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# *behavioural Biases, Financial Motives, and Literacy in Crypto-Pyramid Schemes Susceptibility: Evidence from a Systematic Review*

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## **Abstract**

This study employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to examine the influence of behavioural biases, financial motives, and financial literacy on participation in crypto-based pyramid schemes. The review included peer-reviewed journal articles, book chapters, and conference papers published from 2023 to 2025. A systematic literature search was conducted in Scopus, Web of Science, and Google Scholar between 20<sup>th</sup> February 2025 and 28 February 2025 using combinations of the terms behavioural biases, financial motives, and financial literacy with participation in crypto-based pyramid schemes. Retrieved records were imported into Zotero for duplicate removal, followed by title, abstract, and full-text screening against predefined inclusion and exclusion criteria. A total of 25 studies met the eligibility criteria and were synthesised thematically to identify recurring patterns, gaps, and outcomes. The review found that behavioural biases, including overconfidence, herding, framing effects, fear of missing out and greed, strongly increase susceptibility to crypto-based pyramid schemes. Financial motives, particularly the pursuit of high returns, financial hardship, and personal enrichment, further drive participation, while low financial literacy exacerbates vulnerability. The interaction among these factors further strengthens their influence on participation. The study recommends that financial literacy programmes incorporate behavioural training to help individuals recognise and mitigate cognitive biases. Future research should adopt longitudinal and experimental designs to establish causal relationships.

**Keywords:** Behavioural Biases; Financial Motives; Financial Literacy; crypto-based pyramid schemes

**JEL Classification :** G4; G53 ; G51 ; D91 ; A20

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## **Introduction**

The rapid expansion of cryptocurrency markets has fundamentally transformed global financial systems by providing decentralised, borderless, and technology-driven investment opportunities. However, this financial innovation has simultaneously created fertile ground for sophisticated fraudulent investment schemes, particularly cryptocurrency-based pyramid schemes, which exploit investor psychology, financial aspirations, and information asymmetries to gen-



erate illicit gains (Auer & Claessens, 2021; Mukherjee et al., 2021). Unlike legitimate cryptocurrency investments whose value is derived from technological innovation and market fundamentals, crypto-pyramid schemes rely exclusively on continuous recruitment of new investors to finance returns promised to earlier participants, making their collapse inevitable once recruitment declines (Department of Financial Protection and Innovation, 2025; Kaiyrbekova, 2024). The magnitude of the problem is substantial. In 2023 alone, the United States Federal Bureau of Investigation received more than 69,000 cryptocurrency fraud complaints involving losses exceeding US\$5.6 billion, while investment scams remained the leading category of crypto-related financial crime (Federal Bureau of Investigation, 2023; Zuckerman & Stock, 2025). Although global illicit cryptocurrency transaction volumes declined in 2024, fraud-related inflows remained high at US\$10.7 billion, demonstrating that cryptocurrency-based pyramid schemes continue to impose enormous financial costs on investors (TRM Labs, 2025). The problem is equally pronounced in Africa, where rapid cryptocurrency adoption, limited regulatory capacity, and relatively low financial literacy have contributed to increasing cases of crypto fraud across Nigeria, South Africa, Kenya, and Tanzania (Chelin, 2021; Garba et al., 2024; U.S. Securities and Exchange Commission, 2025). Existing evidence attributes investor vulnerability to a combination of behavioural biases, financial motives, and inadequate financial literacy (Ayadi et al., 2024; Constantino et al., 2024; Kalabeke & Nguyen, 2024). Despite growing scholarly attention, why otherwise rational individuals continue to participate in cryptocurrency-based pyramid schemes remains inadequately understood, limiting the effectiveness of investor protection initiatives, financial education programmes, and regulatory interventions.

Researchers have made considerable progress in identifying factors associated with participation in Ponzi and cryptocurrency-based pyramid schemes. Experimental studies demonstrate that appropriately framed financial information significantly reduces participation in fraudulent investment schemes (Doğan et al., 2024), while cross-sectional and qualitative studies consistently identify behavioural biases including overconfidence, herding behaviour, framing effects, fear of missing out, anchoring bias, and trust as important predictors of fraudulent investment decisions (Constantino et al., 2024; Ghani et al., 2023; Juned et al., 2024). Other studies establish that financial motives such as greed, rapid wealth accumulation, speculative opportunities, financial distress, and perceived investment benefits significantly encourage participation in Ponzi schemes (Bhat & Kolhe, 2024; Kayode Peter & Adaramola, 2024; Tachado, 2023). Similarly, numerous studies report that financial literacy reduces vulnerability to investment fraud by improving investors' ability to recognise fraudulent schemes and evaluate investment risks (Naseem & Musah, 2025; Sirohi & Misra, 2024; Zheng et al., 2024). Nevertheless, the current evidence remains fragmented and inconclusive. While several studies conclude that financial literacy protects investors, others report weak or insignificant effects once behavioural biases dominate decision-making, suggesting that financially knowledgeable individuals may still become victims of crypto fraud (Aren & Nayman Hamamci, 2023; Kalabeke & Nguyen, 2024). Furthermore, most studies examine behavioural biases, financial motives, or financial literacy independently, employ diverse theoretical perspectives and methodologies, and focus predominantly on individual countries or isolated forms of investment fraud. Consequently, no comprehensive systematic review has synthesised empirical evidence on the combined influence of behavioural biases, financial motives, and financial literacy on susceptibility to cryptocurrency-based pyramid schemes across different contexts. This lack of integrated evidence limits theoretical development and constrains evidence-based policy formulation, thereby necessitating a comprehensive synthesis of the existing literature.



This study addressed the identified knowledge gap by undertaking a systematic literature review to synthesise empirical evidence on the influence of behavioural biases, financial motives, and financial literacy on susceptibility to cryptocurrency-based pyramid schemes. Guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework, the review systematically identified, appraised, and synthesised peer-reviewed empirical studies published between 2023 and 2025 across behavioural finance, economics, psychology, financial education, information systems, and cryptocurrency research. The choice of a systematic review is motivated by the fragmented, multidisciplinary, and sometimes contradictory nature of the existing evidence, particularly regarding the protective role of financial literacy and the interaction between cognitive biases and financial motivations in shaping investment decisions. By integrating findings from diverse geographical regions, research designs, and theoretical perspectives, the study develops a comprehensive understanding of the behavioural, motivational, and literacy-related determinants of cryptocurrency-pyramid scheme vulnerability. Unlike previous studies that focus on individual determinants or specific national contexts, this review provides an integrated evidence base that identifies consistent predictors, theoretical developments, methodological trends, and unresolved research gaps. The findings contribute to behavioural finance literature by extending understanding of fraudulent investment decision-making within digital financial markets while providing practical evidence to inform investor education, financial literacy interventions, regulatory surveillance, fraud prevention strategies, and future empirical research on cryptocurrency-related financial crimes.

## **2. Methods**

### **2.1 Eligibility Criteria**

Eligibility criteria pertain to the particular conditions or standards that determine the inclusion or exclusion of studies in the review. These criteria are established before the commencement of the review (a priori) to guarantee transparency, objectivity, and replicability (Higgins et al., 2022). The studies are often included based on the following criteria: population, concepts, context, study types, timeframe and language. The studies considered under this review were those whose target population included individuals, groups, or communities exposed to or participating in crypto-based pyramid or Ponzi schemes. The studies considered were those that had the following concepts: behavioural biases (e.g., overconfidence, herding, loss aversion), financial motives (e.g., wealth accumulation, diversification), and financial literacy (e.g., knowledge of investment risks, fraud awareness). Additionally, the studies considered were on crypto-based pyramid and Ponzi schemes in developed, emerging and frontier markets. Additionally, empirical studies (quantitative, qualitative, or mixed-methods), published in peer-reviewed journals, conference proceedings, working papers, or institutional reports were considered in the review. Furthermore, publications from 2023 to 2025 were included, reflecting the period when cryptocurrency markets had expanded significantly. Moreover, only full papers published in English were considered. Exclusion criteria encompassed studies that concentrate on general cryptocurrency adoption without mentioning pyramid or fraudulent schemes, editorials lacking empirical or conceptual evidence, publications not in English and publications without full papers.



