

1 **Meme asset wagering: Perceptions of risk, overconfidence, and gambling problems**

2 Kahlil S. Philander<sup>1,2</sup>

3 <sup>1</sup>Washington State University, Carson College of Business, School of Hospitality Business

4 Management, 915 North Broadway, Everett, WA 98201; Kahlil Philander ORCID: 0000-0002-

5 0747-0772

6 <sup>2</sup>University of Sydney, Science Faculty, Brain and Mind Centre, School of Psychology.

7 Gambling Treatment and Research Clinic, 94 Mallet St, Camperdown NSW 2050, Australia

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9 **Corresponding author:** Kahlil Philander, [Kahlil.philander@wsu.edu](mailto:Kahlil.philander@wsu.edu), 915 N. Broadway,

10 Everett, WA, USA, 98201.

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### **Abstract**

Several financial assets, such as shares of GameStop or Dogecoin cryptocurrency, became the focus of substantial speculation in early-2021 that resulted in high price volatility and trading volume. This “meme asset wagering” appears to be closely related to the emergence of zero-fee retail brokerages, high-leverage cryptocurrency exchanges, and social media investment communities that facilitate and encourage risky behavior. As an emerging form of financial risk-taking, little is known about participants in these markets. In this study, an internet-based sample (n=643) was recruited to assess the relation between meme asset ownership, perceived risks in gambling and investing, investment knowledge, and measures associated with gambling problems. Results suggest that meme asset wagerers perceive less risk from financial uncertainty, have higher levels of overconfidence in their investment ability, and have higher risk of gambling problems. The findings suggest that these products may be treated like gambling by some individuals.

*Keywords:* meme assets, cryptocurrencies, retail investing, risk-taking, gambling

1       **Meme asset wagering: Perceptions of risk, overconfidence, and gambling problems**

2                               *“I am become meme, Destroyer of shorts” – Elon Musk (2021)*

3               Meme asset wagering is an emerging phenomenon in capital markets. It occurs when  
4 individuals speculate on the price of a security or digital asset, despite the asset price becoming  
5 materially disconnected from any reasonable measure of value (Chaumont, Gordon, & Sultanum,  
6 2021; Umar et al., 2021). Wagering on the price of meme assets is not well understood as a  
7 social phenomenon but tends to involve a large group of unrelated individuals that use social  
8 media to coordinate behavior around the purchase of an asset, to increase its price (Hasso et al.,  
9 2022; Lyócsa et al., 2022).

10              Coordination among meme asset holders occurs without a mechanism to ensure that  
11 others hold their position, which leads to a risk of large price decreases. What therefore emerges  
12 is a zero-sum game where participants must assess whether popularity and growth is likely to  
13 continue, or whether participants are likely to sell in the future. Unlike most games, meme asset  
14 wagering does not have a traditional randomization mechanism such as dice, cards, or pseudo-  
15 random number generators. Meme wagering also excludes speculation on asset productivity,  
16 which differentiates it from more traditional financial securities where excessive risk-taking  
17 centers on rare events that impact the underlying value of assets (Kumar, 2009).<sup>1</sup> Instead, price  
18 movements largely occur as a function of buyer sentiment (Cary, 2021; Divesh et al., 2022;

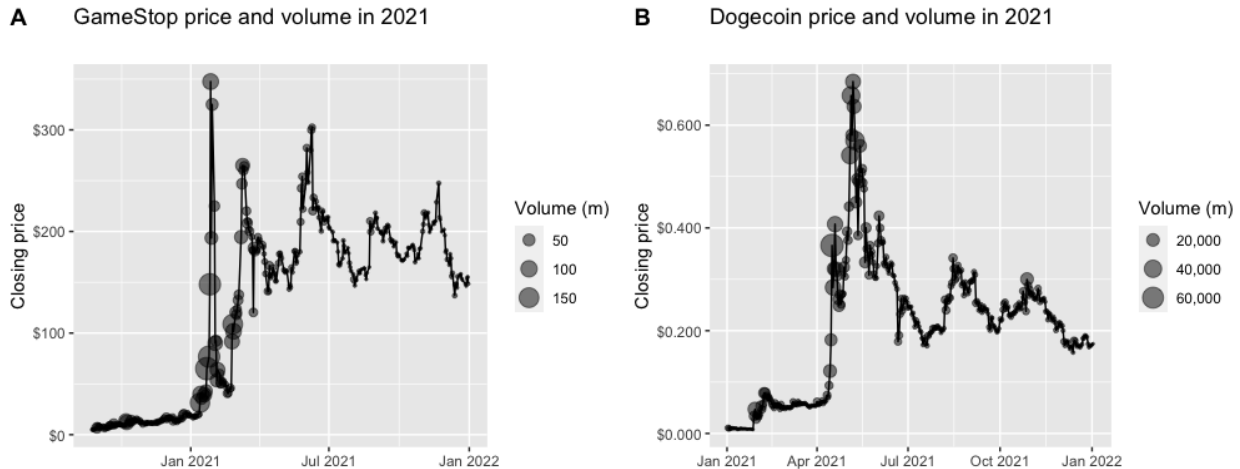
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<sup>1</sup> The term ‘meme asset wagering’ does not characterize all meme asset holders as gamblers. Market participants may have sophisticated strategies with a positive expected value. For instance, any individual that held a US index fund likely had some exposure to meme assets. Semantically, the meme wagering term distinguishes this risk-taking behavior from other forms of financial speculation, which typically describe sources of equity returns through value generation that may be volatile or uncertain. For example, speculating that a quarterly earnings report will exceed market expectations or that a pharmaceutical company will receive a favorable clinical trial result.

1 Lansiaux et al., 2022; Umar et al., 2021). Overall, the distinguishing feature of meme wagering  
2 is a collective willingness to coordinate purchase of a specific asset over a relatively short period  
3 of time.

