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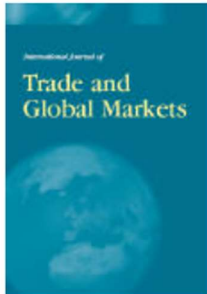
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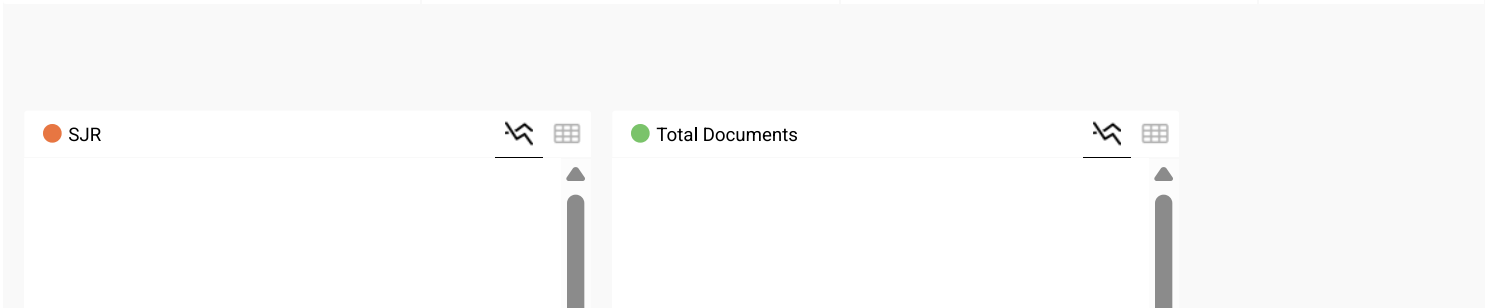
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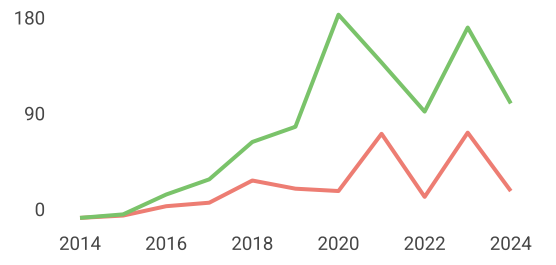
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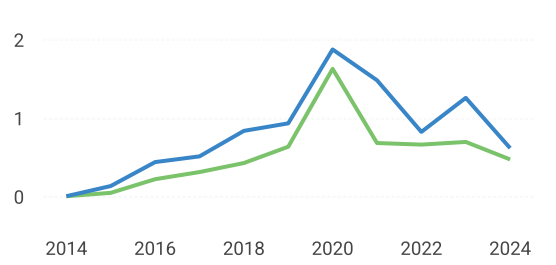
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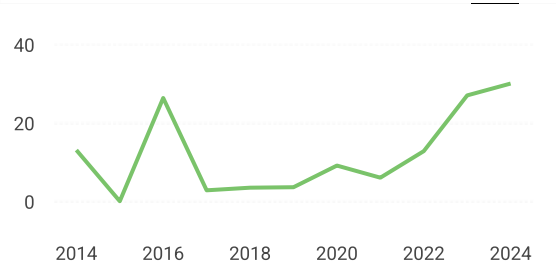
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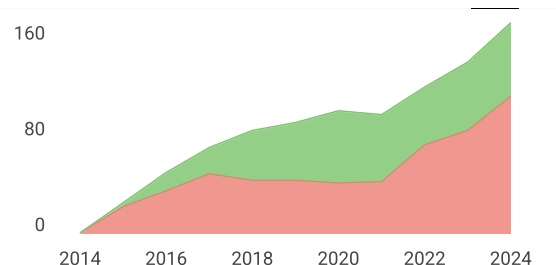
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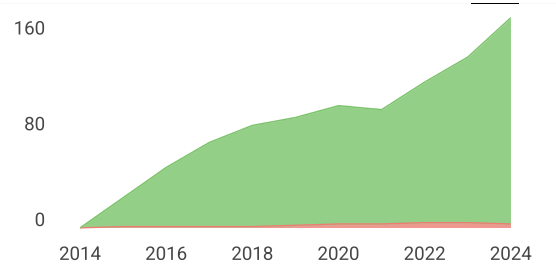
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2018   2019   2020   2021   2022   2023   2024

Estimated APC

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4k

2k

0
        2014    2016    2018    2020    2022    2024
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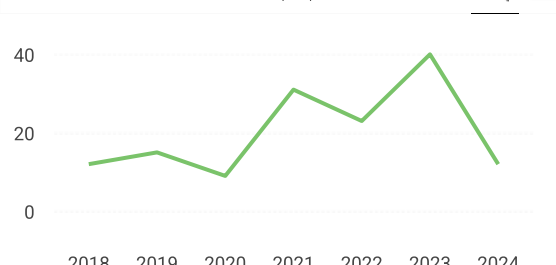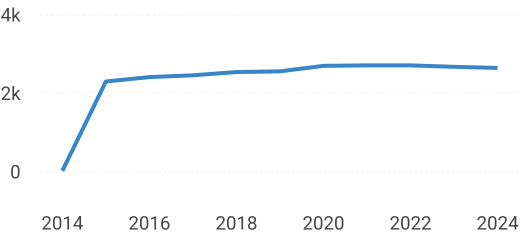
Estimated financial value

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300k

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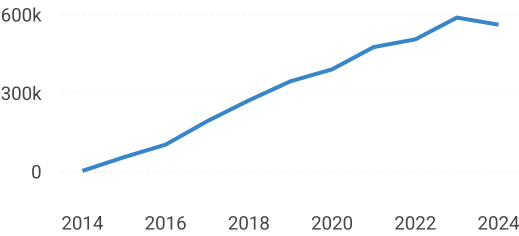
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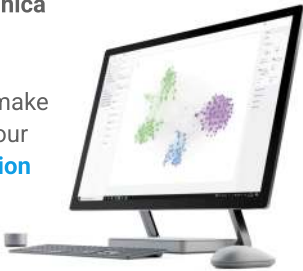
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Financial naivety, excessive gaming, and compulsive buying influence cryptocurrency continuance intention: the mediating role of overconfidence and risk tolerance

Elisa Tjondro*, Retnaningtyas Widuri, Josua Tarigan and Saarce Elsye Hatane

Accounting Department,
School of Business and Management,
Petra Christian University,
Jalan Siwalankerto 121-131, Wonocolo,
Surabaya, 60236, Indonesia
Email: elisatjondro@petra.ac.id
Email: widuri@petra.ac.id
Email: josuat@petra.ac.id
Email: elsyehat@petra.ac.id
*Corresponding author

Abstract: This study seeks to investigate the investment persistence among individuals who have maintained cryptocurrency holdings in the previous year. Financial naivety, online compulsive buying, and excessive gaming behaviours influence continuance intention, either through overconfidence or risk tolerance. The sample comprised 1,097 participants selected from the five provinces of Indonesia's most significant internet user bases. structural equation modeling is utilised in this study. This study demonstrates that excessive gaming behaviour and financial naivety are associated with continuance intention, either directly or indirectly, via overconfidence or risk tolerance. Investors should be cautious regarding their financial naivety and excessive gaming behaviour, as these elements increase the tendency to be overly optimistic. The findings are consistent with the Dunning-Kruger effect. Conversely, this study fail to substantiate the correlation between compulsive buying and continuance intention. The implication is to provide investors with valuable insights into the psychological effects of specific behaviors on investment decisions.