## 2.2 Information Sources

Information sources refer to the databases, repositories, websites, and other materials used to identify and retrieve studies relevant to a systematic review (Chandler et al., 2019). To maximise coverage of the literature, a comprehensive search was conducted across three electronic databases: Scopus, Web of Science (WoS) and Google Scholar. Scopus and Web of Science served as the primary bibliographic databases because of their extensive indexing of high-quality, peer-reviewed scholarly publications. Google Scholar was used as a supplementary source to identify additional relevant studies that may not have been indexed in the primary databases, including conference papers, book chapters, preprints, and other grey literature. To enhance reproducibility and minimise selection bias associated with Google Scholar's dynamic search algorithm, the search was conducted on 27 February 2025, using the same search strings employed in the primary databases. Consistent with recommendations for systematic reviews, only the first 100 search results, ranked by relevance, were screened for eligibility because evidence suggests that the relevance of results declines substantially beyond this threshold (Martín-Martín et al., 2018). Duplicate records identified in Scopus and Web of Science were removed before screening the Google Scholar results to minimise redundancy. In addition to bibliographic databases, reports and publications from recognised international organisations, including the Financial Action Task Force (FATF), the Organisation for Economic Co-operation and Development (OECD), the World Bank, the U.S. Securities and Exchange Commission (SEC), the Federal Bureau of Investigation (FBI), and TRM Labs, were consulted to capture policy, regulatory, and industry evidence relevant to cryptocurrency-based pyramid schemes. The literature search was undertaken between 20 February and 28 February 2025.

## 2.3 Search Strategy, Selection and Data Collection Process

A systematic search strategy was developed using a combination of either 'investor biases' or 'financial literacy', or 'financial motives', with participation in crypto-based pyramid schemes. The search strategy combined keywords to form Boolean operators, adapted to each database as presented in Table 1:

**Table 1: Boolean operators adopted**

| Concept                       | Synonyms / Related Terms                                                                                                            |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Behavioural Biases</b>     | "behavioural bias*" OR "cognitive bias*" OR "investor psychology" OR "decision-making bias"                                         |
| <b>Financial Motives</b>      | "financial motive*" OR "investment motive*" OR "profit motive*" OR "economic motive"                                                |
| <b>Financial Literacy</b>     | "Financial literacy" OR "financial knowledge" OR "financial education"                                                              |
| <b>Crypto-Pyramid Schemes</b> | "cryptocurrency pyramid scheme*" OR "crypto scam*" OR "Ponzi scheme*" OR "pyramid scheme*" OR "investment fraud*" OR "crypto fraud" |



All studies that were retrieved were exported to Zotero for reference management and de-duplication. The screening process occurred in two phases: The first phase involved screening titles and abstracts to eliminate studies that were not relevant. The second phase consisted of full-text screening to determine final eligibility. A structured data extraction form was developed and piloted. The following variables were collected: Bibliographic details (author, year, country, journal); Study design (quantitative, qualitative, mixed-methods, theoretical); Population characteristics; Behavioural biases investigated; Financial motives identified; Measures of financial literacy; Key findings on participation in crypto-based pyramid schemes.

## **2.4 Data Items, Risk of Bias Assessment and Synthesis Methods**

The primary review outcomes included evidence on: behavioural biases influencing participation in cryptocurrency-based pyramid schemes; financial motives underpinning investor engagement and the role of financial literacy in reducing or increasing susceptibility to such schemes. The methodological quality of empirical studies was assessed using the Mixed Methods Appraisal Tool (MMAT 2018), which enables the appraisal of qualitative, quantitative, and mixed-methods research using design-specific quality criteria (Hong et al., 2018). For conceptual and narrative papers, methodological rigour was assessed using a structured narrative appraisal framework adapted from established guidance for reviewing non-empirical literature. The appraisal considered five criteria: clarity of the study's purpose or argument; logical coherence and consistency of the theoretical reasoning; relevance to the review objectives; adequacy and credibility of the supporting literature and evidence; and the originality and contribution of the paper to understanding behavioural biases, financial motives, financial literacy, or cryptocurrency-based pyramid schemes. Studies meeting these criteria were considered sufficiently rigorous for inclusion, thereby ensuring a transparent and consistent assessment of both empirical and non-empirical evidence. Given the anticipated heterogeneity of study designs, a narrative synthesis was employed. The studies were first grouped according to the three constructs: behavioural biases, financial motives, and financial literacy. Within each category, findings were summarised and compared thematically. A conceptual map was developed to illustrate the interaction between the three constructs and participation in crypto-based pyramid schemes. Potential publication bias was addressed by including grey literature and organisational reports. The GRADE approach was employed to assess the certainty of evidence across included studies, considering risk of bias, consistency, directness, precision, and publication bias (Guyatt et al., 2011).

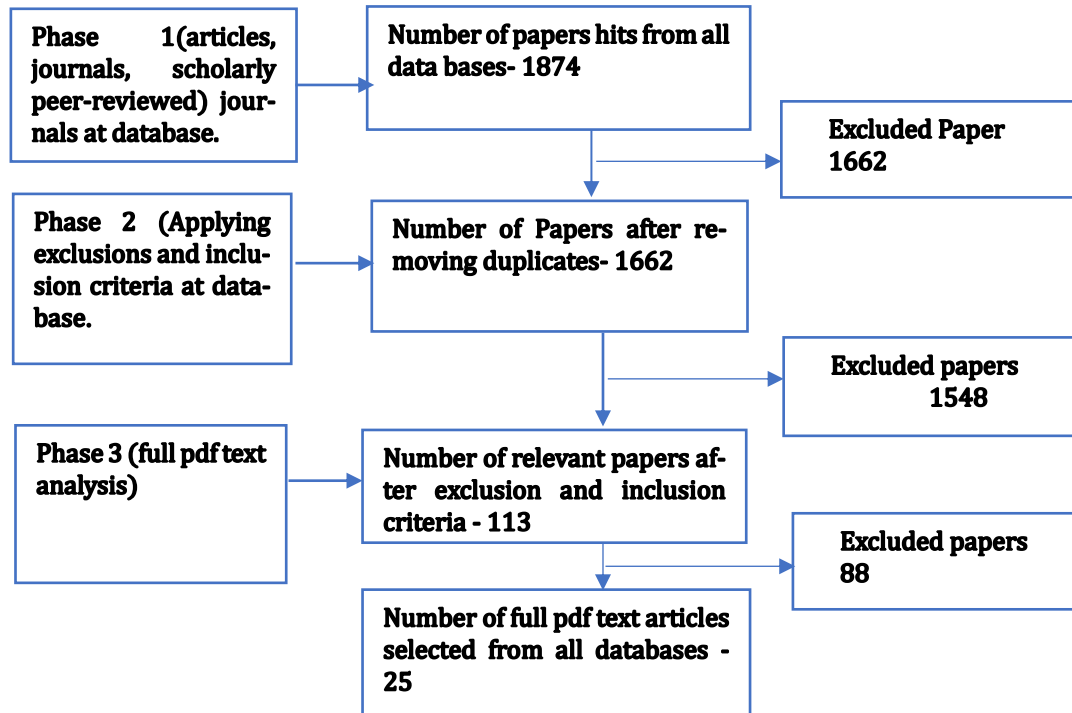
## **3. Results**

### **3.1 Study Selection**

The preliminary database searches based on 3-year publication period from 2023 to 2025 resulted in **1874** records from 3 electronic databases (Scopus, Web of Science and Google Scholar). After eliminating **213** duplicates, **1661** unique records were evaluated based on their titles and abstracts. Out of these, **1548** records were excluded for failing to meet the inclusion criteria (for instance, not about crypto-based schemes or lacking behavioural or financial perspectives). A total of **113** full-text articles were evaluated for eligibility. After the full-text review, 88 articles

were excluded for various reasons, including: Focusing on general cryptocurrency adoption rather than pyramid schemes; Investigating fraud or scams but omitting behavioural/financial literacy aspects. In conclusion, 25 studies were incorporated into the qualitative synthesis. The process of study selection is illustrated in the PRISMA flow diagram (Figure 1).

**Figure 1: Search Process**



### 3.2 Study Characteristics

The studies included in this analysis were published from 2023 to 2025, with a significant proportion (83.3%) released during the years 2024 to 2025, indicating an increasing interest in scams related to cryptocurrency during this timeframe. In terms of Geographic distribution, the studies were conducted in various regions, with notable concentrations in the United States ( $n = 4$ ), South America ( $n=1$ ), Europe ( $n = 1$ ), Sub-Saharan Africa ( $n = 3$ ), and Asia ( $n = 14$ ). As regards methodologies employed, the majority of the studies utilised quantitative approaches (75%), while others incorporated qualitative (16.7%) or mixed methods (4.2%). The Sample sizes employed varied from 2 participants in smaller exploratory studies to over 99,862 participants in larger surveys. A summary of the characteristics of the studies is provided in Table 2.

