



WHEN ENGAGEMENT BACKFIRES: GAMIFICATION AND SUSCEPTIBILITY TO FINANCIAL MISINFORMATION

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This paper examines five theoretically motivated predictors of susceptibility: gamified financial literacy engagement, subjective financial literacy, emotion regulation, information framing preferences, and cognitive ability. These predictors are embedded within a dual process framework and tested using OLS regression with heteroscedasticity-consistent standard errors on survey data from N = 89 university-affiliated respondents in Indonesia. Two unexpected findings are reported. First, engagement with gamified financial literacy programs is positively and significantly associated with susceptibility, contrary to the hypothesized direction, interpreted as a gamification engagement-without-depth effect consistent with self-determination theory and the Dunning-Kruger literature on overconfidence. Second, information framing preferences are also positively associated, reflecting a ceiling effect and a loss-sensitivity dimension linked to financial anxiety. Financial literacy is negatively associated at a marginal level, while females are less susceptible than males. Objective financial knowledge shows near-zero predictive power, suggesting factual knowledge does not reduce susceptibility. Implications for financial education, consumer protection, and measurement are discussed.

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INTRODUCTION

The financial marketplace is saturated with information of widely varying quality. At one end of the spectrum lies careful, evidence-based financial analysis; at the other lies what (Frankfurt, 2005) termed bullshit, assertions presented with confidence and apparent meaningfulness but without regard for evidentiary truth. In the financial domain, such misinformation is ubiquitous: it appears in social media posts promising unrealistic investment returns, in marketing copy for complex financial products, and in narratives surrounding investment fads (Spicer, 2017). The consequences are not trivial. Individuals susceptible to financial misinformation are less financially secure, more financially anxious, and more likely to make

decisions that erode long-term wealth (Kienzler et al., 2022; Lusardi & Mitchell, 2014).

Kienzler et al. (2022) made a foundational contribution by developing and validating a Financial Bullshit Scale (FBS), demonstrating that susceptibility to financial misinformation is a stable, measurable individual difference that predicts financial well-being above and beyond financial knowledge, numeracy, and cognitive reflection. Their work raises a natural follow-up question: what factors drive susceptibility, and which are amenable to intervention? This question has both theoretical and policy relevance. Regulatory initiatives such as the Financial Services Authority of Indonesia's (OJK) national financial literacy strategy explicitly aim to reduce financial vulnerability through education, but the mechanisms by which

education translates (or fails to translate) into reduced susceptibility are poorly understood.

This study examines five theoretically motivated predictors of susceptibility: (1) gamified financial literacy engagement, (2) subjective financial literacy, (3) emotion regulation, (4) information framing preferences, and (5) cognitive ability. We situate these predictors within a dual-process theoretical framework (Evans, 2008; Kahneman, 2011, 2013) that distinguishes between fast, heuristic, affectively driven processing (System 1), which financial misinformation characteristically exploits, and slow, deliberative, analytically driven processing (System 2), which constitutes the primary cognitive defence. The paper is conducted in Indonesia, an important emerging market where financial literacy remains among the lowest in Asia (Demirgüç-Kunt et al., 2018), yet the uptake of gamified financial applications has grown explosively, and exposure to financial misinformation has reached a scale that is impossible to ignore.

The decision to sample from a university-affiliated population is theoretically motivated rather than merely convenient. This demographic constitutes the fastest-growing and most digitally active segment of Indonesian retail investors and is disproportionately exposed to financial misinformation through social media, investment applications, and peer networks. Data from Indonesia's Central Securities Depository KSEI (2022) show that the number of individual investor accounts grew from approximately 2.48 million in 2019 to 10.88 million by the end of 2022, an increase of 339% in three years, with around 60% of new account holders under the age of 30 and holding at least a tertiary education. This cohort is simultaneously the most enthusiastic adopter of gamified investment platforms and the most heavily targeted by financial misinformation campaigns conducted through the same digital channels.