Biographical notes: Elisa Tjondro is an Assistant Professor at Petra Christian University's Accounting Department. She earned a Doctorate degree in Accounting from Airlangga University. Her research and publications are in the

fields of taxation, accounting behaviour, corporate governance, and firm performance. She has been a reviewer in several reputable international journals.

Retnaningtyas Widuri is an Assistant Professor at the Accounting Department of Petra Christian University. She is majoring in tax accounting. Her research and publications are in the fields of taxation, corporate governance, firm performance, and accounting behaviour.

Josua Tarigan is an Associate Professor at the Accounting Department of Petra Christian University. He is majoring in managerial accounting. He does research and publications in corporate governance, strategic management, and accounting behaviour.

Saarce Elsye Hatane is an Associate Professor at the Accounting Department of Petra Christian University. She is majoring in managerial accounting. Her research and publications discuss intellectual capital, corporate governance, the capital market, and accounting behaviour.

1   Introduction

Cryptocurrency is a significant departure from traditional finance since it addresses the limits of the conventional financial system in a world that is becoming more interconnected and boundary-less (Economic Times, 2023). Cryptocurrencies are digital currencies that use technology to enable flexible, convenient, and time-efficient consumer payments (Salcedo and Gupta, 2021). Obstacles such as foreign currency fees, prolonged transfer durations, and increased transaction costs have historically hindered financial transfers across countries. In contrast, cryptocurrency transfers exhibit rapidity, completing within seconds, augmenting the liquidity of funds for individuals and enterprises (Economic Times, 2023). In Indonesia, the volume of cryptocurrency transactions witnessed a significant surge towards the end of 2021, with a growth rate of 1210% compared to the previous year. However, this upward trend was followed by a subsequent fall that persisted until June 2023 (as shown in Table 1). Conversely, the number of cryptocurrency users in Indonesia experienced annual growth and reached its highest point in June 2023, with 17.54 million individual owners (Table 1). Based on the Global Crypto Adoption Index 2022, Indonesia ranks 20th worldwide regarding cryptocurrency adoption (Chainalysis, 2022). This is an improvement from the previous year, when Indonesia was not among the top 20 in the 2021 Global Crypto Adoption Index (Chainalysis, 2021). As of June 2023, the number of persons who hold cryptocurrencies in Indonesia has surpassed the number of individual investors in the stock market by 11.19 million people (KSEI, 2023). This suggests that cryptocurrency is widely accepted as Indonesia's future digital currency.

While cryptocurrencies have provided numerous advantages, individual investors are confronted with more complex obstacles in relation to these digital currencies. The tendency to continue investing, motivated by uninformed or ignorant conduct regarding potential dangers and fraud, as well as prejudiced behaviour, frequently leads individual investors to fall victim to financial fraud. Lev et al. (2022) conducted a comprehensive

review of existing studies and discovered that individuals from developing countries who demonstrate financial naivety are more likely to fall victim to financial scams, particularly those involving cryptocurrencies. The study of Lev et al. (2022) reveals that the majority of individuals affected by Bitcoin fraud are gainfully employed, possess a high level of education, and fall within the young middle-aged demographic. In 2019, Indonesia ranked second worldwide in terms of victim rates for Bitcoin scams, representing 11% of the overall amount (Decrypt, 2019). According to PPATK, an Indonesia independent institution established to prevent money laundering, has identified cyber-based fraud and violations of electronic transaction laws as the predominant types of crimes that prompt suspicious activity reports in Indonesia in 2022 (UNODC, 2022).

Table 1 Number of crypto owners and transaction value in 2020 – June 2023

	2020	*2021*	*2022*	*June 2023*
Crypto owners (persons)	4,000,000	11,200,000	16,550,000	17,540,000
Transaction value (USD)	4,600,000,000	60,300,000,000	19,000,000,000	4,410,000,000

Source: Kominfo (2023) and Indonesian Information Portal (2023)

A limited number of studies have examined the concept of continuance intention in the context of cryptocurrencies. Although intention to adopt cryptocurrency has been the subject of extensive research in the past, very few studies have examined the persistence of intention to adopt cryptocurrency. Prior studies have examined adoption and continuance (Kala and Chaubey, 2023), intention to adopt and/or adoption (Fujiki, 2021; Kawamura et al., 2021; Stix, 2021; Schaupp et al., 2022; Nugraha et al., 2022; Tjondro et al., 2023). Comparatively, the number of studies examining cryptocurrency continuance intention (CCI) remains insignificant compared to research examining its adoption. This is the impetus behind this study, in which respondents who have been crypto owners within the past year comprise the study population. This survey was conducted from the second week to the end of August 2023. Since the extreme decline in 2022 (Figure 1), the cryptocurrency market value relative to IDR (Bitcoin price as representative of cryptocurrency price) has begun to exhibit a reversal trend over the past year. This reversal of trend presents an opportune time to conduct a survey on the intention of Indonesians to maintain cryptocurrency investment. This research aims to determine whether individuals who owned cryptocurrencies within the previous year and witnessed a market value increase will continue to do so in the future and to identify the determinants that impact this decision. By analysing data pertaining to the depreciation of cryptocurrency transactions in 2022 and 2023 (Table 1), this research stands out in its examination of investors' inclinations to persist in their cryptocurrency investments.