**Table 2: Summary of Study Characteristics**

| Author(s), Year                               | Country/<br>Region | Study Design                                                                         | Population                                               | Key Variables                                                | Main Findings                                                                                                                        |
|-----------------------------------------------|--------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Doğan et al., 2024                            | USA and Germany    | Experimental; n= 3060                                                                | Retail investors                                         | Financial literacy.                                          | Financial literacy reduced participation in the Ponzi schemes.                                                                       |
| Constantino, Da Silva, and Constantino (2024) | Brazil             | cross-sectional survey & logistic regression                                         | Investors                                                | Behavioural biases                                           | Herding, overconfidence, and the ostrich effect increased gullibility.                                                               |
| Juned et al., 2024                            | Malaysia Asia      | Discourse analysis                                                                   | Content from reputable regulatory bodies                 | Behavioral biases                                            | Framing effects influence investors' decision-making processes regarding crypto scams.                                               |
| Ghani et al., 2023.                           | Malesia            | Qualitative design; interviewed 7 participants. Thematic analysis of 7 Ponzi schemes | Ponzi scheme investors                                   | Behavioural biases                                           | Ponzi scheme victims demonstrate overconfidence bias.                                                                                |
| Egiyi & Chindengwike (2024)                   | United States      | Conceptual-descriptive case of 4 Ponzi schemes.                                      | Enron, Madoff, Theranos, Wells Fargo Scandals            | Financial motives; Behavioural biases                        | Personal enrichment, debt relief, and maintaining status account for predispositions toward manipulation in high-stakes frauds       |
| Bhat and Kolhe (2024)                         | USA                | Case study analysis. Adopted 2 Cases of scandals                                     | Enron and the Bernie Madoff scandals                     | Financial motives<br>Behavioural biases                      | Greed, financial strain, and perceived opportunity: Fraud patterns.                                                                  |
| Barrichello et al., (2024).                   | Indonesia          | Quantitative. Cross-sectional survey among 161 participants.                         | young investors                                          | Financial literacy<br>Behavioural biases                     | Overconfidence, anchoring, and High-risk tolerance and financial literacy predicted fraudulent investment.                           |
| Baltacı & Vural, 2025).                       | Turkey             | Case studies. Content analysis of marketing mix among 44 Ponzi cases.                | Ponzi scheme cases                                       | Behavioural biases                                           | Marketing mix deliberately incites herd behaviour in Ponzi schemes.                                                                  |
| Kalabeke & Nguyen, (2024).                    | Nigeria            | Cross-sectional survey N= 368<br><br>Spearman correlation adopted                    | Former and current Ponzi schemes individual participants | Financial motives<br>Financial literacy                      | Get-Rich-Quick syndrome strongly predicted Ponzi schemes; Financial literacy weakly predicted intentions to invest in Ponzi schemes. |
| Aren & Nayman Hamamci (2023).                 | Turkey             | Quantitative online of 1,692 participants convenience sampling                       | Ponzi scheme and non-Ponzi scheme participants           | Financial literacy<br>Behavioral biases<br>Financial motives | Risky investment intention is explained by fantasy, overconfidence, and subjective financial literacy.                               |
| Kayode & Adaramola (2024).                    | Nigeria            | Mixed methods. Online survey among 3500 participants                                 | Ponzi and non-Ponzi investors                            | Financial motives                                            | Greed is the primary motivator driving investors towards Ponzi schemes                                                               |
| Sirohi and Misra (2024)                       | India              | Survey-based study based on 11,234 individuals. regression analysis                  | General Public                                           | Financial motive<br>Demographic factors                      | Financial literacy predicted vulnerability to fraudulent schemes; Middle-income men most vulnerable.                                 |



|                             |                               |                                                                                                          |                                                         |                                             |                                                                                                                                                                    |
|-----------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nguyen et al. (2024).       | Vietnamese                    | Cross-sectional survey<br>Among 370 respondents,<br><br>PLS-SEM                                          | Vietnamese individuals                                  | Financial motive<br><br>Financial literacy  | Trust, risk appetite, and knowledge of Ponzi schemes predicted crypto-Ponzi vulnerability.                                                                         |
| Pertiwi et al. (2024)       | Indonesia                     | Cross-sectional survey n= 99,862 participants ; Logistic regression                                      | Millennial and Generation Z generations in Indonesia.   | Financial literacy<br>Socio-economic status | Financial literacy influences participation in Ponzi schemes. Awareness of fraudulent investments moderated the financial literacy and investment decisions nexus. |
| Tachado (2023)              | Philippines                   | Quantitative Cross-sectional survey among 97 investors. ANOVA and Pearson R                              | Investors in a Ponzi scheme.                            | Financial motives                           | Investment intentions, perceived benefits and actual benefits explained the Ponzi scheme investment.                                                               |
| Ayadi et al., 2024).        | Nigeria                       | Online survey among 722 participants.                                                                    | Crypto individual investors                             | Behavioral biases                           | FoMO & enjoyment; low literacy predicted cryptocurrency investment.                                                                                                |
| Prachayanant et al., 2023). | Thailand                      | Cross-sectional survey among 385 participants. logistic regression                                       | Actual and prospective cryptocurrency investors         | Financial motive                            | Youthful investors are drawn to the gamification of cryptocurrencies due to their potential to be both fun and profitable.                                         |
| Ahmad, 2025.                | Malaysian                     | Quantitative. Online survey among 468 participants.<br><br>PLS-SEM                                       | Actual and prospective cryptocurrency investors         | Financial literacy<br><br>Behavioral biases | Literacy doesn't prevent victimisation if biases dominate; Bias-induced gullibility mediates the nexus between financial literacy and victimisation propensity.    |
| Onggowati, 2025.            | Developed Vs Emerging markets | Quantitative Online survey among 214 participants.<br><br>Pearson's correlation and multiple regression. | Actual and prospective cryptocurrency investors         | Financial Literacy                          | Financial and crypto literacy reduce certain behavioural biases associated with crypto investment in developed markets more effectively.                           |
| Nadeem et al., 2025.        | Pakistan                      | An online survey among 167 students<br><br>PLS-SEM                                                       | students in public and private universities in Pakistan | Financial Literacy                          | Digital Financial Literacy negatively predicted victimisation to crypto scams.                                                                                     |
| Samanta, 2025).             | India                         | Experimental design. Semi-structured survey among 350 participants                                       | victims, agents, and control group participants         | Financial motives                           | Investors in Ponzi scams exhibit higher levels of trust in local agents, lower financial self-regulation, and low capacity for delayed gratification.              |
| Kasim et al., 2024).        | Malaysia                      | Quantitative Cross-sectional survey among 200 retirees. PLS-SEM                                          | Retirees                                                | Financial literacy<br><br>Financial stress  | Retirees' low literacy increases scam risk; Financial stress does not explain scam risk.                                                                           |
| Mintz et al. (2025).        | USA                           | Quantitative An experimental design                                                                      | Investors                                               | Behavioral biases<br><br>Financial motives  | Herding behaviour, social influence and                                                                                                                            |



|                        |             |                                     |                             |                                      |                                                                                    |
|------------------------|-------------|-------------------------------------|-----------------------------|--------------------------------------|------------------------------------------------------------------------------------|
|                        |             | was adopted among 126 participants  |                             |                                      | risk tolerance predicted pyramid schemes participation                             |
| Ponteres et al., 2025. | Philippines | Qualitative interviews of 8 victims | Victims of investment scams | Financial motives<br>Behavioral bias | Victims attracted by promises of high returns, framing effects and emotional toll. |
| Zheng et al. (2024)    | China       | Three-stage probit model            |                             | Financial literacy                   | Literacy improves fraud protection, esp. for women & elderly.                      |

### 3.3 Results of the Syntheses

#### 3.3.1 Behavioural Biases

Behavioural biases emerged as the most consistent psychological mechanism explaining participation in cryptocurrency-based pyramid schemes. Across the reviewed studies, cognitive and emotional biases systematically distorted investors' perception of risk, probability, and expected returns, thereby weakening rational investment judgement and increasing susceptibility to fraudulent investment opportunities (Constantino et al., 2024; Ghani et al., 2023). Rather than evaluating investments using objective financial information, individuals frequently relied on mental shortcuts (heuristics) and emotional responses, which fraudsters deliberately exploited through persuasive communication, social influence, and unrealistic promises of extraordinary returns.

Overconfidence was the most frequently reported cognitive bias. Evidence indicates that investors with excessive confidence in their financial knowledge, investment experience, or ability to identify profitable opportunities consistently underestimated fraud risk while overestimating their ability to exit pyramid schemes before collapse (Aren & Nayman Hamamci, 2023; Barichello et al., 2024; Ghani et al., 2023). This illusion of control reduced the perceived need to verify investment claims or conduct independent due diligence, making fraudulent offers appear less risky than they objectively were. Experimental evidence by Doğan et al. (2024) further demonstrated that more than half of participants invested in a Ponzi scheme even when expected returns were objectively negative, suggesting that heuristic-based judgement frequently overrides rational financial evaluation.

Anchoring and framing effects represented another powerful mechanism through which fraudsters influenced investor decisions. Cryptocurrency promoters strategically anchored investors on exceptionally high advertised returns or the early success stories of previous participants, causing subsequent investment decisions to be evaluated relative to these initial reference points rather than objective probabilities of success (Juned et al., 2024). Closely related to anchoring, framing effects shaped how investment opportunities were interpreted. By presenting crypto-pyramid schemes as innovative investment ecosystems, exclusive wealth-building communities, or limited-time opportunities, scammers reframed speculative investments as legitimate financial innovations, thereby reducing investors' perception of fraud.