The concrete stakes are illustrated by two landmark Indonesian cases. The Binomo trading platform case is the most prominent example: Binomo, an offshore binary options platform classified as illegal by OJK, was aggressively marketed to young Indonesians as a fast route to wealth through a network of social media affiliates. The case came to a head in early 2022, when celebrity influencer Indra Kenz, who had amassed millions of followers across Instagram and YouTube by promoting the platform, was arrested on fraud charges, with estimated victim losses totalling tens of billions of rupiah (OJK, 2022). A parallel wave of robot-trading scam automated systems marketed under names such as Fahrenheit, VIP88, and ATG, promising fixed monthly returns of 10–20%, similarly targeted young Indonesians through WhatsApp networks

and social media. The Commodity Futures Trading Regulatory Agency (BAPPEBTI) blocked dozens of such platforms between 2021 and 2023. What is striking about both cases is that the victims were not naïve or financially excluded: many were university students and young graduates who had been introduced to investing through the same social media channels that delivered the fraudulent content. This pattern, digitally literate, financially engaged, yet highly susceptible, is precisely the profile this study seeks to understand.

OJK (2022) National Survey on Financial Literacy and Inclusion provides institutional context for this pattern: while financial inclusion reached 85.1%, financial literacy stood at only 49.7% a gap OJK terms "financial inclusion without literacy," describing a population that participates in financial markets without the capacity to evaluate what it encounters there. Among tertiary-educated adults, literacy is higher but demonstrably incomplete, and the OJK survey documents that even this group is substantially vulnerable to misleading financial claims. Sampling university respondents thus provides a conservative estimate of susceptibility within a relatively advantaged population; the problem in the broader public is almost certainly more acute.

Our findings yield two unexpected but theoretically coherent results. Engagement with gamified financial literacy programs significantly increases susceptibility to financial misinformation. And preferences for structured, loss-framed information are similarly associated with greater susceptibility. We argue that these results, far from being anomalies, reveal important mechanisms: gamification, as typically implemented, engages System 1 (reward-seeking, social comparison, entertainment) without consistently activating System 2's critical evaluation, which protects against misinformation. Information framing preferences, meanwhile, partly reflect financial anxiety rather than analytical sophistication, and anxiety is a System 1 state that heightens rather than reduces susceptibility to emotionally salient financial claims.

The contribution of this paper is fourfold: (i) we extend the Kienzler et al. (2022) framework to a non-Western, emerging-market context; (ii) we introduce gamified financial literacy engagement and information framing preferences as novel predictors; (iii) we demonstrate that objective financial knowledge offers essentially no independent protective effect against susceptibility, consistent with Kienzler et al.'s thesis that the construct has affective rather than purely informational roots; and (iv) we propose a dual-process interpretation of all five predictors that generates clear hypotheses for future experimental research.

HYPOTHESES DEVELOPMENT

Financial Misinformation and Dual-Process Theory

System 1 is fast, automatic, and associative, generating judgments based on familiarity, fluency, and affective resonance rather than careful analysis (Kahneman, 2011, 2013). Financial misinformation succeeds, in large part, by exploiting these cognitive shortcuts. System 2, by contrast, is slow, deliberate, and rule-governed; it is the cognitive system responsible for evaluating the logical consistency of claims and for overriding heuristic responses when they are unreliable. Financial is, at its core, a System 1 phenomenon: it feels right before it can be evaluated (Pennycook et al., 2015).

A dual-process account suggests that individual differences in System 2 engagement predict resistance to heuristic errors (Evans, 2008; Stanovich, 2011). This account predicts that individual characteristics which promote System 2 engagement should reduce susceptibility to financial misinformation, while characteristics that anchor individuals in System 1 processing should increase it. We apply this framework to structure five hypotheses below.

The susceptibility construct measured in this study is operationalized as a self-report scale capturing the tendency to accept financial information uncritically, to be unable to distinguish valid from misleading financial advice, to follow investment trends without understanding underlying risks, and to feel confident in decisions despite incomplete information. This approach differs from Kienzler et al. (2022) behavioural approach and is subject to social desirability bias (Paulhus, 1991). Respondents are aware they are reporting on their own credulity, which likely suppresses scores and restricts variance. This is acknowledged as a primary limitation.

Gamified Financial Literacy

Gamification has been widely adopted in financial education, both by edtech startups and by financial institutions seeking to increase engagement with their products (Landers, 2014; Rodrigues et al., 2017). The theoretical rationale for gamification's educational benefits draws primarily from self-determination theory (Deci & Ryan, 2000a): when gamification supports intrinsic motivation, it can promote deep learning and durable knowledge acquisition. (Hamari et al., 2014), in a systematic review of 24 empirical studies, found that gamification generally produces positive educational outcomes, though effects are moderated by the context and the type of motivation activated. From a dual-process perspective, a gamification program that successfully promotes System 2 engagement

should reduce susceptibility. We therefore hypothesize:

H1: Engagement with gamified financial literacy programs is associated with lower susceptibility to financial misinformation.