Financial naivety, compulsive buying, and excessive gaming are the main factors influencing CCI. Overconfidence and risk tolerance act as mediators in this relationship. An investor's financial naivety refers to their lack of awareness or understanding regarding potential fraudulent activities that are beyond their control (Kawamura et al., 2021). Compulsive buying is an addiction to online shopping characterised by the

development of extreme behaviours that are highly reliant on internet shopping (Jiang et al., 2017). Excessive gaming is a condition characterised by detrimental gaming behaviours, including but not limited to disrupting work or tasks, deceiving close relationships regarding gaming activities, experiencing sleep deprivation, and developing an addiction or struggling to cease gaming (Király et al., 2017). Based on a survey by Statista in the third quarter of 2022 (Statista, 2023), Indonesia has achieved the second-highest global ranking in gaming penetration, at 94.8%. This indicates that the majority of Indonesian internet users are enthusiasts, which inspired this research. These three behaviours may increase investors' overconfidence or risk tolerance, leading them to continue investing in cryptocurrencies without conducting exhaustive due diligence. Study shows that risk tolerance mediates retirement savings reduction and high-risk investment decisions (Shi and Jiang, 2022). Khan et al. (2019) identify overconfidence as a mediator between imprudent investment behaviour and past portfolio returns, such as excessive trading, hazardous share investment, and non-diversification of asset holdings. Overconfidence has the potential to act as a mediating factor that deters investors from engaging in logical investment practices, including asset allocation, risk management, and trading, ultimately leading to subpar investment outcomes.

Figure 1   Market value of Bitcoin in the last year (August 2022–August 2023) (see online version for colours)

Source: Google Finance (2023)

This work makes several significant contributions. First, this study is unique in establishing a connection between financial naivety, compulsive buying, and excessive gaming with continuance intention. Kawamura et al. (2021) and Lev et al. (2022) studies have previously examined financial naivety. Kawamura et al. (2021) examined the correlation between financial literacy and demography on financial naïvety. According to Lev et al. (2022), persons who exhibit financial naivety are at a heightened risk of falling prey to financial fraud, particularly in the realm of cryptocurrency. Nevertheless, the aforementioned research did not address the correlation between financial naivety and continuance intention. Second, a very limited prior studies have established a connection

between compulsive buying behaviour and continuance intention. Prior research on compulsive buying and finance has mostly examined financial risk and security (Leonard et al., 2019; She et al., 2021), money management and indebtedness (Nyrhinen et al., 2023), and financial well-being (Wheeler and Brooks, 2023). Third, insufficient research exists regarding the relationship between excessive gaming and persistent intention in cryptocurrencies. Oksanen et al. (2022a, 2022b) did a study investigating the correlation between excessive gaming and cryptocurrency. Researchers found that individuals engaged in cryptocurrency market trading exhibited a greater propensity for excessive gaming and internet consumption compared to other demographic groups. However, Oksanen et al. (2022a, 2022b) does not examine the relationship between excessive gaming and the continuance intention. Finally, previous studies have not investigated how risk tolerance or overconfidence act as mediators between financial ignorance, compulsive buying, excessive gaming, and continuance intention.

The organisation of the paper is as follows. Section 2 provides a literature assessment of the three primary characteristics that determine the continuation of cryptocurrency investment, risk tolerance, and overconfidence. Section 3 explains the methodology, sample selection, and definition of variables. Section 4 provides the outcomes and primary examinations. Section 5 discusses the study's findings and the theoretical and practical implications that can be drawn from them.

2 Literature review and hypothesis development

2.1 Cognitive bias, overconfidence, and continuance intention

Prior research on the intention of cryptocurrency continuation is limited. Kala and Chaubey (2023) investigated the correlation between adopting cryptocurrencies and the intention to continue using them. They employed the technology acceptance model (TAM) hypothesis, suggesting that technology might enhance individuals' task performance. Alternatively, what if the determination of one's intention to continue is influenced by multiple behaviours that affect both overconfidence and a propensity for taking large risks? This study focuses on an unexplored field of research.

An individual's belief of having a high level of financial literacy, although having a low level of financial knowledge, can lead to engaging in risky financial conduct (Balasubramnian and Sargent, 2020). The cognitive bias, referred to as the illusion of knowing, is commonly recognised as the Dunning-Kruger Effect (Kruger and Dunning, 1999). The Dunning-Kruger Effect centres around individuals displaying an inflated sense of self-assurance due to their lack of knowledge and their failure to recognise this lack of knowledge (Dunning, 2011). Prior research also provides evidence that excessive self-assurance leads individual investors to potentially fall prey to financial fraud (Xiao et al., 2022). According to Lev et al. (2022), persons from underdeveloped nations who have a lack of financial knowledge are vulnerable to being victims of cryptocurrency fraud. The tendency for individuals to continue investing while being influenced by their lack of awareness or understanding of potential dangers and fraud, as well as their tendency to make decisions based on personal biases often leads to them becoming victims of financial fraud.

2.2   Hypothesis development

This study utilises the Dunning-Kruger effect and overconfidence theory to examine individual investor behaviour towards cryptocurrency investment continuance.

2.2.1   Financial naivety and fraud-risk ignorance

Financial naivety refers to individual investors' lack of knowledge and awareness regarding potential fraudulent activities, which they should ideally avoid (Kawamura et al., 2021). Moreover, financial naivety manifests an unconscious mindset and is typically associated with the individual's degree of financial literacy. Lev et al. (2022) explained that investors' naivety and susceptibility to manipulation are frequently driven by their aspiration to outperform prevailing economic circumstances, expecting their choices to rapidly boost their assets. Indeed, Kawamura et al. (2021) discovered that individuals with a strong grasp of financial concepts are more likely to exhibit financial naivety, as they tend to be audacious and inattentive when it comes to financial matters (Kawamura et al., 2021). The correlation between financial naivety and the Dunning-Kruger theory centres around two key factors: the tendency for overconfidence stemming from misinformation and the inability to acknowledge one's inexperience (Balasubramnian and Sargent, 2020).

The defining feature of developing nations is typically a population comprised of individuals seeking rapid economic advancement. Indonesia will transition from a developing nation to an upper-middle-income country by the start of July 2023 (Bloomberg, 2023), with a cumulative national income of $4,580 in 2022. Despite the current economic transition, there is no discernible decline in financial naivety. On the contrary, individual investors are confronted with an unprecedented escalation in potential risks. Unwittingly disregarding the risk of a cryptocurrency market depreciation similar to that which transpired during the pandemic several years ago, investors are unconsciously unconcerned and careless in their investment decisions due to the abundance of offers from various cryptocurrency investments, including those from abroad that promise enormous potential gains. As a result of developing a greater tolerance for hyper-volatile investments and becoming overconfident, investors continue to hold cryptocurrency positions. According to this explanation, the hypotheses are

H1a: Financial naivety influences cryptocurrency continuance intention (CCI).

H1b: Financial naivety influences risk tolerance.

H1c: Financial naivety influences overconfidence.