Similarly, herding behaviour transformed individual cognitive errors into collective investment decisions. Rather than independently assessing investment opportunities, many investors interpreted widespread participation by friends, relatives, social media influencers, or online communities as evidence of legitimacy (Baltacı et al., 2025; Constantino et al., 2024). This social validation created a halo effect whereby professionally designed websites, celebrity endorsements, luxurious lifestyles displayed by promoters, or blockchain-related technical terminology generated an overall perception of credibility that overshadowed warning signs of fraud. Consequently, investors often interpreted popularity as evidence of investment quality instead of recognising it as a recruitment strategy fundamental to pyramid schemes.

Emotional biases further reinforced these cognitive distortions. Fear of Missing Out (FoMO), optimism bias, greed, and the sunk-cost fallacy accelerated investment decisions by increasing emotional urgency while suppressing critical evaluation (Ayadi et al., 2024). Investors increasingly focused on the anticipated regret of missing exceptional profits rather than the possibility of financial loss. Once investments had been made, the sunk-cost fallacy encouraged victims to invest additional funds in an attempt to recover previous losses, thereby prolonging participation even when evidence of fraud became apparent.

### **3.3.2 Financial Motives**

Financial motives emerged as the principal economic mechanism driving participation in cryptocurrency-based pyramid schemes. While behavioural biases distorted how investors processed information, financial motives influenced why individuals remained willing to accept unusually high levels of financial risk. Across the reviewed studies, investors were consistently motivated by aspirations for rapid wealth accumulation, financial security, debt reduction, social mobility, and improved lifestyles (Bhat & Kolhe, 2024; Kayode Peter & Adaramola, 2024). These motivations altered investment decision-making by shifting attention from the likelihood of financial loss towards the attractiveness of potential financial gains.

The most dominant financial motive was the "Get-Rich-Quick" mentality. Evidence from Nigeria indicates that expectations of rapid wealth accumulation strongly predicted intentions to participate in Ponzi schemes even among individuals who recognised the associated risks (Kalabeke & Nguyen, 2024). Rather than conducting objective risk-return evaluations, investors increasingly viewed cryptocurrency pyramid schemes as opportunities capable of solving immediate financial problems or achieving long-term financial aspirations within unusually short periods. This finding was reinforced by Kayode and Adaramola (2024), who identified greed as the strongest motivational factor underlying participation in Ponzi investments. Financial motives also interacted closely with risk perception. Studies consistently found that individuals motivated by financial gain displayed greater willingness to tolerate investment uncertainty because anticipated rewards psychologically outweighed perceived risks (Aren & Nayman Hamamci, 2023). Consequently, fraudulent promises of extraordinary returns became increasingly attractive despite their economic implausibility. Similarly, Samanta (2025) demonstrated that victims exhibited weaker financial self-regulation and lower capacity for delayed gratification, preferring immediate financial rewards over sustainable long-term investment outcomes.



Another important mechanism involved the gamification of cryptocurrency investments. Cryptocurrency pyramid schemes increasingly present investment as an enjoyable, competitive, and technologically sophisticated activity rather than as conventional financial decision-making. Interactive digital platforms, referral bonuses, reward systems, and online communities transform investment into an emotionally engaging experience, thereby reducing investors' attention to financial fundamentals while reinforcing speculative behaviour. Marketing narratives emphasising exclusivity, innovation, financial independence, and extraordinary returns further strengthen these motives by appealing to investors' aspirations for wealth and social status. Overall, the reviewed evidence indicates that financial motives operate by systematically altering investors' risk-reward trade-offs. Rather than objectively evaluating investment quality, individuals increasingly prioritise potential rewards, making them more receptive to fraudulent promises of exceptional returns. This motivational mechanism complements behavioural biases by providing the economic incentive necessary for participation in cryptocurrency-based pyramid schemes.

### **3.3.3 Financial Literacy**

Financial literacy was consistently identified as an important protective factor against cryptocurrency-based pyramid schemes; however, its influence proved considerably more complex than suggested by traditional financial education models. Rather than exerting a direct and uniform effect, financial literacy interacted with behavioural biases and financial motives to influence investment decisions. Several studies concluded that higher levels of financial literacy significantly improved investors' ability to recognise fraudulent investment characteristics, evaluate risk-return relationships, and detect unrealistic promises of guaranteed returns (Doğan et al., 2024; Nadeem et al., 2025; Pertiwi et al., 2024; Sirohi & Misra, 2024; Zheng et al., 2024). Enhanced knowledge of financial markets and cryptocurrency mechanisms strengthened investors' capacity to question investment legitimacy and reduced reliance on misleading promotional information. Experimental evidence by Doğan et al. (2024) further demonstrated that improved presentation of investment information significantly reduced participation in Ponzi schemes, highlighting the importance of financial education and effective communication.

Nevertheless, several studies challenged the assumption that financial literacy alone is sufficient to prevent victimisation. Ahmad (2025) demonstrated that bias-induced gullibility mediated the relationship between financial literacy and vulnerability to cryptocurrency scams, implying that knowledgeable investors remained vulnerable whenever emotional and cognitive biases dominated decision-making. Similarly, Kalabeke and Nguyen (2024) reported that financial literacy exerted only a weak influence on intentions to invest in Ponzi schemes compared with the powerful effect of the "Get-Rich-Quick" syndrome. A particularly important distinction emerging from the literature concerns objective versus subjective financial literacy. Objective literacy refers to actual financial knowledge, whereas subjective literacy reflects individuals' confidence in their financial capability. Aren and Nayman (2023) found that subjective financial literacy frequently encouraged excessive confidence, leading investors to underestimate fraud risk de-



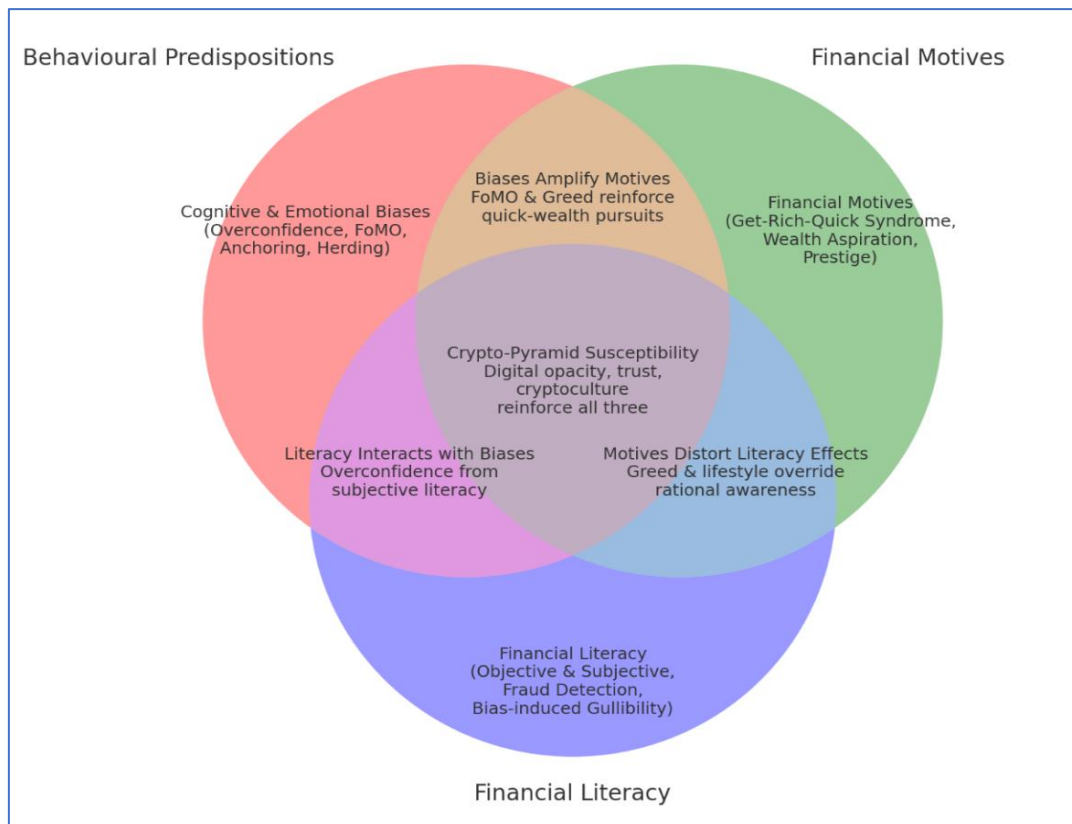
spite possessing only moderate financial knowledge. Consequently, financial education may unintentionally increase vulnerability if it enhances confidence more rapidly than analytical competence.