Financial Literacy

Financial literacy is the most extensively studied predictor of financial decision quality (Lusardi & Mitchell, 2014). Individuals with higher financial knowledge are better equipped to evaluate the logical plausibility of financial claims, to recognise implausible return promises, and to apply actuarial reasoning to financial products. (Kienzler et al., 2022) found that objective financial knowledge was significantly positively correlated with the ability to distinguish financial bullshit from genuine statements. Subjective financial knowledge is conceptually related but empirically imperfect as a proxy, given well-documented overconfidence effects (Atir et al., 2015; Barber & Odean, 2001) Nevertheless, consistent with the dual-process framework in which financial literacy strengthens System 2 capacity, we hypothesize:

H2: Higher financial literacy is associated with lower susceptibility to financial misinformation.

Emotion Regulation

Emotion regulation refers to the capacity to recognize, understand, and modulate emotional responses (Gross & John, 2003). Financial decisions are frequently emotionally charged: fear of loss, excitement about potential gains, and social pressure from peers can all overwhelm deliberative reasoning. (Peterson, 2007) documents how emotional states, particularly fear and greed, impair financial judgment by activating amygdala-driven responses that crowd out prefrontal, System 2 processing. (Parise & Peijnenburg, 2019) show that noncognitive abilities, including emotional stability, are independently predictive of financial distress in large representative samples. Individuals with higher emotion regulation capacity should be better positioned to maintain System 2 dominance when confronted with emotionally salient financial claims. We hypothesize:

H3: Higher emotion regulation capacity is associated with lower susceptibility to financial misinformation.

Information Framing Preferences

Kahneman and Tversky's (1979) prospect theory and the associated framing literature (Levin et al., 1998; Tversky & Kahneman, 1981)

demonstrate that the way information is presented, in particular, whether outcomes are framed as gains or losses, substantially influences choice, independently of the objective content. From a dual-process perspective, loss-framed information can engage more scrutiny because losses are motivationally potent: prospect theory's loss aversion implies that potential losses attract more cognitive resources than equivalent gains (Kahneman, 2011). Separately, clearer and more structured information presentation has been linked to reduced cognitive overload, better comprehension, and improved decision quality (Johnson et al., 1991). Individuals who prefer such presentations might engage in more systematic information processing and therefore exhibit lower susceptibility. We hypothesize:

- H4: Stronger preferences for clear and loss-framed information presentation are associated with lower susceptibility to financial misinformation.

Cognitive Ability (H5)

Cognitive ability is consistently linked to better performance on financial and probabilistic judgment tasks (Frederick, 2005; Pennycook & Rand, 2019). (Pennycook et al., 2015) found that bullshit receptivity in the general domain is negatively associated with numeracy and verbal intelligence. (Kienzler et al., 2022) report a significant positive correlation between cognitive reflection and the ability to distinguish financial bullshit from genuine statements. In the dual-process framework, cognitive ability is the principal determinant of System 2 capacity:

- H5: Higher cognitive ability is associated with lower susceptibility to financial misinformation.

METHOD

Participants and Procedure

Data were collected via a self-administered online survey distributed to university-affiliated respondents in Indonesia. The final analytic sample comprised $N = 89$ respondents (41 male, 48 females; 46.1% and 53.9%, respectively). All respondents were university-affiliated (lecturers or students), resulting in zero variance on the education variable; consequently, education could not be included as a predictor and is omitted from all regression analyses. Regarding income, 73 respondents (82.0%) fell below the low-income threshold ($< \text{IDR } 5,000,000/\text{month}$), and 16 (18.0%) exceeded it. The survey required approximately 10–15 minutes to complete. Participation was voluntary and anonymous.

The sampling approach yields a purposive convenience sample that is not representative of

the broader Indonesian population. The homogeneity of education is both a constraint and a deliberate feature: it holds educational background constant, isolating the effects of the other predictors while generating data that speaks directly to the high-risk demographic identified above. External validity limitations are discussed in Section 6.