2.2.2   Compulsive buying, self-control, and inefficient money management

Compulsive buying refers to the repetitive and uncontrollable need to make purchases primarily motivated by unfavourable events or feelings. This behaviour is often linked to adverse psychological, social, and financial outcomes (Grougiou et al., 2015; Leonard et al., 2019; Mrad and Cui, 2020). This study examines the phenomenon of compulsive buying, specifically in the context of online shopping addiction. It explores how individuals develop excessive and highly dependent behaviour towards shopping on the internet (Jiang et al., 2017). The purchasing experience amidst the COVID-19 pandemic has the capacity to establish the prevailing standards of the post-pandemic world (Rippé

et al., 2022). Compulsive buying, a behaviour characterised by addiction and sometimes resulting in adverse outcomes, can be triggered via the internet (Sharif and Khanekharab, 2017). Compulsive buying is linked to financial vulnerability, reduced overall satisfaction (Leonard et al., 2019), and ineffective money management, resulting in debt (Nyrhinen et al., 2023).

The detrimental effects of compulsive buying behaviour, such as lack of self-discipline, heightened financial vulnerability, and indebtedness, contribute to a greater inclination towards investing in high-risk and highly volatile investments. Investors who exhibit compulsive buying behaviour typically possess a greater propensity for risk-taking or overconfidence compared to investors who do not display such conduct. According to the above reasoning, the hypotheses are

H2a: Compulsive Buying influences cryptocurrency continuance intention (CCI).

H2b: Compulsive Buying influences risk tolerance.

H2c: Compulsive Buying influences overconfidence.

2.2.3 Excessive gaming, gambling, and addictive behaviours

Excessive gaming is defined as internet gaming disorder, which manifests as unhealthy patterns of behaviour in individuals. These behaviours include impairments in work or duties owing to excessive gaming, deception towards close associates regarding gaming habits, sleep deprivation, and addiction or challenges in disengaging from gaming. The assessment of excessive gaming involves utilising five indicators derived from the Internet Gaming Disorder Test (Király et al., 2017). The prevalence of excessive gaming has surged during the COVID-19 pandemic as a result of young individuals being confined to their homes and consequently being subjected to the adverse effects of excessive gaming (Lopez-Cabarcos et al., 2020; Oksanen et al., 2022a). Daglis (2022) demonstrates a rising inclination towards excessive gaming and gambling activities following the onset of the COVID-19 epidemic.

Oksanen et al. (2022a) found that cryptocurrency investors exhibit higher levels of gaming, gambling, and internet usage compared to investors with conventional assets. Oksanen et al. (2022a) discovered a robust correlation between individuals who participate in the cryptocurrency market and engage in excessive gaming and internet consumption. Additional attributes of Bitcoin investors encompass encountering elevated levels of psychological strain and solitude (Oksanen et al., 2022a). Moreover, Oksanen et al. (2022b) demonstrate that there is a connection between excessive gaming and excessive gambling, both at an individual level and across different individuals. This refers to the long-term effects of excessive gaming on individuals and the relationships between individuals. Individual investors exhibiting excessive gaming demonstrate a proclivity for investing in highly volatile assets, possess a higher risk tolerance, and exhibit overconfidence compared to investors without excessive gambling tendencies. According to the above reasoning, the hypotheses are

H3a: Excessive gaming influences cryptocurrency continuance intention (CCI).

H3b: Excessive gaming influences risk tolerance.

H3c: Excessive gaming influences overconfidence.

2.2.4   Risk tolerance as a mediator between predictors and continuance intention

Risk tolerance refers to the highest level of uncertainty an individual is willing to embrace while making financial decisions. Individual risk tolerance is frequently associated with risk-seeking behaviour (Nguyen et al., 2022) and investment choices (Huang et al., 2021; Mohta and Shunmugasundaram, 2023a, 2023b). The study by Sridharan et al. (2023) revealed a significant correlation between risk tolerance and individuals' inclination to embrace Bitcoin. Consistent with Mohta and Shunmugasundaram (2023b), there is a correlation between risk tolerance and the intention to make risky investments. Risky investment encompasses financial products that lack a guarantee of both risk and return, such as bank deposits and government securities. Individuals exhibiting a propensity for assuming high levels of risk are inclined to select investments that carry a higher degree of risk (Huang et al., 2021; Lei and Ramos Salazar, 2022; Mohta and Shunmugasundaram, 2023b).

Risk tolerance serves as a mediator between individual neglectful behaviour, such as financial naivety, compulsive buying, excessive gaming, and decisions regarding crypto continuance intention (CCI). This implies that when individuals engage in neglectful behaviour, their risk tolerance increases, leading to irrational decisions regarding risky investments. Shi and Jiang (2022) discovered that risk tolerance acts as a mediator between buying health insurance and investing in financially hazardous investments. This suggests a rise in risk appetite among health insurance purchasers, leading to a greater willingness to invest in high-risk investments. The study conducted by Nguyen et al. (2022) also demonstrates a rise in risk tolerance among investors possessing a high level of financial literacy, leading them to intent of decreasing their retirement savings. According to the above reasoning, the hypotheses are

> H4a: *Risk tolerance mediates the influence of financial naivety (FN) on cryptocurrency continuance intention (CCI).*

> H4b: *Risk tolerance mediates the influence of compulsive buying (CB) on cryptocurrency continuance intention (CCI).*

> H4c: *Risk tolerance mediates the influence of excessive gaming (EG) on cryptocurrency continuance intention (CCI).*

2.2.5   Overconfidence as a mediator between predictors and continuance intention

Overconfidence refers to the tendency of individuals to overestimate their actual ability, performance, level of control, or opportunity for success (Czaja and Röder, 2020). In part, it might be characterised as an excessive reliance on convictions, intuition, expertise, erudition, familiarity, and individual attributes (Abdin et al., 2022). Overconfidence arises when decision-makers or financial investors display excessive optimism in their initial evaluation of a situation and subsequently fail to incorporate supplementary information into their judgement due to their overconfidence (Busenitz and Barney, 1997). Investor overconfidence is characterised by irrational decision-making (Ahmad, 2024), a reduced inclination to seek financial advice (Hsu, 2022), a tendency to trade higher-risk investments (Merkle, 2017), engaging in high-frequency trading (Czaja and Röder, 2020), and being influenced more by past success than failure,

as well as experiencing poor financial performance in the future (Czaja and Röder, 2020). Prior research also provides evidence that excessive self-assurance can make individual investors susceptible to financial fraud (Gamble et al., 2015; Xiao et al., 2022).

Overconfidence serves as a mediator between individual negligent behaviour, such as financial naivety, compulsive buying, excessive gaming, and CCI decisions. This means that when individual investors engage in negligent behaviour, it can increase overconfidence, ultimately resulting in irrational decisions regarding risky investments. Khan et al. (2019) have demonstrated that overconfidence acts as a mediator between historical portfolio results and investing behaviour. The possible mediating influence of overconfidence leads investors to deviate from making logical investments in trading, risk-taking, and asset allocation decisions, ultimately leading to adverse investment outcomes. Moreover, excessive self-assurance acting as an intermediary leads to unwise investment actions, such as engaging in excessive trading, making risky investments in shares, and failing to diversify asset holdings (Khan et al., 2019). According to the above reasoning, the hypotheses are

H5a: Overconfidence mediates the influence of financial naivety (FN) on cryptocurrency continuance intention (CCI).