#### **3.3.4 Interaction Among Factors**

One of the strongest findings emerging from this review is that susceptibility to cryptocurrency-based pyramid schemes cannot be adequately explained by behavioural biases, financial motives, or financial literacy in isolation. Instead, participation results from a dynamic interaction among these three determinants, each reinforcing the effects of the others throughout the investment decision-making process. The reviewed evidence suggests a sequential behavioural mechanism. Behavioural biases first distort investors' perception of investment opportunities by exaggerating expected rewards and minimising perceived risks. These distorted perceptions subsequently activate powerful financial motives, including rapid wealth accumulation, financial independence, social status, and fear of missing profitable opportunities, which further strengthen intentions to invest (Kalabeke & Nguyen, 2024; Kayode Peter & Adaramola, 2024; Samanta, 2025). Financial literacy then acts as a moderating influence by improving fraud recognition and encouraging more analytical evaluation of investment opportunities. However, its effectiveness depends on the relative strength of the underlying behavioural biases.

For example, an investor possessing adequate financial knowledge may recognise that guaranteed returns are economically unrealistic. Nevertheless, overconfidence, herd behaviour, framing effects, or FoMO may simultaneously convince the investor that this particular opportunity represents an exception or that early participation guarantees profits before the scheme collapses (Juned et al., 2024). Thus, behavioural biases frequently override objective financial knowledge, while strong financial motives further reduce resistance to persuasive marketing. The cryptocurrency environment intensifies this interaction. Technological complexity, anonymous transactions, decentralised platforms, influencer marketing, online communities, referral incentives, and gamified investment applications collectively strengthen psychological biases while increasing speculative financial motivations (Ayadi et al., 2024; Nguyen et al., 2024; Prachayanant et al., 2023). Consequently, investors increasingly rely on social proof, emotional judgement, and aspirational narratives rather than objective financial analysis.

**Figure 2: Interaction between Behavioural Biases, Financial Motives and Financial Literacy in Crypto-Pyramid Schemes**



The evidence supports a multidimensional explanation of cryptocurrency-pyramid susceptibility in which behavioural biases shape how investment information is interpreted, financial motives determine the attractiveness of potential rewards, and financial literacy influences investors' capacity to critically evaluate fraudulent opportunities. The interaction of these three factors provides a more comprehensive explanation of victimisation than any single determinant considered independently and highlights the need for integrated interventions that simultaneously address cognitive biases, motivational drivers, and financial education. The interaction among factors can be presented in the form of a Venn diagram in Figure 2.

### 3.4 Summary of Evidence

The results indicate that involvement in cryptocurrency pyramid schemes is affected by a mix of cognitive biases, significant financial incentives, and a lack of financial knowledge. Although each element alone heightens vulnerability, their interplay results in increased risks, especially in situations characterised by economic difficulties and insufficient regulatory supervision. Table 3 (Thematic Findings) gives a structured evidence summary.



**Table 3: Thematic Synthesis of Findings**

| Theme                                                                          | Representative Evidence                                                                                                                                                                  | Direction and Strength of Evidence                                                                                                                                                                                                                                                                             | Synthesised Interpretation                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Behavioural Biases                                                             | Constantino et al. (2024); Ghani et al. (2023); Juned et al. (2024); Baltacı & Vural (2025); Barrichello et al. (2024); Ayadi et al. (2024); Mintz et al. (2025)                         | Strong positive relationship (high consistency).<br><br>Most studies consistently reported that overconfidence, herding, anchoring, framing effects, FoMO, greed, optimism bias, and the Get-Rich-Quick syndrome significantly increase investor susceptibility.                                               | Behavioural biases systematically distort risk perception and judgement, making fraudulent investment opportunities appear credible and attractive. The evidence is highly consistent across different countries and research designs.                                            |
| Financial Motives                                                              | Egiyi & Chin-dengwike (2024); Bhat & Kolhe (2024); Aren & Nayman (2023); Prachayanant et al. (2023); Kalabeke & Nguyen (2024); Kayode & Adaramola (2024); Samanta (2025); Tachado (2023) | Strong positive relationship (high consistency).<br><br>Desire for rapid wealth, financial hardship, debt relief, social status, high risk tolerance, and low delayed gratification consistently increased intentions to participate in cryptocurrency-based pyramid schemes.                                  | Financial motives amplify behavioural biases by increasing the perceived attractiveness of fraudulent investment opportunities, particularly when exceptional returns are promised.                                                                                               |
| Financial Literacy                                                             | Doğan et al. (2024); Zheng et al. (2024); Aren & Nayman (2023); Ahmad (2025); Onggowati (2025); Nadeem et al. (2025); Pertiwi et al. (2024)                                              | Generally negative relationship with mixed evidence.<br><br>Objective financial literacy consistently reduced vulnerability, whereas subjective financial literacy occasionally increased vulnerability through overconfidence. The protective effect was therefore moderate rather than absolute.             | Financial literacy generally improves fraud detection and investment evaluation. However, its effectiveness depends on whether literacy reflects actual competence or merely perceived financial capability, explaining conflicting findings across studies.                      |
| Interaction among Behavioural Biases, Financial Motives and Financial Literacy | Kalabeke & Nguyen (2024); Kayode & Adaramola (2024); Ahmad (2025); Aren & Nayman (2023); Juned et al. (2024); Barrichello et al. (2024); Nguyen et al. (2024)                            | Strong interactive effect (emerging but consistent evidence).<br><br>Behavioural biases strengthen financial motives, while financial literacy moderates, but does not eliminate, their influence. The interaction is reinforced by digital environments, social influence, and weak institutional safeguards. | Susceptibility is best explained as a dynamic interaction among psychological, motivational, and educational factors rather than by any single determinant. This integrated relationship represents the principal theoretical contribution emerging from the reviewed literature. |

### 3.5 Quality Assessment

Employing the critical appraisal tools from the Joanna Briggs Institute (JBI), 25% of studies were assessed as high quality, 70% as moderate quality, and 5% as low quality. Cross-sectional surveys and qualitative research primarily constitute the evidence base. While they are suitable for identifying associations and experiences, they restrict causal inference. Representative large-n surveys (e.g., Kayode Peter & Adaramola, 2024) achieve higher scores on JBI domains where sampling and analytical controls are documented. Most of the studies utilise strong quantitative analyses (i.e., SEM, PLS-SEM, and multistage probit), extensive sample sizes, or multi-wave designs; these studies received High or Moderate-High ratings on the JBI appraisal (for instance, Doğan et al., 2024). The majority of limitations were associated with small sample sizes, reliance on self-reported data, and restricted generalizability.



### 3.6 Risk of Bias Assessment and Certainty of Evidence

Due to the diverse nature of your evidence base, which includes cross-sectional surveys, experiments, qualitative studies, reviews, and case studies, the studies were categorised into risk levels (Low, Moderate, High). This categorisation is informed by the extent to which they effectively tackled selection, measurement, confounding, analysis, and reporting as presented in Table 4. Most of the studies employed in the systematic review were moderately risky in terms of Bias Assessment. Studies were either low risk or high risk. Given that most studies were moderately risky concerning risk of bias assessment, it was concluded that risk of bias assessment was moderate.

**Table 4: Risk of Bias Assessment**

| <b>Risk of Bias Level</b> | <b>Studies</b>                                                                                                                                                    | <b>Characteristics</b>                                                                            |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Low risk</b>           | Doğan et al. (2024); Mintz et al.(2025)                                                                                                                           | Strong methodology (experiments, large/national samples, confounder control, systematic reviews). |
| <b>Moderate risk</b>      | Constantino et al. (2024); Aren & Nayman (2023); Kalabeke & Nguyen (2024); Ayadi et al. (2024); Juned et al. (2024); Ghani et al. (2023); Bhadra and Singh (2024) | Adequate design and findings, but issues with sampling, confounder control, or reporting.         |
| <b>High risk</b>          | Kasim et al. (2024); Egiyi & Chindengwike, 2024; Bhat & Kolhe, 2024)                                                                                              | Very small or selective samples, limited generalizability, and lack of reported rigour.           |

Table 5 concisely communicates the strength and reliability of the evidence for each dimension. The strongest certainty lies in the role of behavioural biases, supported by experiments and large samples. Financial motives also enjoy moderate certainty, consistently identified but rarely tested with causal models. Financial literacy shows low-to-moderate certainty due to contradictions (protective vs. risky effect). Evidence for the three-way interplay is low certainty, suggesting a major knowledge gap and future research. The overall strength of evidence presented in this review was moderate.