On sample size adequacy, we conducted a priori and post hoc power analyses using (Cohen, 2013) framework for multiple regression. The relevant effect-size metric is $f^2 = R^2/(1 - R^2)$. Post hoc analysis based on the observed $R^2 = .340$ yields $f^2 = .515$, a large effect by Cohen's benchmarks (small = .02; medium = .15; large = .35). For a model with $k = 7$ predictors at $\alpha = .05$ and power = .80, the required sample size to detect a large effect ($f^2 = .35$) is approximately $N = 49$; to detect a medium effect ($f^2 = .15$) requires $N = 103$. The present $N = 89$ therefore provides adequate power (1.00) to detect the overall model effect and adequate power for predictors with medium-to-large partial effects: post hoc power for GF (partial $r = .42$) is .99, and for IF (partial $r = .28$) is .78. Power is lower for predictors with smaller individual contributions: FL (partial $r = .19$) has estimated power of .44, which means the marginal $p = .096$ result should be interpreted cautiously, a true medium-sized FL effect cannot be reliably detected at $N = 89$. We acknowledge this limitation explicitly and note that null results for ER and CA may similarly reflect insufficient power for small effects rather than the true absence of relationships. These power constraints do not compromise the primary findings; they do warrant caution in interpreting the non-significant coefficients.

Measures

All Likert-scale constructs were measured on five-point scales ranging from 1 (Strongly Disagree / Never) to 5 (Strongly Agree / Always), with four items per construct. Construct scores were computed as the arithmetic mean of constituent items. An objective financial knowledge score was computed separately from three binary true/false questions (scored 0 = incorrect, 1 = correct), yielding a sum score ranging from 0 to 3.

Susceptibility to Financial Misinformation (SB)

Four items captured the tendency to accept financial information uncritically without verification, to be unable to distinguish valid from misleading financial advice, to follow popular investment trends without understanding their risks, and to feel confident in financial decisions despite incomplete information. Items were adapted from (Kienzler et al., 2022) to a self-

report format (Littrell et al., 2021). Cronbach's $\alpha = .817$. An important measurement caveat applies, unlike the behaviourally grounded FBS of (Kienzler et al., 2022), in which respondents rate actual financial statements without knowing which are genuine and which are pseudo-profound, our self-report items are face-valid and transparent, raising the possibility of social desirability suppression (Paulhus, 1991). The sample mean of 2.35 on a 5-point scale, well below the midpoint, is consistent with such suppression.

Gamified Financial Literacy (GF)

Four items measured self-reported engagement with and perceived benefit of gamified financial learning programs, including interactive financial applications adapted from (Rodrigues et al., 2017). Cronbach's $\alpha = .865$.

Financial Literacy (FL)

Four items measured subjective financial knowledge, including the ability to manage a household budget, calculate loan interest, plan long-term finances, and understand investment risk and return trade-offs (Lusardi & Mitchell, 2014). Cronbach's $\alpha = .831$.

Emotion Regulation (ER)

Four items assessed the capacity to remain calm, control emotional responses, evaluate feelings before financial decisions, and redirect attention from financial worries (Gross & John, 2003). Cronbach's $\alpha = .873$.

Information Framing Preferences (IF)

Four items captured preferences for receiving financial information in simple language (IF1, $M = 4.40$), for loss-framed rather than gain-framed information (IF2, $M = 3.73$), for clear and structured information when making decisions (IF3, $M = 4.36$), and for scepticism toward overly complex financial information (IF4, $M = 3.79$). Cronbach's $\alpha = .684$, the lowest in the study, reflecting the construct's heterogeneity (see Section 5.4). Items were adapted from (Kahneman, 2011) and (Johnson et al., 1991)

Cognitive Ability (CA)

Four items measured self-perceived numerical reasoning, analytical thinking before financial decisions, logical evaluation of financial information, and confidence in solving complex financial problems (Frederick, 2005) Cronbach's $\alpha = .794$.

Objective Financial Knowledge (ObjKnow)

Three binary questions assessed factual financial knowledge (correct = 1, incorrect = 0), yielding a sum score (range: 0–3, $M = 2.08$, $SD = 0.77$). These items served as a robustness check on the subjective FL measure.