4 In traditional markets, the best recent example of a meme asset is GameStop stock during  
5 early-2021. Largely coordinated through the WallStreetBets subreddit, an over 16-fold  
6 appreciation in price occurred in January 2021, followed by similar sized collapse by February  
7 2021 (Chaumont, Gordon, & Sultanum, 2021). While not all buyers were motivated by the  
8 gambling-like properties of these assets (Anderson et al., 2021), many subreddit participants  
9 describe their behavior as gambling (e.g. Ned\_Flanderz, 2021) and many GameStop buyers had a  
10 history of purchasing stocks with lottery-like features (Hasso et al., 2022). In digital assets, the  
11 most widely cited example is Dogecoin, whose promotion by Elon Musk and others led to the  
12 limited-utility cryptocurrency reaching a market capitalization of over \$15 billion in 2021  
13 (Shahzad et al., 2022).

14 In both GameStop and Dogecoin, trading volume increased, price became disconnected  
15 from prior levels, and volatility grew exponentially before settling at new levels (see Figure 1).  
16 Interest and activity followed a path that appears similar to either a novelty effect or the  
17 gambling exposure/adaptation curve, with an early spike in activity that was followed by a  
18 longer tail of reduced intensity in involvement (LaPlante & Shaffer, 2007).



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2 *Figure 1 – GameStop and Dogecoin price and volume activity before and after their peak periods of*  
 3 *interest.*

4 Over-optimistic speculation on financial assets has been discussed as early as John  
 5 Maynard Keynes' (1936) description of “animal spirits” in markets, but new technologies appear  
 6 to have magnified these effects in more recent years. Social media-based investment  
 7 communities have encouraged risk-taking (Cary, 2021; Divesh et al., 2022; Umar et al., 2021)  
 8 while high-leverage cryptocurrency exchanges and zero-fee retail brokerages have facilitated  
 9 activity (Barber et al., 2020). Although capital markets serve an important role in personal  
 10 finance and wealth building, these technology platforms increasingly appear to be used as a  
 11 venue for coordinated social gambling and there appears to be a strong memetic effect of social  
 12 platforms for growing interest in specific assets (Ante, 2021; Chaumont, Gordon, Sultanum, et  
 13 al., 2021). As a result, public attention has grown. Cryptocurrency analytics site,  
 14 CoinMarketCap, actively tracks over 300 assets in their ‘meme’ category of tokens  
 15 (CoinMarketCap, 2022).

16 Understanding the nature of this potentially speculative activity is important to decisions  
 17 around the regulatory framework of retail financial products and the clinical practice in treating  
 18 gambling problems. Recent research demonstrates that high volume cryptocurrency or retail

1 investment activity is correlated with measures of excessive gambling (Delfabbro et al., 2021;  
2 Oksanen et al., 2022) but little is known about meme assets specifically, which appear to be  
3 among the most volatile. It is unclear whether participants in these markets view their behavior  
4 as risky or whether they are at the same risk of problems as traditional gamblers. It is similarly  
5 unclear if meme asset holders are knowledgeable of financial risks and are allocating small  
6 amounts of capital for entertainment purposes or whether there is excessive risk-taking. In this  
7 study, an internet-based community sample was recruited to assess the relation between meme  
8 asset ownership, perceived risks in gambling and investing, investment knowledge, and measures  
9 associated with gambling problems.

## 10 **Hypotheses**

11         Several authors have identified behavior that is consistent with gambling on financial  
12 assets, where there appears to be a subset of investors who seek higher volatility in returns in  
13 order to receive a potentially larger payoff. Kumar (2009) examined data from a discount  
14 brokerage in the early 1990s and found that retail investors preferred equities with lottery-like  
15 distributions. Similarly, Dorn et al. (2015) found evidence that individuals were substituting  
16 lottery play and retail brokerage trading based on lottery jackpot sizes. Gong et al. (2021) found  
17 that investors' preferences for lottery-type outcomes tend to be strongest during downturns in the  
18 markets. Similarly, Pelster et al., (2019) found that cryptocurrency traders are more risk-seeking  
19 in stocks cryptocurrency volatility was low. Other work has focused on behavior related to  
20 speculative bubbles where market participants collectively overestimate asset values (Scherbina  
21 & Schlusche, 2014). These findings suggest that individuals who are willing to own more  
22 volatile financial assets may subjectively view them as less personally risky than non-owners.  
23 H1: Meme asset ownership is related to reduced relative perceptions of financial risk-taking

1           In both finance and gambling, overconfidence appears to be related to increased risk-  
2 taking (Allen & Evans, 2005; Glaser & Weber, 2010; Goodie, 2005; Grinblatt & Keloharju,  
3 2009; Philander & Gainsbury, 2021). Overconfidence tends to emerge in two ways, better-than  
4 average biases and miscalibration effects (Glaser & Weber, 2010). Better-than average biases  
5 occur when individuals believe that they are more knowledgeable or skilled than a typical  
6 participant and therefore believe they can outperform, such as in a financial market or poker  
7 game. This is connected to illusion of control biases (Langer, 1975), where individuals believe  
8 their skill will enable them to earn excessive returns. Miscalibration effects occur when  
9 individuals systematically fail to accurately account for the probability and magnitude of tail-risks  
10 (Glaser & Weber, 2010). For example, failing to accurately account for the low-probability of a  
11 lottery jackpot or the risk of ruin from financial asset volatility (Taleb, 2007). Owners of meme  
12 assets may therefore be more likely to have misplaced confidence in their ability to understand  
13 financial markets.

14 H2: Meme asset ownership is related to increased relative overconfidence in understanding of  
15 financial markets

16           In gambling studies, some authors have found that active trading of securities or  
17 cryptocurrencies is a risk-factor for developing an addictive disorder (Delfabbro et al., 2021;  
18 Mills & Nower, 2019; Oksanen et al., 2022). Although these results are largely correlational,  
19 there are features of meme wagering that may match or accentuate these risks further. For  
20 instance, there is evidence that demand in cryptocurrencies follows a fear-of-missing-out pattern,  
21 where positive price changes impact volatility more than negative changes (Baur & Dimpfl,  
22 2018; Bouri et al., 2019; Shahzad et al., 2022; Song, 2022). As this behavior grows and evolves,  
23 the sudden changes in asset prices may heighten financial losses. Further loss chasing may be

1 accentuated by norms around “buying the dip” in prices (Ardia et al., 2022). Accordingly, it is  
2 important to regulatory and health outcomes to understand how consumption of meme assets is  
3 related to both personal finance behavior and gambling-like harms.