Table 5: Strength and Reliability of The Evidence

| Outcome                                                 | No. of studies (designs)                                          | Key findings                                                                                                                                                                                     | Certainty of evidence (GRADE) | Comments                                                                                                                    |
|---------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Behavioural biases → Vulnerability</b>               | 15+ (cross-sectional, experiments, qualitative, content analysis) | Overconfidence, FoMO, herd behaviour, and optimism bias consistently predict participation. Experimental studies (Doğan et al., 2024; Mintz et al., 2025) confirm a causal role.                 | ●●●○<br><b>Moderate–High</b>  | Findings are consistent across countries (Asia, Africa, and globally). Some cross-sectional designs limit causal inference. |
| <b>Financial motives → Investment in schemes</b>        | 10+ (surveys, longitudinal, cross-sectional)                      | Greed, Get-Rich-Quick aspirations, and lifestyle motives are consistently linked to Ponzi/crypto participation (Kayode Peter & Adaramola, 2024).                                                 | ●●●○<br><b>Moderate</b>       | Results consistent, but mostly self-reported survey data; limited causal tests.                                             |
| <b>Financial literacy → Protection or risk</b>          | 12+ (cross-sectional, regression, qualitative)                    | Objective literacy helps fraud detection (Zheng et al., 2024; Mireku et al., 2023). Subjective literacy fosters overconfidence and increases risk (Aren & Nayman Hamamci, 2023).                 | ●●○○<br><b>Low–Moderate</b>   | Mixed results reduce certainty; some small samples (e.g., Kasim et al., 2024).                                              |
| <b>Interplay of biases × motives × literacy</b>         | 5–7 indirect studies (cross-sectional, mediation models)          | Biases amplify motives (Kalabeke & Nguyen, 2024), motives distort literacy effects (Ahmad, 2025), and literacy interacts with biases (Barichello et al., 2024).                                  | ●●○○<br><b>Low</b>            | Evidence is fragmented; few studies explicitly test all three dimensions together.                                          |
| <b>Overall susceptibility to crypto-pyramid schemes</b> | 24 (mixed designs: cross-sectional, experiments, reviews)         | Susceptibility emerges from interacting psychological predispositions, motives, and literacy gaps. Crypto context magnifies these factors via anonymity, digital trust, and speculative culture. | ●●●○<br><b>Moderate</b>       | Certainty is strengthened by the breadth of studies but weakened by the lack of longitudinal designs.                       |

Note:

●●●● = **High certainty**: Very confident the true effect is close to the estimate; ●●●○ = **Moderate certainty**: Moderately confident; the true effect is likely close, but the possibility of difference exists; ●●○○ = **Low certainty**: Limited confidence; the true effect may be substantially different; ●○○○ = **Very low certainty**: Very little confidence in the effect estimates.

## 4. Discussion

### 4.1 Behavioural Biases and Investor Susceptibility

The review demonstrates that behavioural biases constitute the principal psychological mechanism underlying vulnerability to cryptocurrency-based pyramid schemes. The persistence of overconfidence, anchoring, herding behaviour, framing effects, confirmation bias, FoMO, and greed across the reviewed studies suggests that investment decisions are shaped less by objective financial information than by systematic cognitive shortcuts and emotional responses. These findings strongly support Behavioural Finance Theory, which argues that investors are boundedly rational and frequently deviate from expected utility maximisation because of predictable cognitive biases (Shefrin, 2002; Barberis & Thaler, 2003). Rather than objectively evaluating risk and return, investors simplify complex financial decisions by relying on heuristics, making them particularly vulnerable to persuasive marketing and misleading investment narratives.

The findings are also consistent with Prospect Theory (Kahneman & Tversky, 1979), particularly the principles of reference dependence, loss aversion, and probability weighting. Cryptocurrency pyramid schemes deliberately establish unrealistically high return expectations that



become investors' psychological reference points. Once these expectations are formed, individuals disproportionately focus on the possibility of achieving the promised gains while underestimating the probability of financial loss. Moreover, when warning signs emerge, or early losses occur, loss aversion discourages investors from withdrawing because realising a loss is psychologically more painful than the possibility of incurring even greater future losses. Consequently, many investors continue investing or recruit additional participants in the hope of recovering previous investments, a behaviour further reinforced by the sunk-cost fallacy. Experimental evidence showing that participants continued investing despite objectively negative expected returns (Doğan et al., 2024) illustrates how behavioural biases systematically override rational economic judgement.

Herd behaviour provides an additional theoretical explanation for these findings. Rather than independently evaluating investment opportunities, investors frequently interpret widespread participation by peers, family members, social media influencers, or online communities as evidence of legitimacy. This social proof reduces perceived uncertainty and creates an illusion of investment safety, particularly in cryptocurrency markets characterised by limited regulation and high information asymmetry. Consequently, behavioural biases operate not independently but as mutually reinforcing mechanisms that collectively increase investor susceptibility to fraudulent investment schemes.

#### **4.2 Financial Motives and Investor Susceptibility**

The review further demonstrates that financial motives provide the economic incentive that transforms behavioural biases into actual investment decisions. Across the reviewed studies, aspirations for rapid wealth accumulation, financial independence, debt relief, social status, and improved lifestyles consistently motivated participation in cryptocurrency-based pyramid schemes. These findings suggest that fraudulent investment decisions are not driven solely by irrational cognition but also by powerful economic aspirations that alter individuals' evaluation of financial risk. Prospect Theory provides a useful explanation for this relationship. According to the theory, individuals evaluate potential outcomes relative to perceived gains and losses rather than absolute wealth levels (Kahneman & Tversky, 1979). Investors experiencing financial hardship or aspiring to substantial financial improvement may therefore perceive cryptocurrency pyramid schemes as opportunities to escape their current reference point. This encourages greater willingness to accept unusually high risks because the perceived utility of achieving exceptional gains outweighs concerns regarding potential losses. The "Get-Rich-Quick" syndrome identified in Nigeria (Kalabeke & Nguyen, 2024) exemplifies this mechanism, whereby expectations of extraordinary financial rewards distort rational risk-return evaluations. The findings further indicate that cryptocurrency promoters intentionally exploit these motives through sophisticated marketing strategies, gamification, exclusivity narratives, and testimonials of successful investors. These promotional techniques frame participation not merely as an investment decision but as an opportunity for financial transformation and social mobility. Consequently, financial motives interact closely with behavioural biases, particularly greed, FoMO, and optimism bias, creating powerful psychological incentives that encourage investment despite clear warning signs.

#### **4.3 Financial Literacy and Investor Susceptibility**

The review identifies financial literacy as both a protective factor and, paradoxically, a potential source of vulnerability. Consistent with human capital perspectives on financial capability, higher levels of objective financial literacy improve investors' ability to recognise fraudulent investment characteristics, evaluate investment risk, and make informed financial decisions



(Mireku et al., 2023; Zheng et al., 2024). An important methodological observation emerging from this review is the considerable heterogeneity in the measurement of the principal constructs. Financial literacy was operationalised differently across studies, with some researchers using objective knowledge-based tests, others relying on subjective self-assessments of financial capability, and still others measuring cryptocurrency-specific or digital financial literacy. These differences in construct operationalisation may partly explain the inconsistent findings regarding the influence of financial literacy and the relative importance of specific behavioural biases. Accordingly, the findings of this review should be interpreted with recognition of this measurement heterogeneity, and future research would benefit from the development and adoption of standardised, validated measurement frameworks to improve comparability across studies and facilitate more robust evidence synthesis.

These findings reinforce the importance of investor education as a mechanism for strengthening financial resilience against increasingly sophisticated cryptocurrency fraud. However, the review also demonstrates that financial literacy alone does not guarantee protection. Prospect Theory suggests that individuals do not always act according to objective knowledge because decisions are frequently influenced by subjective perceptions of gains and losses rather than factual information (Kahneman & Tversky, 1979). Consequently, emotionally charged investment opportunities promising exceptional returns may still attract financially knowledgeable individuals if anticipated gains dominate perceived risks. This finding is further explained by Behavioural Finance Theory, which distinguishes between objective financial literacy and subjective financial literacy. While objective knowledge improves analytical decision-making, subjective confidence may encourage excessive risk-taking by creating an illusion of competence (Aren & Nayman, 2023). Ahmad (2025) further demonstrates that bias-induced gullibility mediates the relationship between financial literacy and victimisation, indicating that behavioural biases frequently override rational financial knowledge. These findings suggest that financial education programmes focusing exclusively on knowledge acquisition may have limited effectiveness unless they simultaneously address behavioural and emotional drivers of investment decisions.