Analytic Strategy

We estimated two OLS regression models. Model 1 uses subjective financial literacy (FL) as the predictor of literacy; Model 2 replaces FL with objective financial knowledge (ObjKnow) as a robustness check. All models control for gender and income; education is omitted due to zero variance. Heteroscedasticity-consistent (HC1) standard errors are reported throughout. We also computed variance inflation factors (VIF) to assess multicollinearity. Pearson correlations and descriptive statistics are reported as preliminary analyses. All analyses were conducted in Python using the stats model package (version 0.14). Python was used because it produces fully reproducible, transparent, and auditable code; the results can be independently verified by any researcher with access to the data file

RESULT AND DISCUSSION

Descriptive Statistics and Reliability

Table 1 presents descriptive statistics and internal consistency coefficients for all constructs. The susceptibility to financial misinformation scale yielded a sample mean of 2.35 ($SD = 0.90$), substantially below the scale midpoint, consistent with social desirability suppression noted above. All scales demonstrated good internal consistency ($\alpha \geq .79$) except Information Framing Preferences ($\alpha = .684$), which falls in the marginal-to-acceptable range and whose items exhibit a notable ceiling pattern (IF1: $M = 4.40$; IF3: $M = 4.36$). The objective knowledge score ($M = 2.08$ out of 3) indicates that many respondents answered most factual questions correctly, consistent with the university-educated sample.

Table 1. Descriptive Statistics, Reliability, and Construct Overview

Construct	Items	Mean	SD	Min	Max	α	Reliability
Susceptibility to Fin. Misinformation (SB)	4	2.348	0.901	1.00	5.00	0.817	Good
Gamified Financial Literacy (GF)	4	3.621	0.775	1.50	5.00	0.865	Good

Financial Literacy (FL)	4	3.860	0.722	2.00	5.00	0.831	Good
Emotion Regulation (ER)	4	3.744	0.782	1.50	5.00	0.873	Good
Information Framing Pref. (IF)	4	4.070	0.597	3.00	5.00	0.684	Marginal
Cognitive Ability (CA)	4	3.874	0.660	2.00	5.00	0.794	Good
Objective Knowledge (ObjKnow)	3	2.079	0.772	0.00	3.00	—	Binary items

Bivariate Correlations

Table 2 presents the bivariate Pearson correlation matrix. Among the most noteworthy patterns: SB is positively and significantly correlated with GF ($r = .44$, $p < .001$) and IF ($r = .27$, $p < .01$) and shows a non-significant negative correlation with FL ($r = -.14$) and CA ($r = -.08$).

Objective knowledge is uncorrelated with SB ($r = .001$), suggesting that factual financial knowledge does not straightforwardly protect against susceptibility. The constructs FL, ER, IF, and CA are substantially intercorrelated, particularly FL–ER ($r = .65$) and FL–CA ($r = .56$), indicating shared variance attributable to a general financial competence dimension.

Table 2. Means, Standard Deviations, and Pearson Correlation Matrix

	Variable	M	SD	1.	2.	3.	4.	5.	6.	7.
1.	SB	2.348	0.901	—						
2.	GF	3.621	0.775	0.443	—					
3.	FL	3.860	0.722	−0.142	0.113	—				
4.	ER	3.744	0.782	0.069	0.248	0.652	—			
5.	IF	4.070	0.597	0.273	0.327	0.400	0.563	—		
6.	CA	3.874	0.660	−0.076	0.093	0.561	0.459	0.428	—	
7.	ObjKnow	2.079	0.772	0.001	0.093	0.025	−0.065	−0.117	0.031	—

Regression Results

Table 3 presents results for both regression models. Before interpreting coefficients, we note that all VIFs were below 2.4 (range: 1.11–2.33), indicating that multicollinearity is not a concern despite the moderate bivariate intercorrelations. The full model (Model 1) explains 34.0% of the variance in SB (Adjusted $R^2 = .283$), a meaningful improvement over the controls-only model ($R^2 = .036$).

Two predictors reach conventional significance thresholds in the hypothesized direction: none. Instead, two predictors are significant in the opposite direction. Gamified Financial Literacy (GF: $\beta = .46$, $p < .001$) and Information Framing Preferences (IF: $\beta = .47$, $p = .002$) are both positively associated with susceptibility, directly contradicting H1 and H4. Financial Literacy (FL) is negatively associated at a marginal level ($\beta = -.32$, $p = .096$), providing limited support for H2. Emotion Regulation (ER: $\beta = -.06$, $p = .69$) and Cognitive Ability (CA: $\beta =$

$-.14$, $p = .43$) are not significant in Model 1, leaving H3 and H5 unsupported.

Model 2 substitutes objective financial knowledge for subjective FL. ObjKnow is essentially zero ($\beta = .003$, $p = .97$), confirming that factual financial knowledge does not predict susceptibility in this sample. However, when ObjKnow is included, the estimates for ER and CA shift toward marginal significance (ER: $\beta = -.19$, $p = .087$; CA: $\beta = -.26$, $p = .100$), suggesting these effects may have been partially masked by multicollinearity with subjective FL in Model 1.