H5b: Overconfidence mediates the influence of compulsive buying (CB) on cryptocurrency continuance intention (CCI).

H5c: Overconfidence mediates the influence of Excessive gaming (EG) on cryptocurrency continuance intention (CCI).

3 Methodology

3.1 Sample selection and questionnaire study

The study's sample consisted of 1097 Indonesian respondents who were active crypto owners within the past year. There were 549 men and 548 women surveyed to evaluate the determinants of continued crypto investment among crypto owners. The questionnaire was distributed from mid to late August 2023 for two weeks. This period coincides with the resumption of all communal and economic activities following the government's lifting of the COVID-19 pandemic status at the end of June 2023 (Setkab, 2023). Participants who complete the survey will be rewarded with a GoPay/OVO coupon valued at 10,000 Rupiah or around USD 0.65. The survey was disseminated to 1968 participants who has made investments in cryptocurrencies. This study excluded 54 participants who did not fulfil the requirements of being crypto owners since previous year. The automatic rejection system affected 714 respondents who failed to meet the specified time limit for completing the questionnaire or did not pass the validation questions, which involved basic mathematical additions. This suggests that these respondents may not have completed the questionnaire with full awareness. This study employs many demographic parameters to mitigate the potential bias in sample selection. The quantity of male and female participants is equal. Further, the participant's residence is restricted to five provinces in Indonesia with the highest number and proportion of internet users. These provinces are Jakarta, West Java, Central Java, East Java, and North Sumatra (APJII, 2023). The age category is restricted to individuals aged 20 to 50 years.

The questionnaire was planned in multiple stages to enhance the sample's representativeness of the research population. First, this study employs the findings from the 2023 survey conducted by the Association of Indonesian Internet Service Providers (APJII) to identify the geographical areas in Indonesia with the highest number of internet users (Table 2). Five provinces with the highest internet users in Indonesia were chosen as representative samples of the research population. According to Stix (2021), cryptocurrency owners use the internet actively on a weekly basis. Table 2 demonstrates that the five provinces chosen as samples account for 56.90% of Indonesia's internet users' overall contribution.

Table 2   Largest internet users in Indonesia by province

Top 5 provinces' internet users contribution	*Contribution* (%)	Internet penetration (%)
Jakarta and its surroundings	4.33	86.96
West Java	18.93	82.73
Central Java	13.36	77.54
East Java	15.58	81.26
North Sumatra	4.70	67.12
Total contribution	56.90	
Average of internet penetration		79.12

Source: Association of Indonesian Internet Service Providers (APJII, 2023)

Next, ascertain the sample frame step, which involves identifying the population elements that are eligible to be chosen as samples in the survey. Questionnaires are distributed exclusively to registered and validated users in a centralised database maintained by a reputable survey service institution. The institution is officially enrolled with the ESOMAR membership group. Further, random probability sampling ensures that all respondents in the database have an equal chance of being selected as the sample. The surveys were distributed concurrently to 1200 respondents through the surveyor services institution's application. Participants who did not match the specified criteria were excluded from the sample.

This study employs partial least squares (PLS) methodology to ascertain the impact of financial naivety, compulsive buying, and excessive gaming on CCI. All primary variables in this study were measured using a five-point Likert scale. Partial least squares (PLS) has the benefit of utilising mediating variables to examine the indirect impact between independent and dependent variables. The minimum sample size can be determined using the procedure in WarpPLS by providing the following parameters: a minimum absolute significant path coefficient of 0.121, a significance level of 0.05 for hypothesis testing, and a needed power level of 0.8 (Kock, 2018). The results indicate a sample size ranging from 409 to 423, with a minimum value. The study included a sample size of 1200 respondents, which is believed to have surpassed the necessary criteria.

The questionnaire is segmented into four distinct sections. First, the primary validation question pertains to individuals who have possessed cryptocurrency within the previous year. Failure to meet the requirements will result in the termination of the survey. Second, the demographic data encompasses gender, city of residence, age,

education, wealth, and level of comprehension regarding cryptocurrency. Third, a validation question will be presented in the form of a basic mathematical addition. Respondents who respond accurately to the questions will be rendered eligible. Finally, the final fundamental questions are financial naivety, compulsive buying, excessive gaming, overconfidence, risk tolerance, and continuance intention.

The questionnaire utilised in the prior study was translated into Indonesian and subsequently adjusted to align with the research objectives. Moreover, a pilot study involving 30 participants who were not part of the main sample was conducted to assess the accuracy and consistency of the questionnaire items. In the end, the questionnaire was rendered into English once again with the intention of publishing it.

3.2 Definition of variables and model analysis

A five-point Likert scale is employed in this study to assess the dependent, predictors, and mediating variables. Table 3 shows the definitions of variables and indicators.

3.2.1 Dependent variable

The dependent variable is CCI, particularly the dedication of crypto owners to maintaining their investment in cryptocurrency going forward. A five-point Likert scale was utilised to quantify CCI. The CCI indicator modified from Bhattacherjee (2001) and Cheng (2023) following the research objective to ascertain the future continuity of crypto investment.

3.2.2 Mediating variables

This study incorporates two mediating variables, specifically risk tolerance and overconfidence. The overconfidence (OV) quantifies an individual's propensity to overestimate his capabilities. Moreover, overconfidence bias refers to investor confidence in their ability to forecast the irrational and unsubstantiated market (Abdin et al., 2022; Hossain and Siddiqua, 2022). Following the definition provided by Rieger et al. (2022), an individual tends to regard his abilities as surpassing most others. Risk tolerance (RT) refers to the propensity of individuals to engage in or embrace investments that entail a higher degree of risk in comparison to others (Rahman et al., 2020); it also encompasses an individual's preparedness to undertake risks (Abdin et al., 2022). The RT indicator, a derivative of the study conducted by Rahman et al. (2020) and Abdin et al. (2022), primarily investigates the risk associated with investing in equities, in contrast to the subject matter of this study, cryptocurrency investment.

3.2.3 Predictors variables

In this study, financial naivety (FN), compulsive buying (CB), and excessive gaming (EG) serve as predictor variables. Financial naivety (FN) refers to the prejudiced conduct of individuals who disregard the possibility of fraudulent activities or unwarranted excessive profits (Kawamura et al., 2021). Four of the FN measurement indicators are alterations of items from Kawamura et al. (2021); the remaining two items were formulated following the variable definition. Compulsive buying (CB) is characterised by the irrational desire to purchase a product without first considering whether or not it is

necessary. Uncontrolled CB can result in negative outcomes (Sharif and Khanekharab, 2017; Chen et al., 2019). The compulsive buying (CB) metric is derived from the indicators utilised in Sharif et al. (2022) and She et al. (2021). Excessive gaming frequently correlates with persistent online gaming behaviour that substantially diminishes personal quality (King and Delfabbro, 2018). This includes activities such as allocating a substantial portion of one's income to gaming, overindulging, and devoting excessive time to gaming. Measures of internet gaming disorder were applied to excessive gaming based on the research of Király et al. (2015).