4 H3: Meme asset ownership is related to increased problem gambling risk levels

## 5 **Method**

### 6 **Recruitment**

7 Ethics clearance was granted by [REDACTED] Human Research Ethics Committee, who  
8 found the study exempt from review. Only US participants were recruited to ensure that there  
9 were no legal restrictions to the capital markets where the assets were traded. Respondents were  
10 recruited online since the platforms where the assets are traded and discussed are predominantly  
11 online. To evaluate the survey instrument, an initial group of 228 participants were recruited in  
12 April 2021 using Amazon Mechanical Turk (MTurk), an online web-based platform for human  
13 tasks. Data was collected using Qualtrics. Participants were restricted to those with an MTurk  
14 approval rating of at least 95 percent, consistent with practices adopted in previous research  
15 (Goodman et al., 2013). The first group of participants only included respondents that received  
16 the MTurk Masters designation for demonstrated excellence across a wide range of tasks. No  
17 errors were discovered in the survey instrument and a second group of 415 US participants were  
18 recruited in May 2021. To improve recruitment of relevant subjects, that group included  
19 respondents that were prequalified by MTurk as owning common share stocks. To improve  
20 response quality, responses were collected anonymously, respondents were asked to complete a  
21 captcha before beginning the survey, and an attention screener question was asked mid-survey  
22 (Berinsky et al., 2014). Study data is available upon request for approved research projects.



1           A total of 33 responses were removed due to failure to complete the survey and 55 were  
2 removed due to failure of the attention screener. Study analysis used the remaining 555  
3 responses. A majority of the respondents were male (58%); the median income band was  
4 \$60,000 to \$69,999; age frequencies by age band were: 5 (1%, 18–20), 17 (3%, 21–24), 139  
5 (25%, 25–34), 201 (36%, 35–44), 89 (16%, 45–54), 81 (15%, 55–64), 20 (4%, 65–74), and 3  
6 (1%, 75–84); all respondents had a high school diploma or equivalent, and 71.0% had a  
7 bachelor’s degree or higher. Just over half the sample (52%, n=287) reported owning a meme  
8 asset in 2021.

## 9           **Measures**

### 10           *Meme Asset Ownership*

11           When meme wagering first emerged as a widespread phenomenon in early-2021, the  
12 most high-profile examples were the “BANG” stocks: BlackBerry, AMC Entertainment, Nokia,  
13 and GameStop (Lyócsa et al., 2022), and the Dogecoin cryptocurrency (Nani, 2022). To  
14 operationalize meme asset ownership, respondents were therefore asked, “In 2021, which of the  
15 following assets have you owned? (select all that apply)” and were given the option to select  
16 from the “BANG” stocks and/or Dogecoin. Meme asset ownership is computed as the sum of  
17 unique assets owned within that group. The totals categories are zero (n=268, 48%), one (n=145,  
18 26%), two (n=77, 14%), three (n=44, 8%), four (n=10, 2%), five (n=11, 2%).

### 19           *Perceptions of Financial Risk Taking*

20           The Domain-Specific-Risk-Taking (Dospert) risk perception scale (Blais & Weber, 2006)  
21 was used to assess perceptions of risk. The Dospert financial subscale includes both a gambling  
22 and an investing component and assesses subjective views of perceived financial risk (see  
23 Appendix A). Markiewicz & Weber (2013) found that a related Dospert gambling propensity

1 subscale assessing likelihood of engaging in activities predicts volume of trades by investors.  
 2 Respondents were instructed to indicate “how risky you perceive each situation” on a seven-  
 3 point Likert scale from Not at all Risky (1) to Extremely Risky (7). There are six questions and  
 4 scores can range from 6 to 42. The mean score was 26.24 ( $SD=6.33$ ).

### 5 ***Overconfidence in understanding of financial markets***

6 Overconfidence in understanding of financial markets (Overconfidence) was computed as  
 7 the difference in standardized *subjective understanding* and standardized *measured*  
 8 *understanding* (Philander & Gainsbury, 2021). Subjective understanding was assessed using a  
 9 question from Cox et al. (2020) based on findings from Glaser & Weber (2007), “Compared to  
 10 an average investor, how would you rate your investment abilities?” The five-point scale ranges  
 11 from much worse to much better and scores were then standardized. Measured understanding  
 12 was assessed using the “Big Three” financial literacy questions (Cox et al., 2020; Lusardi &  
 13 Mitchell, 2007), covering the nature of compound interest, inflation, and portfolio diversification  
 14 risk (see Appendix A). Scores ranged from zero to four and were then standardized.

$$15 \quad \text{Overconfidence} = \frac{x_i - \bar{x}}{S^x} - \frac{y - \bar{y}}{S^y}$$

16 Where  $x_i$  is the reported subjective understanding of respondent  $i$ ,  $\bar{x}$  and  $S^x$  are the respective  
 17 sample mean and standard deviation of subjective understanding,  $y_i$  is measured understanding  
 18 of respondent  $i$ , and  $\bar{y}$  and  $S^y$  are the respective sample mean and standard deviation of  
 19 measured understanding. The mean score was 0.05 ( $SD=1.37$ ).

### 20 ***Problem gambling risk***

21 A modified version of the nine question DSM-5 diagnostic criteria risk (see Appendix A)  
 22 was used to measure gambling problems, which followed prior studies by replacing the word  
 23 ‘gambling’ with ‘trading financial products’ (DSM-5, Cox et al., 2020; Youn et al., 2016). The

1 response scale for each question is: (0) Never, (1) Sometimes, (2) Often, and (3) All the time.  
2 Items are summed and scores can range from 0 to 27. There was good dispersion in measured  
3 problems ( $M=2.25$ ,  $SD=3.63$ ).