Across both models, the gender control replicates the pattern from Kienzler et al. (2022): females are significantly less susceptible to financial misinformation than males (Model 1: $\beta = -.39$, $p = .013$; Model 2: $\beta = -.37$, $p = .022$). Income is not significant in Model 1 ($p = .383$) but is marginally significant in Model 2 ($\beta = -.30$, $p = .086$).

Table 3. OLS Regression: Determinants of Susceptibility to Financial Misinformation

Predictor	M1: Subj. FL β (SE)	p	VIF	M2: Obj. Know. β (SE)	p	VIF	Hypothesis
Gamified Fin. Literacy (GF)	0.462 (0.115)	<0.001	1.14	0.473 (0.112)	<0.001	1.13	H1 Rejected (Sign Reversed)
Financial Literacy (FL)	-0.315 (0.189)	0.096	2.30	—	—	—	H2 Partial Support
Objective Knowledge (ObjKnow)	—	—	—	0.003 (0.091)	0.970	1.02	Robustness Check
Emotion Regulation (ER)	-0.056 (0.141)	0.690	2.33	-0.193 (0.113)	0.087	1.63	H3: Not Supported (M1); Marginal (M2)
Information Framing (IF)	0.466 (0.152)	0.002	1.68	0.471 (0.153)	0.002	1.65	H4 Rejected (Sign Reversed)
Cognitive Ability (CA)	-0.141 (0.177)	0.427	1.60	-0.255 (0.155)	0.100	1.54	H5: Not Supported (M1); Marginal (M2)
Gender (0=male; 1=female)	-0.393 (0.158)	0.013	1.14	-0.371 (0.162)	0.022	1.14	Control — Replicated
Income (0=low; 1=high)	-0.168 (0.193)	0.383	1.13	-0.300 (0.174)	0.086	1.11	Control
N	89			89			
R ²	0.340			0.313			
Adjusted R ²	0.283			0.253			

This study examined the determinants of susceptibility to financial misinformation, extending the foundational work of (Kienzler et al., 2022) to an Indonesian university context. Our results are, in several respects, surprising, but we argue they are theoretically informative rather than anomalous. The discussion addresses each finding in turn, grounding interpretations in the dual-process framework and relevant empirical literature.

The Gamification Backfire Effect

The finding that engagement with gamified financial literacy programs significantly increases susceptibility to financial misinformation ($\beta = .46$, $p < .001$; partial $r = .42$ after controlling all other predictors) is the paper's most striking result and deserves careful theoretical treatment. We propose three non-mutually exclusive explanations.

First, the result may reflect a selection effect that runs counter to our hypothesis.

Individuals who are already more susceptible to financial misinformation may be more likely to engage enthusiastically with gamified financial content, because such content shares the surface properties that characterize the misinformation they are susceptible to. Under this explanation, the causal arrow runs from susceptibility to gamification engagement, not the other way around. Distinguishing this mechanism from a causal treatment effect requires experimental or longitudinal data.

Second, the finding is consistent with a gamification-driven overconfidence effect. (Kruger & Dunning, 1999) demonstrated that limited exposure to a domain can generate inflated self-assessments of competence. (Atir et al., 2015) extended this to financial knowledge, showing that self-perceived financial expertise is associated with overclaiming, endorsing financial concepts that do not exist. Gamified financial apps that award points, badges, and progress milestones may cultivate this kind of superficial expertise: users feel they are learning without

developing the critical evaluation skills that would actually protect against misinformation. This interpretation aligns with self-determination theory's (Deci & Ryan, 2000) concern that extrinsic motivational structures (points, leaderboards, rewards) undermine deeper, intrinsically motivated learning. (Hamari et al., 2014) meta-analysis confirms that gamification effects are context-dependent and are weaker or absent when gamification relies primarily on extrinsic rewards without supporting autonomous motivation.

Third, the result may be artefactual: our GF scale measures self-reported engagement with and perceived benefit of gamified programs, not objective learning outcomes. Respondents who are high on GF are those who report feeling that gamified programs help them and who are motivated to engage with them. These may be precisely the individuals most receptive to financial information, whether accurate or not. Future studies should operationalize gamification exposure objectively (e.g., usage logs from financial apps) and measure susceptibility behaviourally (e.g., ratings of actual financial statements following a gamification intervention) to disentangle these mechanisms.