#### **4.4 Interplay of Behavioural Biases, financial motives and financial literacy**

Perhaps the most significant contribution of this review is the demonstration that behavioural biases, financial motives, and financial literacy operate as an integrated behavioural system rather than as independent determinants of participation in cryptocurrency-based pyramid schemes. As illustrated in Figure 2, investor vulnerability emerges from the intersection of these three dimensions, where psychological distortions, motivational drivers, and financial capability converge to create conditions that substantially increase the likelihood of fraudulent investment participation. Rather than exerting isolated effects, each factor reinforces the others, creating a dynamic process through which investors progressively become more vulnerable to cryptocurrency-related fraud. The interaction depicted in Figure 2 is consistent with Behavioural Finance Theory, which argues that investment decisions are jointly shaped by cognitive limitations, emotional responses, and contextual influences rather than by purely rational economic calculations (Barberis & Thaler, 2003; Shefrin, 2002). Behavioural biases, including overconfidence, anchoring, framing effects, herd behaviour, and fear of missing out (FoMO), initially distort investors' interpretation of investment information by exaggerating expected returns and downplaying potential risks. These distorted perceptions subsequently activate powerful financial motives such as aspirations for rapid wealth accumulation, financial independence, debt relief, and improved social status, thereby increasing the perceived attractiveness of cryp-



tocurrency-based pyramid schemes. Financial literacy then functions as a moderating mechanism by enhancing investors' ability to critically evaluate investment opportunities; however, as the reviewed evidence demonstrates, its protective influence is often weakened when strong behavioural biases and financial motivations dominate decision-making.

This dynamic interaction is further explained by Prospect Theory (Kahneman & Tversky, 1979). Investors frequently anchor their expectations on the extraordinary returns promised by scheme promoters and become psychologically committed to achieving these anticipated gains. As shown conceptually in Figure 2, behavioural biases increase the perceived probability of success, while financial motives strengthen investors' willingness to pursue these expected rewards. When warning signs emerge, loss aversion discourages investors from accepting realised losses because the psychological pain associated with loss exceeds the satisfaction derived from equivalent gains. Simultaneously, the certainty effect and probability weighting encourage investors to overestimate the likelihood of recovering previous investments, resulting in continued participation, additional financial commitment, or the recruitment of new participants despite mounting evidence of fraud. Consequently, the interaction among the three factors transforms what initially appears to be a rational investment decision into a progressively self-reinforcing behavioural cycle. The cryptocurrency ecosystem further amplifies this interaction through characteristics unique to digital financial markets. As reflected in Figure 2, anonymity, decentralised platforms, influencer marketing, online social networks, referral incentives, and gamified investment applications create an environment in which behavioural biases are continuously reinforced while financial motives are intensified through persuasive narratives of innovation, exclusivity, and extraordinary wealth creation (Dulisse et al., 2024; Naseem & Musah, 2025). In many emerging economies, where regulatory oversight remains relatively weak and interpersonal trust frequently substitutes for formal financial information, community influence and social validation further strengthen these behavioural processes, making fraudulent schemes appear both credible and socially acceptable (Ayadi et al., 2024; Nguyen et al., 2024). Overall, Figure 2 illustrates that investor vulnerability should be understood as the outcome of a dynamic behavioural system rather than the product of any single determinant. The findings therefore extend Behavioural Finance Theory by demonstrating that behavioural biases, financial motives, and financial literacy operate synergistically to shape investment behaviour. They also extend Prospect Theory into the context of digital financial fraud by explaining how reference dependence, probability weighting, the certainty effect, and loss aversion interact to sustain participation in cryptocurrency-based pyramid schemes even after objective evidence indicates an impending collapse. This integrated conceptualisation suggests that effective interventions should simultaneously target cognitive biases, motivational drivers, and financial capability through behavioural debiasing strategies, behaviourally informed financial literacy programmes, and regulatory measures that reduce the psychological appeal and social diffusion of fraudulent cryptocurrency investment opportunities.

#### **4.5 Contextual and Regional Differences in Investor Susceptibility**

Although the behavioural mechanisms identified in this review were remarkably consistent across the included studies, the evidence also indicates that their manifestation is influenced by cultural, institutional, and economic contexts. Consequently, behavioural biases, financial motives, and financial literacy should not be viewed as universally operating with equal intensity across jurisdictions. Instead, their influence appears to be moderated by differences in regulatory effectiveness, financial market maturity, social norms, digital financial ecosystems, and levels of institutional trust. Studies undertaken in African countries, particularly Nigeria, Kenya, Tanzania, and South Africa, suggest that social trust, community networks,



and informal information channels play a particularly important role in facilitating participation in cryptocurrency-based pyramid schemes (Ayadi et al., 2024; Kalabeke & Nguyen, 2024; Kayode & Adaramola, 2024). In many emerging markets, investment decisions are frequently influenced by recommendations from family members, religious leaders, friends, or respected community members rather than by formal financial advice. Consequently, herd behaviour and social proof become especially powerful behavioural mechanisms because interpersonal trust often substitutes for limited access to reliable financial information or formal investment advisory services. Weak regulatory enforcement and relatively low financial inclusion further amplify these vulnerabilities by reducing opportunities for independent verification of investment opportunities.

By contrast, studies conducted in North America and Europe emphasise somewhat different mechanisms. Experimental evidence from the United States and Germany demonstrates that even financially sophisticated investors remain susceptible to cognitive biases such as overconfidence, framing effects, and heuristic decision-making despite operating within comparatively mature regulatory environments (Doğan et al., 2024). These findings suggest that stronger institutions cannot eliminate behavioural vulnerabilities, although they may reduce the prevalence and scale of fraudulent schemes through more effective regulatory oversight, investor protection mechanisms, and enforcement actions. Evidence from Asian countries, including Malaysia, Indonesia, Vietnam, Thailand, Pakistan, and the Philippines, highlights the interaction between rapid digitalisation, social media influence, cryptocurrency enthusiasm, and behavioural biases. Across these contexts, persuasive online marketing, influencer endorsements, gamification strategies, and Fear of Missing Out (FoMO) were consistently associated with increased vulnerability to fraudulent cryptocurrency investments (Ahmad, 2025; Barrichello et al., 2024; Juned et al., 2024). At the same time, several Asian studies demonstrated that digital and cryptocurrency-specific financial literacy could improve fraud detection, although its effectiveness diminished when investors exhibited excessive confidence in their own financial knowledge (Nadeem et al., 2025; Onggowati, 2025).

These contextual differences have important implications for investor protection strategies. While behavioural biases appear to represent relatively universal psychological processes, the institutional and cultural environments determine how these biases are activated and exploited by fraudsters. Accordingly, prevention strategies should be adapted to local contexts rather than adopting a universal approach. In emerging economies, interventions should prioritise strengthening financial inclusion, improving regulatory enforcement, leveraging trusted community institutions, and combating misinformation disseminated through informal social networks. Conversely, in more developed financial markets, behavioural interventions aimed at reducing overconfidence, improving risk communication, and counteracting sophisticated digital marketing techniques may be more effective. Thus, the findings suggest that successful prevention requires both behaviourally informed interventions and context-sensitive regulatory policies that reflect regional differences in institutional capacity, financial literacy, and social influence.

## Conclusions

- **Conclusion**

This systematic review demonstrates that vulnerability to cryptocurrency-based pyramid schemes is a multidimensional behavioural phenomenon shaped by the dynamic interaction of behavioural biases, financial motives, and financial literacy. Behavioural biases, including overconfidence, herding behaviour, anchoring, framing effects, fear of missing out (FoMO),



and optimism bias, systematically distort investors' perception of risk and reward, making fraudulent investment opportunities appear credible and financially attractive. These psychological distortions are further reinforced by powerful financial motives, particularly aspirations for rapid wealth accumulation, financial security, debt relief, and social status, which increase investors' willingness to accept unusually high levels of financial risk. Although financial literacy generally improves fraud recognition and investment evaluation, the review indicates that its protective effect is neither absolute nor uniform. Rather, behavioural biases and strong financial motivations frequently override objective financial knowledge, explaining why even financially literate individuals may become victims of cryptocurrency-based pyramid schemes.

Beyond synthesising the existing evidence, this review advances the literature by proposing an integrative behavioural susceptibility framework in which behavioural biases shape investors' interpretation of investment information, financial motives strengthen the perceived attractiveness of fraudulent opportunities, and financial literacy acts as a moderating mechanism that either reduces or, when accompanied by excessive subjective confidence, inadvertently increases vulnerability. These relationships operate within a broader cryptocurrency ecosystem characterised by technological complexity, social influence, persuasive marketing, information asymmetry, and regulatory weaknesses, which collectively amplify investor vulnerability. The framework therefore conceptualises participation in cryptocurrency-based pyramid schemes as the outcome of interacting psychological, motivational, educational, and contextual factors rather than the consequence of any single determinant. The proposed framework provides a useful heuristic for future empirical research by identifying plausible causal pathways that can be tested using longitudinal, experimental, and cross-country comparative studies. It also offers practical guidance for policymakers and financial regulators by suggesting that effective investor protection requires integrated interventions combining behavioural debiasing strategies, targeted financial literacy programmes, fraud-awareness campaigns, and stronger regulatory oversight of digital investment platforms.