3.2.4 *Demographic variables*

The study incorporated the following demographic variables: gender, province of residence, age, level of education, and comprehension of cryptocurrency. In order to reduce sample selection bias, demographic variables restrict particular demographic criteria. First, prior to other considerations, it is important to achieve gender balance in the study to guarantee that the test outcomes are not influenced by gender bias. Further, the domicile of the respondents is restricted to the five provinces with the highest number of internet users. Third, the specified age range is restricted to individuals of productive age, specifically between 20–50 years. Fourth, occupation encompasses a wide range of labour types. Fifth, the respondent's degree of wealth is indicative of all wealth levels. Ultimately, the respondents' varying degrees of comprehension are reflected in the level of crypto understanding category. Consistent with prior studies that have established a correlation between cryptocurrency investment and demographic factors, including gender, age, education, wealth, and occupation (Fujiki, 2020; Khan, 2023).

Table 3   Definition of variables and indicators

Construct	Indicators	Code
	Dependent variable	
Crypto continuance intention	(1) I plan to keep investing in cryptocurrency instead of stopping to use them	CCI
	(2) In the future, I will regularly put money into cryptocurrency	
	(3) I will be making a lot of investments in cryptocurrency in the future	
	(4) I plan to keep engaging in cryptocurrency instead of using any other method	
	Mediating variables	
Risk tolerance	(1) I will put a lot of money into cryptocurrency	RT
	(2) I am ready to take financial risks if it means my assets will grow a lot	
	(3) I take chances when it comes to money	
	(4) I am ready to borrow money to make an investment if I think it will make me money	
	(5) I think I need to take more financial chances if I want to improve my finances	
	(6) I am ready to take a chance and lose money if there is a chance I could make money	

Table 3 Definition of variables and indicators (continued)

Construct	Indicators	Code
Overconfidence	(1) I am more sure about my investment in cryptocurrency than anyone else	OV
	(2) I believe that my talents and knowledge surpass the potential of the cryptocurrency market	
	(3) I achieved success in investing while others encountered failure	
	(4) I believe I can control my abilities so that my chosen investment outperforms the market	
	Predictor variables	
Financial Naivety	(1) It is attracted to me when a trusted financial advisor takes care of your money for a 0.2% monthly fee	FN
	(2) I am attracted in investing in cryptocurrency, which could increase more quickly than stocks	
	(3) I am attracted in investing in cryptocurrency with many ups and downs	
	(4) I am attracted in investing in cryptocurrency, which is said to have very high profits	
	(5) I agree that all buyers should try investing in cryptocurrency, even though the price changes a lot	
	(6) I am attracted in investing in cryptocurrency, even though there is a higher chance of fraud than with stocks	
Compulsive buying	(1) When I see something I want online, I often buy it without planning	CB
	(2) Shopping online helps me unwind and forget about my troubles	
	(3) Even when I have little money left, I often buy things I do not need	
Excessive gaming	(1) How often do you feel antsy, angry, or worried when you do not play games as much as usual?	EG
	(2) How many times have you tried to cut down on your game time in the past year but failed?	
	(3) Do you play a lot even though it hurts you (e.g., you do not get enough sleep, do not do well at school or work, or get into fights with family and friends)?	
	(4) How often do you try to make family or friends without them knowing how much you play games or if you tell them lies about them?	
	(5) How often have you messed up your work or school grades by playing games in the past year?	

Research model:

$$CCI = \eta\beta + \beta1OV + \beta2RT + \varepsilon \qquad (1)$$

$$RT = \eta\beta + \beta1OV + \beta2FN + \beta3CB + \beta4EG + \varepsilon \qquad (2)$$

$$OV = \eta\beta + \beta1FN + \beta2CB + \beta3EG + \varepsilon \qquad (3)$$

CCI = Cryptocurrency continuance intention

$\eta\beta$ = Constant coefficient

OV = Overconfident

RT = Risk tolerance

FN = Financial naivety

CB = Compulsive Buying

EG = Excessive gaming

ε = Error

4   Empirical result

4.1   *Demographic and descriptive statistics*

Table 4 presents the demographic statistics, which reveal several attributes of the participants in this study. The gender composition exhibits equal representation of males and females, with each gender comprising 50% of the total. The majority of responders, comprising 91%, fall between the age range of 20–40 years. The majority of respondents in this study, accounting for 62%, have completed either a diploma or undergraduate level of education. On the other hand, 31% of respondents have a high school degree or below. West Java province has the highest proportion, accounting for 30% of the total based on area of habitation. The numbers shown reflect the population data for 2022, indicating that West Java has the highest population among the four provinces (BPS, 2023). The primary sources of household income reported by respondents in this study are salaries and business profits, accounting for 92% of the total.

Table 4   Demographic characteristics of the respondents

Characteristics	*Number* ($N = 1097$)	*Percentage*
Gender		
Male	549	0.50
Female	548	0.50
Age		
20–24 years	286	0.27
25–30 years	319	0.29
31–35 years	244	0.22
36–40 years	139	0.13
41–45 years	82	0.07
46–50 years	27	0.02

Table 4   Demographic characteristics of the respondents (continued)

Characteristics	Number (N = 1097)	Percentage
Education level		
High school	340	0.31
Diploma/Undergraduate	684	0.62
Graduate	73	0.07
Domicile		
Jakarta and surrounding	307	0.28
West Java	326	0.30
Central Java	141	0.13
East Java	213	0.19
North Sumatra	110	0.10
The main source of household income		
Salary	756	0.69
Business profits	250	0.23
Investment return	78	0.07
Buying and selling or renting buildings	13	0.01
Cryptocurrency knowledge level		
Expertise	45	0.04
Thorough knowledge	416	0.38
Basic knowledge	602	0.55
Have no knowledge	34	0.03

4.2   Hypothesis result

The assessment of the quality of the variables in Table 5 employs the model criteria established by Hair et al. (2021). The Cronbach's α values range from 0.778 to 0.915, which aligns with the requirement of being greater than or equal to 0.70. The composite reliability (CR) value indicates that the criteria for each component exceed 0.7, specifically ranging from 0.871 to 0.934. In order to achieve the criteria, each component's average variance extracted (AVE) must be above the threshold of 0.50. The component values fall within the range of 0.679 to 0.769 that meets the specified criteria. The loading component has a weight ranging from 0.724 to 0.910, which satisfies the requirement of being greater than or equal to 0.70. This suggests that each variable can explain the component's measurement model.