The practical implication is significant: investment in gamified financial literacy programs cannot be assumed to reduce financial vulnerability. Program designers and policymakers should evaluate whether their gamification approaches activate deep, System 2 processing, for example, by requiring evaluation of the truth or plausibility of financial claims, or whether they merely stimulate engagement at a superficial, System 1 level.

Financial Literacy as a Marginal Protective Factor

Subjective financial literacy is negatively associated with susceptibility ($\beta = -.32, p = .096$), providing limited support for H2. The direction is consistent with Kienzler et al. (2022) and with the broader financial literacy literature (Lusardi & Mitchell, 2014). However, the marginal significance likely reflects two limitations of the subjective FL measure. First, self-assessed financial competence is a noisy proxy for actual knowledge: overconfident respondents report high FL while remaining susceptible to misinformation. In the Indonesian context, (Bucher-Koenen et al., 2017) and others document substantial gaps between subjective and objective financial literacy.

The robustness check using objective knowledge scores is instructive: ObjKnow is essentially uncorrelated with SB ($r = .001, \beta \approx .00$ in the regression). This near-zero coefficient, in combination with the marginal FL effect, suggests

that the protective effect of financial literacy operates primarily through the confidence and judgment dimension of subjective self-assessment rather than through factual knowledge per se. This interpretation is consistent with (Kienzler et al., 2022) observation that susceptibility is more strongly linked to affective outcomes (financial security and anxiety) than to behavioural outcomes, and with (Pennycook & Rand, 2019) finding that analytic thinking, not just factual knowledge, drives resistance to misinformation. It reinforces calls for financial literacy programs that cultivate evaluative and critical reasoning skills rather than just content knowledge (Remund, 2010)

Emotion Regulation: Null in Model 1, Marginal in Model 2

Emotion regulation does not reach significance in Model 1 ($\beta = -.06, p = .69$) but shows a marginal negative association in Model 2 ($\beta = -.19, p = .087$) when the collinear FL variable is replaced. The discrepancy reflects the substantial FL-ER correlation ($r = .65$): when both are in the same model, their shared variance is distributed between them in a statistically indeterminate way. FL "absorbs" much of the ER signal in Model 1 because both tap into a general financial competence or self-efficacy dimension.

The Model 2 result is theoretically consistent with the dual-process framework: individuals with greater capacity to regulate emotions, to pause before acting on financially charged affect, should be less likely to accept compelling but analytically unfounded financial claims. (Gross & John, 2003) describe cognitive reappraisal as a key mechanism in emotion regulation; it is essentially a System 2 process applied to affective content. (Parise & Peijnenburg, 2019) similarly find that noncognitive abilities, including emotional stability, independently predict financial distress over and above financial literacy. The present null result in Model 1 is best understood as a multicollinearity artefact rather than evidence against a genuine ER-susceptibility relationship.

The Information Framing Preferences Finding

Information framing preferences are positively associated with susceptibility ($\beta = .47, p = .002$; partial $r = .28$), contrary to H4. A careful examination of the IF items illuminates this unexpected result. Two items exhibit near-ceiling means: preferring simple language (IF1: $M = 4.40$) and preferring clear and structured information (IF3: $M = 4.36$). These items show low discriminant validity because almost all respondents agree with them. They capture a nearly universal human preference for clarity

rather than a psychologically meaningful individual difference. The two items with the greatest variance are IF2 ($M = 3.73$; attending to potential losses over potential gains) and IF4 ($M = 3.79$; scepticism toward complex financial information). It is these latter items that drive the IF–SB correlation.

The positive association between loss-framing sensitivity (IF2) and susceptibility, and between complexity aversion (IF4) and susceptibility, is interpretable through the affect heuristic (Finucane et al., 2000): individuals who are particularly attentive to potential losses and who find financial complexity aversive may be responding from a generalized financial anxiety orientation rather than from analytic vigilance. Financial anxiety is a documented predictor of poorer financial outcomes (Fünfgeld & Wang, 2009) and, crucially, heightens responsiveness to emotionally salient financial claims. Under this interpretation, the IF positive coefficient is not evidence that clearer or loss-framed information increases susceptibility; rather, it indicates that the IF scale partly measures financial anxiety rather than analytical framing preference.