#### 4 **Analytic strategies**

5 Using the rstatix package (Kassambara, 2021), independent Welch t-tests were used to  
6 test for pairwise differences between the zero meme asset ownership category and the non-zero  
7 categories. Pairwise tests are used as the primary interest is to understand differences relative to  
8 zero asset ownership, as opposed to differences between varying positive levels. Due to the small  
9 group size of owners reporting four or five assets, the final categories were: zero, one, two, and  
10 three or more, with the last category including all individuals who report owning three, four, or  
11 five meme assets. The pairwise tests were used for Dospert scores, Overconfidence, and DSM-5  
12 scores and were visualized as boxplots with difference lines. Similar tests with bootstrapped  
13 standard errors and non-parametric tests are provided in an online appendix. To assess the  
14 measures' joint predictive ability, a regression model was estimated using all of the variables of  
15 interest simultaneously, along with demographic control variables. Since the dependent variable  
16 is cardinal, an ordinary least squares model is estimated but a similar ordinal probit model is  
17 included in an online appendix. The ungrouped meme scores were used in the linear regression  
18 analysis since there are not the same small group measurement issues when the variable is used  
19 as a dependent variable in a linear regression.

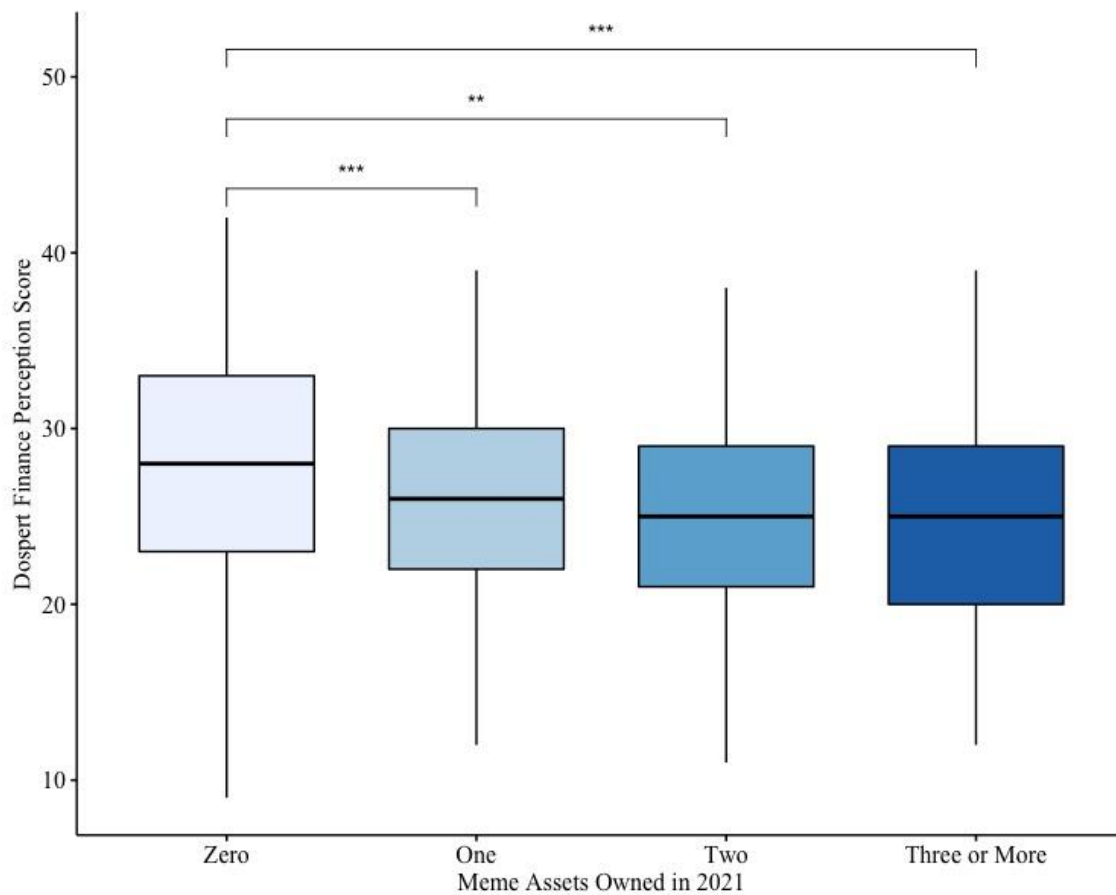
## 20 **Results**

### 21 **Perceptions of Financial Risk Taking**

22 Findings supported H1. The respondents who owned no meme assets ( $M = 27.5$ ,  $SD =$   
23  $6.6$ ) showed higher perceptions of risk in investment and gambling activity than respondents

1 with one meme asset ( $M = 25.5$ ,  $SD = 5.6$ ),  $t(338) = 3.27$ ,  $p = .001$ ,  $d = .33$ ; two meme assets  
 2 ( $M = 24.9$ ,  $SD = 6.3$ ),  $t(127) = 3.12$ ,  $p = .002$ ,  $d = .40$ ; or three or more meme assets ( $M = 24.4$ ,  
 3  $SD = 5.9$ ),  $t(107) = 3.69$ ,  $p < .001$ ,  $d = .49$ . Boxplots of score distributions are provided in Figure  
 4 2.