Table 6 displays the correlation matrix used to determine criteria according to Fornell and Larcker's (1981) methodology. The square roots of AVE's in each construct (bold letters) exceed those in the horizontal and vertical row constructs. These findings suggest that each variable possesses discriminant validity and can be effectively utilised to analyse structural equation models.

Table 5   Measures of internal consistency reliability, and convergent validity

Constructs	Items	Loading	Cronbach's α	CR	AVE
Cryptocurrency Continuance intention(CCI)	CCI1	0.839	0.899	0.930	0.769
	CCI2	0.907			
	CCI3	0.910			
	CCI4	0.850			
Risk tolerance (RT)	RT1	0.820	0.915	0.934	0.703
	RT2	0.864			
	RT3	0.846			
	RT4	0.782			
	RT5	0.848			
	RT6	0.868			
Overconfidence (OV)	OV1	0.858	0.896	0.928	0.762
	OV2	0.883			
	OV3	0.856			
	OV4	0.895			
Financial naivety (FN)	FN1	0.724	0.905	0.927	0.679
	FN2	0.837			
	FN3	0.857			
	FN4	0.843			
	FN5	0.845			
	FN6	0.830			
Compulsive buying (CB)	CB1	0.871	0.778	0.871	0.693
	CB2	0.814			
	CB3	0.811			
Excessive gaming (EG)	EG1	0.861	0.912	0.934	0.740
	EG2	0.808			
	EG3	0.869			
	EG4	0.886			
	EG5	0.876			

Table 6   Fornell–Larcker criterion analysis

	Correlation matrix					
Construct	CCI	RT	OV	FN	CB	EG
CCI	**0.877**					
RT	0.749	**0.839**				
OV	0.744	0.734	**0.827**			
FN	0.747	0.729	0.803	**0.824**		
CB	0.399	0.474	0.500	0.499	**0.832**	
EG	0.328	0.457	0.440	0.398	0.661	**0.860**

The variance inflation factor (VIF) in Table 7 shows whether the presence of multicollinearity in the model. The VIF score falls within the range of 1.601–3.493, which is still within the acceptable threshold of 10. This indicates that there is no causal association between the predictor variables in the model. The structural path coefficient is employed to assess the path coefficient and p-value, using significance levels of 1%, 5%, and 10% as criteria.

Figure 2 and Table 7 demonstrate that the data analysis directly supports six out of the nine hypotheses. H1a: Financial naivety (FN) has a positive effect on CCI at a significance level of 0.01 ($\beta = 0.287$, p-value < 0.001). H1b: Financial naivety (FN) has a positive effect on risk tolerance (RT) at a significance level of 0.01 ($\beta = 0.399$, p-value < 0.001). H1c: Financial naivety (FN) has a positive effect on Overconfidence (OV) at a significance level of 0.01 ($\beta = 0.722$, p-value < 0.001). H3a: Excessive gaming (EG) has a positive effect on cryptocurrency continuance intention (CCI) at a significance level of 0.01 ($\beta = 0.084$, p value = 0.003). H3b: Excessive gaming (EG) has a positive effect on Risk tolerance (RT) at a significance level of 0.01 ($\beta = 0.120$, p-value < 0.001). H3c: Excessive gaming (EG) has a positive effect on overconfidence (OV) at a significance level of 0.01 ($\beta = 0.126$, p-value < 0.001). Three additional hypotheses pertaining to Compulsive purchasing (CB) were shown to be statistically insignificant, specifically H2a, H2b, and H2c.

Figure 2 Structural model testing
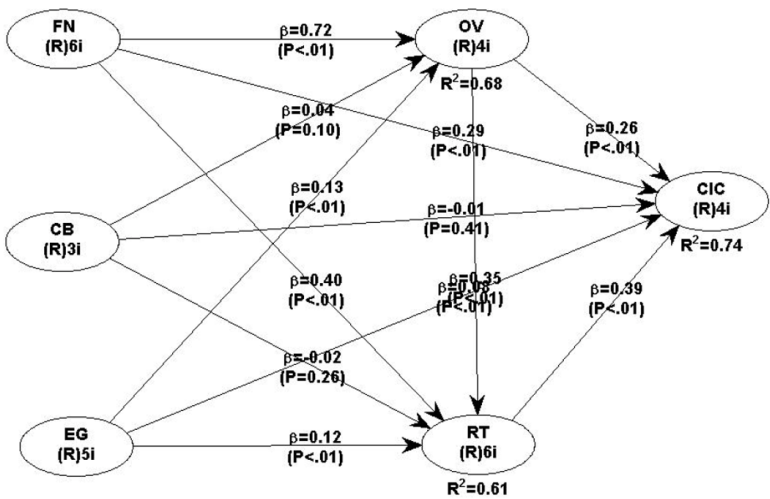
Four of the six hypotheses are supported by the data analysis for indirect relationships in Table 8. H4a: Financial naivety (FN) influences CCI through Risk tolerance (RT) at a significance level of 0.01 ($\beta = 0.154$, p-value < 0.001). H4c: Excessive gaming (EG) influences CCI through Risk tolerance (RT) at a significance level of 0.01 ($\beta = 0.0463$, p-value = 0.004). H5a: Financial naivety (FN) influences CCI through Overconfidence (OV) at a significance level of 0.01 ($\beta = 0.188$, p-value < 0.001). H5c: Excessive gaming (EG) influences Crypto continuance intention (CCI) through Overconfidence (OV) at a significance level of 0.01 ($\beta = 0.0329$, p-value = 0.004). H4b and H5b, two additional hypotheses pertaining to compulsive buying (CB), were found to be statistically insignificant.

Table 7 Hypotheses testing – direct effect

Hypotheses	Paths	Coefficient (β) – direct effect	P values	VIF	Remarks
H1a	FN → CCI	0.287	<0.001***	3.493	Supported
H1b	FN → RT	0.399	<0.001***	3.323	Supported
H1c	FN → OV	0.722	<0.001***	1.601	Supported
H2a	CB → CCI	−0.007	0.412	2.839	Not supported
H2b	CB → RT	−0.019	0.263	2.887	Not supported
H2c	CB → OV	0.038	0.105	2.777	Not supported
H3a	EG → CCI	0.084	0.003***	2.694	Supported
H3b	EG → RT	0.120	<0.001***	2.650	Supported
H3c	EG → OV	0.126	<0.001***	2.518	Supported

*$p < 0.10$, **$p < 0.05$ ***$p < 0.001$. FN = Financial Naivety, CCI = Cryptocurrency continuance intention (CCI), RT = Risk tolerance, OV = Overconfidence, CB = Compulsive buying, EG = Excessive gaming.