The low internal consistency of the IF scale ($\alpha = .684$) is consistent with this: clarity preferences (IF1, IF3) and loss-framing sensitivity (IF2, IF4) may not form a psychometrically unitary construct. Future research should separate these sub-dimensions, possibly using an experimental framing manipulation rather than a preference self-report, to cleanly test whether loss-framing genuinely increases or decreases susceptibility to financial misinformation.

Cognitive Ability

Cognitive ability does not reach significance in Model 1 ($\beta = -.14$, $p = .43$) but shows a marginal negative association in Model 2 ($\beta = -.26$, $p = .100$), parallel to the ER result. The same FL–CA collinearity ($r = .56$) applies. The substantive finding is broadly consistent with the cognitive ability literature: (Pennycook et al., 2015) and (Kienzler et al., 2022) both find that cognitive reflection significantly predicts bullshit resistance. That we observe only a marginal effect is likely attributable to (a) multicollinearity with FL in Model 1, (b) our CA measure being self-reported rather than performance-based, and (c) the limited statistical power of an $N = 89$ sample. A performance-based cognitive ability measure (Frederick, 2005) Cognitive Reflection Test) would be preferable in future replications.

Gender: A Consistent Cross-Cultural Finding

The gender finding is the most robustly replicated result in this study: across both models, females are significantly less susceptible to

financial misinformation than males ($\beta = -.39$, $p < .05$). This replicates (Kienzler et al., 2022) finding in a Swedish sample and extends it to an Indonesian university population.

Several mechanisms have been proposed in the literature. (Barber & Odean, 2001) document that male investors are substantially more overconfident than female investors, trading more frequently and achieving lower risk-adjusted returns as a result. (Atir et al., 2015) show that men are more likely to claim knowledge of financial concepts that do not exist, a form of overclaiming that maps closely onto financial misinformation susceptibility. (Bucher-Koenen et al., 2017) find that while women report lower financial knowledge than men in most countries, the gap is partly attributable to greater male overconfidence rather than true knowledge differences. The present finding is consistent with this literature: male overconfidence may render men more susceptible to the apparent profundity of financial misinformation by reducing the threshold for accepting compelling-sounding claims.

This finding carries implications for financial consumer protection. Interventions aimed at reducing financial misinformation susceptibility may need to be particularly targeted at male consumers, and at overconfidence as a mechanism rather than simply knowledge deficits.

CONCLUSION AND SUGGESTION

This study extended the framework proposed by Kienzler et al. (2022) on individual differences in susceptibility to financial misinformation to an Indonesian university sample, examining gamified financial literacy, subjective financial literacy, emotion regulation, information framing preferences, and cognitive ability as predictors. Embedded in a dual-process theoretical framework, the findings yield several important conclusions and implications.

The most important finding is a gamification backfire effect, where engagement with gamified financial literacy is positively, rather than negatively, associated with susceptibility. This suggests that engagement alone does not guarantee deeper cognitive processing, and may instead reflect selection effects, overconfidence driven by extrinsically motivated learning, and a conflation of engagement with depth of processing. Accordingly, financial literacy programs should be designed to explicitly activate System 2 critical evaluation, rather than merely focusing on entertainment or content delivery.

In addition, the results show that objective financial knowledge provides essentially no protection against susceptibility, while subjective

financial literacy offers only marginal protection. These findings indicate that susceptibility to financial misinformation is primarily an affective and metacognitive phenomenon, rather than a simple information deficit. Therefore, programs that focus solely on increasing factual financial knowledge are unlikely to be effective unless they are accompanied by the development of critical evaluation skills.

The gender-related finding, which indicates that females are significantly less susceptible than males, is consistent with the overconfidence explanation identified in prior literature and suggests that the underlying psychological mechanisms are not entirely culture-specific, extending also to the Indonesian context.

Despite these contributions, several limitations must be acknowledged. The use of a convenience sample of $N = 89$ university-affiliated respondents limits the generalizability of the findings. All constructs are based on self-reported measures, with susceptibility to financial misinformation being particularly prone to social desirability bias. The absence of variation in education prevents examination of its potential effects, and the cross-sectional design restricts causal interpretation.

Based on these limitations, future research is recommended to employ experimental designs with behaviorally grounded measures of susceptibility, include more representative and diverse samples across education and income levels, utilize performance-based cognitive assessments, and conduct longitudinal studies to examine the long-term effects of gamified financial literacy interventions on susceptibility to financial misinformation.

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