overconfidence. Nonetheless, occupation had no substantial impact on risk aversion or overconfidence, but influenced anchoring bias, suggesting that some professions may be more prone to relying on historical data when making investment decisions. Mediation analysis provided a more nuanced perspective on how these biases translate to investment

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Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

decisions. That shows sociodemographic factors do not directly impact investment decision making but do impact it indirectly through behavioral biases. In terms of the three types of biases that were examined, the findings indicated that overconfidence and anchoring bias had a strong mediation in the sociodemographic characteristics-investing decision relationship, while risk aversion bias showed no mediation. Overconfidence had a positive impact on investment decision-making, suggesting that overconfident investors engaged in more trading activity and assumed greater levels of risk. On the other hand, anchoring bias had a substantial negative impact, which indicated that overdependence on past price levels or anchors does not allow investors to make the right decision regarding investing. Although risk aversion was also negatively correlated with investment decision-making, the mediating influence was not significant because risk-averse investors sought to select cautiously, and sociodemographic characteristics had little substantial impact on their choices. These findings contribute to the behavioral finance literature by showing that psychological biases and sociodemographic characteristics can compound each other to influence financial decisions. They vouch for the significance of financial knowledge and literacy initiatives in aiding investors identify and control their biases. The key to success lies in knowing what affects these behaviors – with this knowledge, investors can become smarter, more rational investors and ultimately improve their wealth. This, in turn, will allow policymakers and financial advisers to design investment plans aligned with behavioral trends of individuals.

DISCUSSION

In line with previous behavioral finance literature, these results illustrate in detail the extent to which sociodemographic characteristics drive investment biases and the intermediary role of sociodemographic characteristics in investment decision making. Indeed, they show that behavioral biases are significantly mediated by age, sex, occupation and investment experience in financial decision-making. The earlier findings from Barberis and Thaler (2003) and Kahneman (2011), suggest that psychological factors are much more critical and form the basis behind the investment decision making process, which rational economic theories fail to address. The study found that younger, less informed, impulsive investors tend to display higher levels of overconfidence, while older, experienced investors become more biased towards the anchor. This finding is in accordance with the previous literature (Bhandari & Deaves, 2020) where it is evident that younger people overrate themselves on financial knowledge & skill which takes them to excessive trading & high-risk. Individuals who have invested for a longer period tend to be more heavily influenced by prior price levels and past experiences, thus anchoring bias gets amplified (Tversky & Kahneman, 1974). The findings emphasize the importance of financial education geared towards novice investors to counteract overconfidence and encourage responsible investment practices. Similarly, training that promotes flexibility in the decision-making process may support senior investors in escaping reliance on obsolete reference points. Men are more overconfident, while anchoring bias affects women more. This is in line with Barber and Odean's (2001) finding that men trade more as they are overconfident and have lower net-return on the investment. In contrast, women tend to be more cautious when it comes to investing, tend to follow past market trends, and tend to stick by the anchoring bias (Agnew & Mazumder, 2022). This study found no significant differences between genders as far as risk aversion goes, whereas past research has suggested that men approach

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Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

investments with higher levels of risk and women avoid riskier investments (Baker & Yi, 2016; Lusardi & Mitchell, 2017). Our findings underscore the importance of tailored financial literacy initiatives that not only consider overconfidence in men but also promote risk-taking among women to combine their historical outlook on investments with market realities. Occupation did not have a significant impact on risk aversion or overconfidence as we had expected, but it did affect anchoring bias. These results run counter to studies that imply that finance professionals or entrepreneurs show greater risk appetite from continuous exposure to market forces (Chavali & Mohanraj, 2016; Malmendier & Tate, 2015). However, investment experience tended to have a significant influence on risk aversion and anchoring bias but not on overconfidence. Even if the literature already suggested that experienced investors tend to make better decisions (Glaser et al., 2019; Bhandari & Deaves, 2020), and given that overconfidence is a particularly pernicious bias, it is remarkable to see that both novice and experienced investors continue to fall into the trap.