5 *Figure 2 – Boxplots and t-tests of Dospert finance perceptions scores by meme asset ownership count*



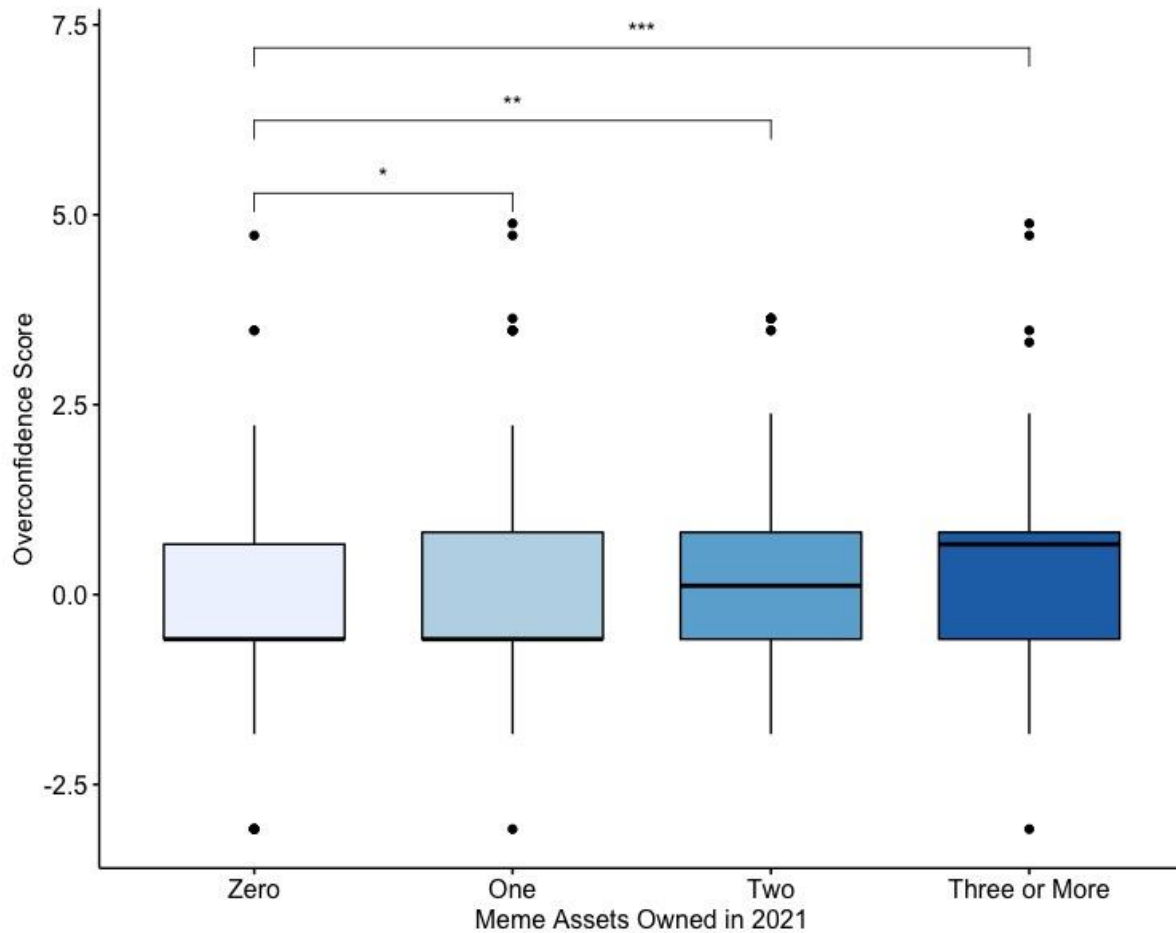
6  
 7 \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$   
 8

## 9 **Overconfidence in understanding of financial markets**

10 Findings supported H2. The respondents who owned no meme assets ( $M = -0.23$ ,  $SD =$   
 11  $1.17$ ) showed lower levels of overconfidence in their investment abilities than respondents with  
 12 one meme asset ( $M = 0.17$ ,  $SD = 1.46$ ),  $t(229) = -2.74$ ,  $p = .007$ ,  $d = -.30$ ; two meme assets ( $M$

1 = 0.43, SD = 1.47),  $t(102) = -3.57, p < .001, d = -.50$ ; or three or more meme assets (M = 0.49,  
 2 SD = 1.56),  $t(76) = 3.69, p = .001, d = -.53$ . Boxplots of score distributions are provided in  
 3 Figure 3.

4 *Figure 3 – Boxplots and t-tests of Overconfidence scores by meme asset ownership count*