- **Theoretical and Practical Implications**

The findings of this review carry important theoretical and practical implications. Theoretically, the evidence extends behavioural finance by demonstrating that susceptibility to cryptocurrency-based pyramid schemes cannot be adequately explained by behavioural biases, financial motives, or financial literacy in isolation. Instead, these factors operate synergistically, with behavioural biases shaping investors' perception of risk, financial motives strengthening the attractiveness of speculative opportunities, and financial literacy moderating, though not always eliminating, the influence of these psychological and motivational processes. This integrated perspective advances existing behavioural finance literature by providing a multidimensional explanation of fraudulent investment participation within digital financial markets and offers a conceptual basis for future theory development and empirical testing.

From a practical perspective, the findings suggest that conventional investor protection strategies centred solely on financial education and disclosure requirements are unlikely to sufficiently reduce participation in cryptocurrency-based pyramid schemes. Instead, policymakers should adopt behaviourally informed regulatory interventions that directly address the psychological mechanisms identified in this review. For example, financial regulators could require cryptocurrency investment platforms to incorporate mandatory risk-awareness modules or investor competency assessments before individuals are permitted to invest in high-risk crypto-assets. Similar to appropriateness assessments used in some financial



markets, these short assessments could evaluate investors' understanding of volatility, fraud indicators, and the absence of guaranteed returns before transactions are completed. The findings indicate that future financial education initiatives should shift from a purely knowledge-transmission model towards a behavioural capability model. Such programmes should combine financial knowledge with critical thinking, bias awareness, fraud recognition, digital information verification, and reflective decision-making skills. This approach acknowledges that investors frequently fail not because they lack financial knowledge, but because cognitive biases and emotional motivations override that knowledge during investment decision-making.

The review also suggests that investor protection policies should be tailored to regional contexts. In emerging economies, where interpersonal trust and informal social networks substantially influence investment decisions, regulators should collaborate with community organisations, religious institutions, and local financial educators to disseminate fraud awareness messages. In contrast, regulators in developed markets should focus more on behavioural nudges, enhanced digital disclosure requirements, and algorithmic monitoring of online investment promotions. These findings demonstrate that although behavioural biases are universal, effective prevention strategies must account for differences in institutional capacity, financial market development, and cultural norms. In addition, regulators could consider introducing mandatory cooling-off periods for first-time or high-risk cryptocurrency investments, particularly those involving unusually high promised returns or multi-level referral programmes. Such waiting periods would interrupt emotionally driven decisions arising from fear of missing out (FoMO), overconfidence, and impulsive responses to persuasive marketing, thereby encouraging more reflective investment choices. Behavioural research consistently shows that delaying immediate decisions reduces the influence of cognitive biases and emotional impulses on financial decision-making.

Given the prominent role of herd behaviour and social influence identified in this review, digital platforms and social media companies should also assume a greater role in fraud prevention. Regulatory authorities could require platforms hosting cryptocurrency advertisements to implement algorithmic detection and flagging of fraudulent investment promotions, display prominent fraud warnings alongside high-risk investment advertisements, and limit the rapid dissemination of posts exhibiting common characteristics of pyramid or Ponzi schemes. Similar interventions have already been implemented in other domains to reduce the spread of harmful online content and could be adapted to combat cryptocurrency investment fraud.

The findings further suggest that financial literacy programmes should be redesigned to incorporate behavioural financial education rather than focusing exclusively on technical financial knowledge. Investor education initiatives should explicitly train individuals to recognise behavioural biases such as overconfidence, anchoring, framing effects, herd behaviour, and FoMO, while also teaching practical debiasing techniques, including verification of investment information through licensed regulatory sources, independent risk assessment, and structured decision checklists before committing funds. Scenario-based simulations and fraud recognition exercises could further improve investors' ability to identify fraudulent cryptocurrency investment opportunities. Finally, stronger regulatory oversight of cryptocurrency markets remains essential, particularly in emerging economies where digital asset regulation is still evolving. Regulatory agencies should strengthen licensing requirements for cryptocurrency investment providers, require greater transparency regarding investment products and referral-based compensation structures, enhance cross-border



cooperation among financial intelligence units, and deploy artificial intelligence and block-chain analytics to identify suspicious transaction patterns and rapidly detect emerging cryptocurrency pyramid schemes. Collectively, these multidimensional interventions would address not only deficiencies in financial knowledge but also the behavioural and motivational processes that underpin investor vulnerability, thereby providing a more comprehensive framework for preventing cryptocurrency-based investment fraud.

- **Study Limitations**

This review should be interpreted in light of several limitations. First, the included studies exhibited considerable heterogeneity in terms of research design, study populations, geographical settings, theoretical perspectives, and outcome measures, limiting the generalisability of the findings across different institutional and cultural contexts. Although this diversity provides a broader understanding of cryptocurrency-based pyramid schemes, it also introduces contextual variation that may influence the observed relationships among behavioural biases, financial motives, and financial literacy. Second, most of the reviewed studies employed cross-sectional and correlational research designs, with relatively few adopting longitudinal, experimental, or quasi-experimental approaches. Consequently, while the review consistently identified associations among behavioural biases, financial motives, financial literacy, and investor susceptibility, the available evidence does not permit strong causal inferences regarding the direction or temporal ordering of these relationships. Accordingly, the discussion of the interaction and mutual reinforcement among the three factors should be interpreted as evidence of co-occurring and interrelated influences rather than definitive causal pathways. For example, although behavioural biases were frequently associated with stronger financial motives and weaker effects of financial literacy, the predominance of correlational evidence makes it difficult to determine whether behavioural biases amplify financial motives, whether strong financial motives activate particular biases, or whether both are jointly influenced by unobserved contextual factors. Third, a substantial proportion of the empirical evidence relied on self-reported questionnaires, interviews, and case studies, making the findings susceptible to recall bias, social desirability bias, and common method bias. These approaches may not accurately capture actual investment behaviour, particularly in the emotionally charged and rapidly evolving environment of cryptocurrency markets. In addition, differences in the operationalisation and measurement of behavioural biases, financial motives, and financial literacy across studies limited direct comparability and precluded quantitative synthesis through meta-analysis. An additional limitation of this review relates to the predominant focus of the existing literature on the perspectives of victims or potential participants in cryptocurrency-based pyramid schemes. Most studies examined the behavioural biases, financial motives, and financial literacy of investors, while comparatively little empirical attention has been given to the psychology, decision-making processes, and strategic behaviours of fraudsters who design and operate these schemes. Consequently, although this review identifies the behavioural mechanisms that increase investor vulnerability, it provides more limited insight into how perpetrators intentionally exploit cognitive biases through persuasive communication, social engineering, framing techniques, influencer marketing, gamification, and digital platform algorithms.

- **Future Research**

Future research should therefore prioritise methodologies capable of establishing causal mechanisms. Longitudinal panel studies could examine how behavioural biases, financial motives, and financial literacy evolve over time and jointly influence susceptibility to cryp-



tocurrency-based pyramid schemes before, during, and after investment decisions. Experimental and behavioural laboratory studies would be particularly valuable for isolating causal effects by manipulating specific psychological or informational conditions. For example, researchers could experimentally prime fear of missing out (FoMO), overconfidence, framing effects, anchoring, or social proof to examine how these biases alter investors' risk perceptions, financial motivations, and responses to fraudulent cryptocurrency investment offers. Similarly, financial literacy interventions could be experimentally varied to determine whether enhanced objective knowledge mitigates the influence of behavioural biases or whether psychological debiasing strategies produce stronger protective effects than conventional financial education alone. Future studies should also adopt cross-country comparative designs to investigate how regulatory quality, digital financial inclusion, cultural norms, and institutional trust moderate the relationships among behavioural biases, financial motives, financial literacy, and participation in cryptocurrency-based pyramid schemes. Future research should also adopt a more holistic perspective by investigating both the demand side (investors) and the supply side (fraudsters) of crypto pyramid scams. Qualitative studies involving law enforcement agencies, financial regulators, cybersecurity specialists, and, where ethically and legally feasible, convicted fraudsters could provide valuable insights into the behavioural strategies used to manipulate investor decision-making. Such evidence would advance behavioural finance theory by integrating the psychology of both victims and perpetrators while informing more targeted fraud prevention strategies, behavioural interventions, and regulatory responses to cryptocurrency-based pyramid schemes. Further, future research should explicitly distinguish between objective and subjective financial literacy to determine their relative influence on investor vulnerability. Longitudinal and experimental studies examining whether behavioural interventions can reduce the overconfidence associated with subjective financial literacy would substantially advance behavioural finance theory and improve the design of investor protection programmes. Accordingly, future research should move beyond individual-level explanations by examining how behavioural biases, financial motives, and financial literacy interact with macro-contextual factors, including regulatory quality, economic uncertainty, institutional trust, financial inclusion, digital platform governance, and misinformation ecosystems. Multilevel modelling, cross-country comparative studies, and mixed-methods research would be particularly valuable in identifying how contextual environments strengthen or weaken the influence of behavioural mechanisms on participation in cryptocurrency-based pyramid schemes.

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