The results of the mediation analysis showed that sociodemographic factors have an impact on investment decisions through behavioral biases rather than directly, with overconfidence mediating the influence of sociodemographic factors on investment decisions positively, indicating that investors with levels of confidence above the average are more likely to trade actively and make risky choices (Barber & Odean, 2001). This agrees with previous research that overconfidence leads to excessive trading (which is typically harmful to portfolio performance because of transactions and bad timing) (Malmendier & Tate, 2015). In contrast, anchoring bias mediates investment negatively, indicating that augmented reliance on previous reference men points inhibits investors from making optimal economic choices (Tversky & Kahneman, 1974). On the other hand, if some investors are highly prone to anchoring, they may be resistant to adapting their strategies to the new market realities, yielding poor decisions (Hwang & Satchell,). While being negatively related to investment decisions, risk aversion didn't show a significant mediation effect. This means that even though risk-averse investors tend to adopt cautious financial plans, sociodemographic characteristics do not play a major role when it comes to decision-making in terms of investing. These findings are in line with the study conducted by Lusardi and Mitchell (2017), where they find that market conditions and individual financial goals are more important risk preference determinants than demographic features. This lack of such a mediation effect suggests that the relationship between individual risk perception and external factors like financial literacy and economic resilience requires elaborate elaboration and exploration of an investor's psychology.

CONCLUSION

This study contributes to the growing area of research into investment decision-making by providing empirical evidence of how sociodemographic variables such as age, gender, occupation, and investment experience shape investment biases (overconfidence, risk aversion, and anchoring bias) that subsequently mediate investment decisions. The outcome lends credence to Prospect Theory (Kahneman & Tversky, 1979) and the Adaptive Market Hypothesis (Lo, 2004), indicating that investors are not always rational and that decisions are influenced by psychological biases. Young investors are more overconfident, while older investors use out-of-date reference points and thus should have a higher anchoring bias. Men are more

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ISSN (P) 3007-3189
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Frequency Of Journal: Bi-Annual
Annual Methodological Archive Research Review

overconfident than women, whereas women follow historical prices more closely. Experience has a strong negative impact on risk aversion and anchoring bias but has no impact on overconfidence, which means that experience does not always cancel cognitive bias. Moreover, occupation does not have a pronounced effect on overconfidence or risk aversion, but there are professions with stronger anchoring tendencies. The mediation analysis models show that overconfidence and anchoring bias significantly mediate the effect of sociodemographic factors on investment decision-making with no mediation effect of risk aversion. These findings imply that there is a need for financial literacy programs tailored towards risk assessment training to curb overconfidence and real-time data usage to reduce anchoring bias. Our findings mirror those from developed markets, and future studies may look into other psychological and economic aspects, enhancing the understanding of the micro-foundation behind investment decision-making for emerging markets.

LIMITATIONS OF THE STUDY

Geographical Limitation: The study collects data for only one city, Karachi, which may limit the extent to which the results may be generalized to other parts of Pakistan or other markets. Self-Reported Data: Results from self-reported surveys are inherently based in subjective perceptions and individual biases. Limited Variables: The study analyzes age, sex, occupation, and experience, but it omitted other possible variables, such as education, cultural factors, and income level. Cross-Sectional Design: Instead of tracking investor behavior over a long period, the research takes a snapshot of data at one moment in time. Longitudinal studies may also provide a better understanding of the evolution of the investment biases.

FUTURE RESEARCH DIRECTIONS AND PRACTICAL IMPLICATIONS

The study is evidence to the Adaptive Market Hypothesis (Lo, 2004), which states that investor behavior is what changes with experience underneath the biases that remain while Prospect Theory (Kahneman & Tversky, 1979) proposes that decisions of investors are driven by perceived gains and losses. It also reaffirms that investment decision-making is not always a rational process, but rather a process that is molded and influenced by demographic factors that play into cognitive biases. The results underscore, in practical terms, how critical tailored financial literacy efforts can be in trumping biases. Anchoring bias can be mitigated by focusing on recent data instead of historical trends, while overconfidence can be reduced through investment simulations and risk assessments. Gender-inclusive financial literacy can help calibrate male overconfidence and female risk aversion and better investment strategies across many constituencies.

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