5  
 6 \* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$   
 7

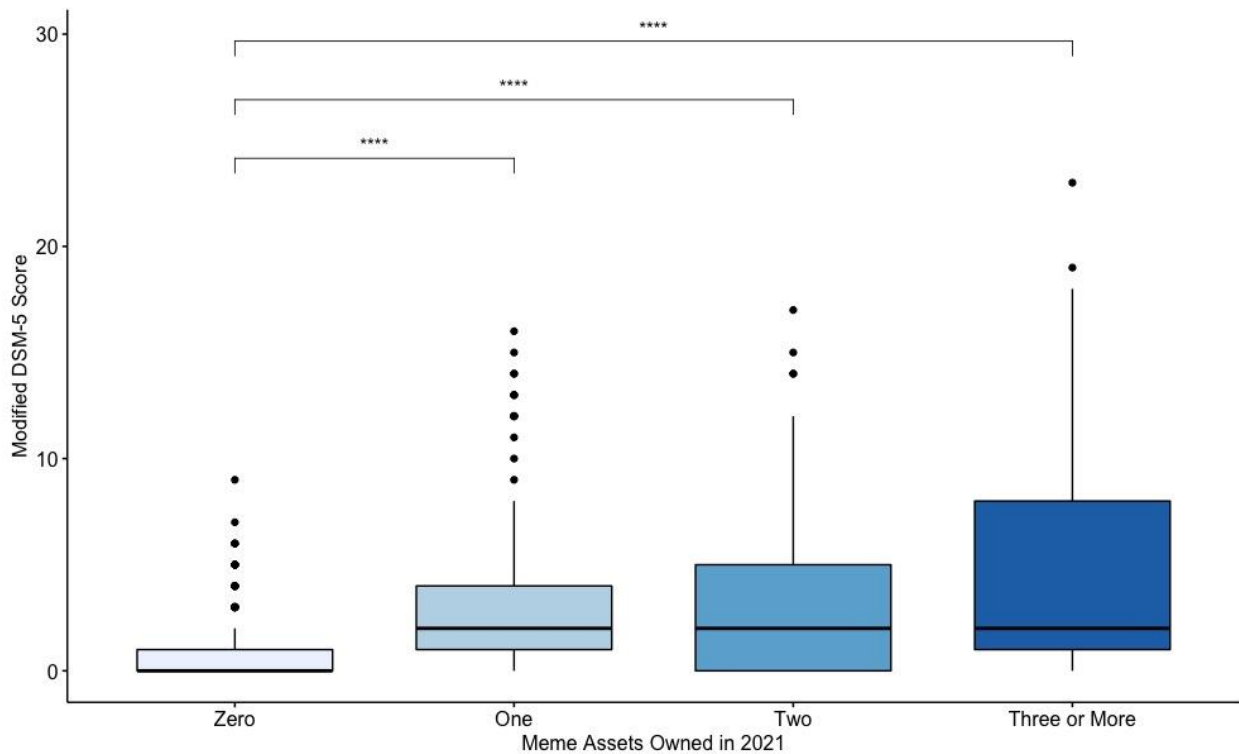
## 8 **Problem gambling risk**

9 Findings supported H3. The respondents who owned no meme assets (M = 0.86, SD =  
 10 1.43) showed lower levels of investing related gambling problems than respondents with one  
 11 meme asset (M = 3.06, SD = 3.74),  $t(167) = -6.80, p < .001, d = -.78$ ; two meme assets (M =  
 12 3.30, SD = 4.23),  $t(81) = -4.98, p < .001, d = -.77$ ; or three or more meme assets (M = 4.95, SD

1 = 5.86),  $t(66) = -5.60$ ,  $p < .001$ ,  $d = -.96$ . Boxplots of score distributions are provided in Figure

2 3.

3 *Figure 4 – Boxplots and t-tests of modified DSM-5 problem gambling scores by meme asset ownership*  
 4 *count*



5  
 6 \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$   
 7

## 8 Regression analysis

9 Findings from the regression analysis demonstrate that the variables of interest have joint  
 10 predictive ability, supporting H1-H3. All of the variables are statistically significant and have  
 11 coefficients with the correct sign. The variance inflation factors (VIF) of the variables did not  
 12 exceed 1.43, suggesting low multicollinearity in the model. Age group was also statistically  
 13 significant and negative, suggesting that younger respondents were more likely to hold meme  
 14 assets.

1 *Table 1 – Ordinary least squares regression of predictor variables and demographic controls onto meme*  
 2 *asset ownership count*

<i>Predictors</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	<i>VIF</i>
Dospert Finance Perceptions Score	-0.02	-0.03 – -0.00	<b>0.019</b>	1.05
Overconfidence Score	0.11	0.03 – 0.18	<b>0.004</b>	1.23
Modified DSM-5 Score	0.09	0.06 – 0.11	<b>&lt;0.001</b>	1.31
Age Group	-0.28	-0.36 – -0.19	<b>&lt;0.001</b>	1.34
Household Income	0.01	-0.02 – 0.05	0.515	1.43
Highest Education	-0.08	-0.16 – 0.00	0.051	1.15
Gender (Male)	0.05	-0.14 – 0.24	0.617	1.08
Gender (Other)	-0.42	-1.61 – 0.78	0.494	1.08
(Intercept)	2.84	2.09 – 3.60	<b>&lt;0.001</b>	
Marital Status (Factor)	Included			
Observations	519			
R <sup>2</sup>	0.256			
R <sup>2</sup> adjusted	0.238			

3 *Statistically significant variables are highlighted in bold.*

#### 5 **Robustness Tests**

6 To assess whether the results were driven by broad cryptocurrency ownership as opposed  
 7 to meme assets specifically, a series of regression models were estimated as robustness tests. In  
 8 Appendix B – Table I, a set of models use meme asset ownership count as an outcome variable,  
 9 fitting models with and without ‘Past 12-month cryptocurrency ownership’ as a control variable,  
 10 along with demographic controls. The results show robust effects from the variables of interest in  
 11 the study, regardless of cryptocurrency ownership status. In Appendix B – Table II, the variables  
 12 of interest are used as dependent variables and meme asset ownership count is used as an  
 13 independent variable. Again, a robust relationship is observed between meme asset ownership  
 14 and the variables of interest.

#### 15 **Discussion**

16 Prompted by growth in low-fee retail brokerages, cryptocurrency networks, and social  
 17 media platforms, meme assets appear to be an emergent way in which individuals are wagering  
 18 on the internet. This study tested whether interest in meme asset ownership was related perceived

1 risks in gambling and investing, overconfidence in investing abilities, and/or increase risk of  
2 gambling problems. Support was found for all three measures, suggesting that meme asset  
3 holders perceive less risk from financial uncertainty, have higher levels of overconfidence in  
4 their investment ability, and have higher risk of problems. The findings were found in bivariate  
5 tests and were robust to a multivariate model specification. In addition, younger individuals were  
6 found to be more likely to own meme assets. These results closely resemble findings from  
7 gambling literature and suggest that these products may be treated like gambling by some  
8 individuals.

9         The findings from this study underline an ongoing need to consider prevention programs  
10 that target non-traditional forms of gambling, including some financial assets. Based on coverage  
11 in media and public discourse (Davies, 2022; Fleming, 2021; Lee, 2020; Zweig, 2020), there  
12 appears to be a trend towards potentially harmful risk-taking by consumers in financial services.  
13 Security regulators have begun to focus attention on excessive risk-taking. For example, the  
14 European Securities and Markets Authorities identified gamification and other product design  
15 trends as “potentially impacting retail investors’ risk awareness” (*ECON Exchange of Views in*  
16 *Relation to GameStop Share Trading and Related Phenomena*, 2021) and the U.S. Securities and  
17 Exchange Commission stated before Congress that gamification could lead to a “substantial  
18 effect on a saver’s financial position” (*Testimony Before the House Committee on Financial*  
19 *Services*, 2021).