Table 8 Hypotheses testing – indirect effect and total effect

Hypotheses	Paths	Coefficient (β) – indirect effect	P values	Remarks	Coefficient (β) – total effect
H4a	FN → RT → CCI	0.154	<0.001***	Supported	0.441
H4b	CB → RT → CCI	−0.0073	0.467	Not supported	−0.0143
H4c	EG → RT → CCI	0.0463	0.004***	Supported	0.1303
H5a	FN → OV → CCI	0.188	<0.001***	Supported	0.475
H5b	CB → OV → CCI	0.0099	0.467	Not supported	0.0029
H5c	EG → OV → CCI	0.0329	0.004***	Supported	0.1169

*$p < 0.10$, **$p < 0.05$ ***$p < 0.001$. FN = Financial Naivety, CCI = Cryptocurrency continuance intention (CCI), RT = Risk tolerance, OV = Overconfidence, CB = Compulsive buying, EG = Excessive gaming.

The Stone-Geisser Q2 metric is utilised to assess a model's predictive relevance. A Q2 value greater than zero (>0) signifies that the value has been accurately reconstructed and that the model possesses predictive validity. The Q2 variable CCI is 0.668, risk tolerance (RT) 0.607, and overconfidence (OV) 0.671, greater than zero, so it is relevant to the predictive validity of the model. The adjusted R-squared of CCI is 0.734, risk tolerance (RT) is 0.609, and overconfidence (OV) is 0.676. This provides evidence for the predictive value of endogenous constructs incorporated into the model. The standard deviation of the root mean square residual (SRMR) is less than 0.08 (Henseler et al., 2016). As indicated by the SRMR of 0.061 in the test results, the model has satisfied the specified criteria.

5   Discussion

The Dunning-Kruger effect and overconfidence theories guide model development. This study elaborates the association among financial naivety, compulsive buying, excessive gaming, and the continuance intention in Indonesia. Firli and Dalilah's (2021) study of personal financial conduct based on psychological factors discovered that financial attitude has an impact on personal financial behaviour. This study uncovered numerous fascinating findings when examining the relationship between behavioural bias and investment decision. These findings were subsequently elucidated through the Dunning-Kruger effect and overconfidence theories. Financial naivety has been shown to have a positive effect on continuance intention via direct or indirect mechanisms, including increased risk tolerance or overconfidence. The findings suggest that investors' financial naiveté elevates their risk tolerance, which increases the possibility of attaining long-term investment in cryptocurrency. Further, these results indicate that overconfidence is exacerbated by financial naivety, thereby increasing the likelihood of CCI. In line with the findings of Lev et al. (2022) and Kawamura et al. (2021), investors' naivety often stems from their desire to surpass current economic conditions, leading them to exhibit boldness and inattention in financial matters. According to Nathani et al. (2023), investors' decision-making and heuristics attitude are highly associated, suggesting that investors' heuristics attitude affects their investment choices. Moreover, this study has shown that excessive gaming has a beneficial effect on investment continuity intention. This is achieved through direct or indirect mechanisms that involve risk tolerance or overconfidence. The findings indicate that engaging in excessive gaming increases individuals' willingness to take risks, which in turn increases the probability of them making investments in cryptocurrency. The results indicate that an investor's propensity for engaging in excessive gaming activities fosters overconfidence, which in turn enhances the prospects for long-term investment in cryptocurrency. Consistent with Oksanen et al. (2022a), cryptocurrency investors spend more time gaming, gambling, and using the internet than investors in traditional assets. Oksanen et al. (2022a) discovered a strong association between Bitcoin market participants and excessive gaming and internet consumption. Conversely, this study fail to substantiate the correlation between compulsive buying and CCI, whether mediated by risk tolerance or overconfidence.

6   Conclusion, implication, and limitation

This study investigates the relationship between financial naivety, online compulsive buying, excessive gaming, and crypto continuation intention in Indonesia. This study is one of the few that investigates the connection between CCI and external factors, such as risk tolerance and overconfidence, which act as mediators. Financial naivety has been demonstrated to have a favourable effect on continuance intention through direct or indirect processes such as higher risk tolerance or overconfidence. The findings show that investors' financial naiveté enhances their risk tolerance, increasing the likelihood of long-term investment in cryptocurrencies. Furthermore, these findings show that financial naivety exacerbates overconfidence, increasing the chance of cryptocurrency continuation intentions. Furthermore, this study found that excessive gaming had a positive impact on investment continuity intentions through either a direct or indirect effect, such as risk tolerance or overconfidence. The findings show that excessive gaming

behaviour boosts individual's willingness to take risks, which raises the likelihood that they will invest in cryptocurrencies. The findings suggest that an investor's tendency for excessive gaming activities promotes overconfidence, which improves the possibilities for long-term investment in cryptocurrencies. In contrast, our study fails to support the link between compulsive buying and cryptocurrency continuation intention, whether mediated by risk tolerance or overconfidence.

6.1   Practical implication

This study aims to address the lack of previous research on continuity intention in cryptocurrency. Its objective is to offer investors valuable insights into the psychological consequences of certain behaviours on investment decisions related to cryptocurrency. In order to mitigate the risk of financial naiveté, investors must first engage in a consistent process of gathering diverse information about cryptocurrency. Investors must consistently forecast and assess the rapidly changing attributes of the cryptocurrency market. Further, excessive gaming behaviour may impair the focus and vigilance of investors when it comes to cryptocurrency-related decision-making. In order to prevent investment decisions in cryptocurrency from becoming skewed, excessive gaming behaviour among investors must be minimised. Research has shown that excessive gaming behaviour and financial naivety contribute to elevated risk tolerance and a tendency for investors to possess overconfident self-assurance regarding their actual capabilities. Lastly, in order to safeguard novice personal investors from financial loss resulting from overly optimistic suggestions or impracticable anticipations, the government must take precautions. Education regarding financial literacy is regarded as the primary safeguard against fraud and conjecture for the general public, including youth.

6.2   Limitation and future research

Several limitations cannot be disregarded despite the fact that this investigation has been meticulously planned and executed. Initially, the respondent sample was restricted to Indonesia only. This may cause disparities in the findings of international studies examining the investment behaviour of cryptocurrency. Second, it is essential to note that the survey was executed amidst a period of rising cryptocurrency market value. Consequently, the test results are limited to describing short-term trends. Finally, most respondents were between the ages of 20 and 40, which diminished the diversity of perspectives.

Several nations propose to issue central bank digital currency (CBDC), including Indonesia, which is currently testing the digital rupiah system. Future research needs to analyse the impact of CBDCs on cryptocurrencies. In addition, future research should examine how changing government laws affect behavioural intentions.

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