20         As financial services appear to be increasingly delivered using gamified products and  
21 user experience designs (Fleming, 2021), wider trends seen in gaming-gambling convergence  
22 (Kolandai-Matchett & Abbott, 2021) may further extend into retail risk-taking. Given the sharp  
23 changes that occur in meme assets’ prices, financial ruin can happen quickly for individuals that



1 fail to understand the nature of the risks they may be taking. As over half of the sample in this  
2 study owned at least one meme asset in 2021, the group at-risk of financial harms from meme  
3 wagering may be a large share of retail investors. Promotion of meme assets by high-profile  
4 public figures or online brokerages may further accelerate risk-taking and may not come under  
5 the purview of institutions with experience in responsible gambling rulemaking. As meme asset  
6 popularity grows, financial regulators and retail-product operators should consider adopting  
7 standards of practice that promote financial literacy and understanding of gambling problems.  
8 Better controls at all related institutions may serve to promote responsible investment activity  
9 that is consistent with the purpose of capital markets.

#### 10 **Limitations and Future Research**

11 This study used a non-random community sample and therefore has limited  
12 generalizability to the general population. Inclusion of related questions in prevalence studies  
13 would improve our understanding of the scale of involvement. This study predominantly focused  
14 on breadth of involvement across major meme assets in early-2021. Part of the cultural  
15 phenomenon during that period also appeared to be an encouragement on forums to allocate  
16 capital into concentrated portfolios of meme assets, which would further increase risk of  
17 substantial losses.

18 This study explored whether holders of specific meme assets have traits or behaviors that  
19 share similarities with conventional gamblers, but the analytical methods do not imply a causal  
20 relationship. It remains unclear whether meme asset ownership perpetuates the noted  
21 relationships, whether there is a self-selection effect towards asset ownership, and/or whether  
22 there are other confounding variables. Future behavioral studies using brokerage account and  
23 cryptocurrency exchange data would help improve our understanding about the extent of meme

1 asset ownership as a share of total portfolios and the potential antecedents to ownership. Since  
2 purchase of many cryptocurrencies is restricted by jurisdictions or exchanges, instrumental  
3 variable approaches using availability constraints as instruments may be useful as an empirical  
4 strategy to infer causality.

5         The robustness tests in this study address the potential confounding role of general  
6 cryptocurrency ownership but those findings do not preclude the possibility of more complex  
7 relationship. However, given that cryptocurrency ownership has become a relatively normative  
8 activity in the United States – 23% adults are estimated to have owned cryptocurrency when this  
9 study’s data was collected (PYMNTS.com & BitPay, 2022) – it seems likely that the results are  
10 not being driven by a small cluster of statistically entangled group of cryptocurrency holders.  
11 Future studies should more closely assess this relationship. The negative coefficient estimated  
12 between general cryptocurrency ownership and the variables of interest may reflect a  
13 differentiation between owners that are actively engaged in riskier meme asset wagering and  
14 more passive cryptocurrency owners that view the asset class as one part of a broader investment  
15 portfolio.

16         Future psychological studies should examine other dimensions in which meme asset  
17 holders are similar to traditional gamblers, including further exploration of cognitive distortions,  
18 habit formation, harms, and attitudes towards risk. This study used an adapted version of DSM-5  
19 criteria for gambling problems. As use of financial products for gambling grows, more research  
20 is needed to validate this and other gambling-related scales to understand where they may be  
21 useful in understanding risk taking with meme assets and other financial services.

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1 **Appendix A – Study Instruments**

2 **The Domain-Specific-Risk-Taking (Dospert) risk perception scale (Blais & Weber, 2006)**

3 Instructions: People often see some risk in situations that contain uncertainty about what the  
4 outcome or consequences will be and for which there is the possibility of negative consequences.  
5 However, riskiness is a very personal and intuitive notion, and we are interested in your gut level  
6 assessment of how risky each situation or behavior is...

7

8 Please indicate how risky you perceive

- 9 1) "Betting a day's income on the outcome of a sporting event"  
10 2) "Investing 5% of your annual income in a very speculative stock"  
11 3) "Betting a day's income at the horse races"  
12 4) "Investing 10% of your annual income in a new business venture"  
13 5) "Betting a day's income at a high-stake poker game"  
14 6) "Investing 10% of your annual income in a moderate growth mutual fund"  
15

16 **The “Big Three” financial literacy questions (Cox et al., 2020; Lusardi & Mitchell, 2007)**

- 17 1) Suppose that you have \$100 in a savings account, the interest is 20% per year, and you  
18 never withdraw the money or interest. How much do you have in the account after 5  
19 years?  
20 • More than \$200  
21 • Exactly \$200  
22 • Less than \$200  
23 • Don't know  
24  
25 2) Suppose the interest on your savings account is 1% per year and the inflation is 2% per  
26 year. After 1 year, can you buy more, exactly the same, or less than today with the money  
27 on the account?  
28 • More than today  
29 • Exactly the same as today  
30 • Less than today  
31 • Don't know  
32  
33 3) Is the following statement true or false? “A company stock usually provides a less risky  
34 return than an equity mutual fund.”  
35 • True  
36 • False  
37 • Don't know  
38

39 **Modified DSM-5 diagnostic criteria risk (DSM-5, Cox et al., 2020; Youn et al., 2016)**

40 Instructions: The following questions are about your of trading of financial products, such as  
41 individual company stocks, ETFs, derivatives, leveraged products, and cryptocurrencies. While  
42 answering these questions please consider your actual trading activities during the last 12  
43 months...  
44

- 1 1) You trade financial products with larger amounts of money to maintain the excitement.
- 2 2) You have to borrow money from family members or friends to cover the losses from
- 3 trading in financial products.
- 4 3) You always think of ways to get money to trade financial products.
- 5 4) You lie to your family or friends about your trading in financial products.
- 6 5) You tried to reduce your trading of financial products, or to quit altogether, but could not.
- 7 6) You trade financial products to escape problems in your life.
- 8 7) You trade more in order to win back your previous losses.
- 9 8) You have problems in your work, with family members or with your partner as a
- 10 consequence of your trading in financial products.
- 11 9) You become irritated when trying to reduce or quit trading financial products.
- 12

13

1 **Appendix B – Robustness Tests**2 *Table I – Robustness tests using meme asset ownership count as a dependent variable*

	<i>Dependent variable: Meme asset ownership count</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Dospert Finance	-0.025***	-0.019***				
Perceptions Score	(0.007)	(0.007)				
Overconfidence			0.196***	0.196***		
Score			(0.036)	(0.033)		
Modified DSM-5					0.108***	0.104***
Score					(0.013)	(0.012)
Owned crypto		0.853***		0.853***		0.854***
(past year)		(0.092)		(0.093)		(0.087)
Age	-0.351***	-0.269***	-0.360***	-0.271***	-0.281***	-0.197***
	(0.042)	(0.040)	(0.042)	(0.040)	(0.041)	(0.039)
Income	-0.006	-0.008	-0.004	-0.005	0.012	0.009
	(0.018)	(0.017)	(0.018)	(0.017)	(0.017)	(0.016)
Education	-0.063	-0.044	-0.063	-0.056	-0.091**	-0.072**
	(0.042)	(0.039)	(0.042)	(0.039)	(0.040)	(0.037)
Male	0.008	-0.093	0.011	-0.094	0.046	-0.057
	(0.098)	(0.091)	(0.100)	(0.093)	(0.093)	(0.087)
Gender (other)	-0.393	-0.615	-0.482	-0.661	-0.505	-0.695
	(0.644)	(0.600)	(0.631)	(0.585)	(0.614)	(0.566)
Widowed	0.506	0.487	0.605	0.583	0.616	0.596
	(0.426)	(0.397)	(0.418)	(0.387)	(0.407)	(0.375)
Divorced	0.064	-0.040	0.213	0.115	0.187	0.083
	(0.208)	(0.194)	(0.211)	(0.196)	(0.200)	(0.184)
Separated	-0.257	-0.190	-0.362	-0.308	-0.209	-0.144
	(0.426)	(0.396)	(0.419)	(0.388)	(0.407)	(0.375)
Never Married	-0.134	-0.140	0.024	0.007	0.035	0.025
	(0.115)	(0.107)	(0.117)	(0.109)	(0.112)	(0.103)
Constant	3.824***	2.845***	3.124***	2.335***	2.455***	1.654***
	(0.376)	(0.365)	(0.341)	(0.327)	(0.336)	(0.321)
Observations	553	553	519	519	553	553
R <sup>2</sup>	0.156	0.272	0.192	0.307	0.232	0.348
Adjusted R <sup>2</sup>	0.141	0.257	0.176	0.292	0.217	0.335
F Statistic	10.051*** (df = 10; 542)	18.332*** (df = 11; 541)	12.035*** (df = 10; 508)	20.440*** (df = 11; 507)	16.327*** (df = 10; 542)	26.249*** (df = 11; 541)

Note: \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

1 Table II – Robustness tests using meme asset ownership count as an independent variable

	<i>Dependent variable</i>					
	<b>Dospert Perceptions</b>		<b>Overconfidence</b>		<b>Modified DSM-5</b>	
	(1)	(2)	(3)	(4)	(5)	(6)
Meme asset ownership count	-0.813*** (0.241)	-0.690*** (0.260)	0.288*** (0.052)	0.332*** (0.056)	0.994*** (0.123)	1.116*** (0.132)
Owned crypto (past year)		-0.753 (0.604)		-0.283** (0.130)		-0.747** (0.307)
Age	0.502** (0.251)	0.471* (0.252)	0.043 (0.054)	0.030 (0.054)	-0.466*** (0.128)	-0.497*** (0.128)
Income	0.068 (0.103)	0.070 (0.103)	-0.022 (0.022)	-0.021 (0.022)	-0.171*** (0.052)	-0.169*** (0.052)
Education	-0.292 (0.236)	-0.301 (0.236)	0.187*** (0.051)	0.186*** (0.050)	0.375*** (0.120)	0.367*** (0.120)
Male	0.081 (0.553)	0.169 (0.557)	-0.140 (0.121)	-0.105 (0.121)	-0.368 (0.282)	-0.280 (0.283)
Gender (other)	4.520 (3.649)	4.751 (3.652)	-0.442 (0.765)	-0.356 (0.763)	0.394 (1.861)	0.623 (1.855)
Widowed	0.808 (2.420)	0.762 (2.419)	-0.631 (0.507)	-0.646 (0.505)	-1.608 (1.234)	-1.654 (1.229)
Divorced	0.776 (1.181)	0.857 (1.182)	-0.616** (0.254)	-0.588** (0.254)	-1.358** (0.602)	-1.277** (0.601)
Separated	-0.302 (2.416)	-0.329 (2.415)	0.749 (0.507)	0.741 (0.505)	-0.171 (1.232)	-0.199 (1.227)
Never Married	0.311 (0.651)	0.332 (0.651)	-0.426*** (0.141)	-0.418*** (0.140)	-1.515*** (0.332)	-1.495*** (0.331)
Constant	24.968*** (2.063)	25.300*** (2.079)	-0.862* (0.444)	-0.740* (0.446)	4.184*** (1.052)	4.514*** (1.056)
Observations	553	553	519	519	553	553
R <sup>2</sup>	0.050	0.052	0.110	0.118	0.205	0.214
Adjusted R <sup>2</sup>	0.032	0.033	0.092	0.099	0.190	0.198
F Statistic	2.830*** (df = 10; 542)	2.717*** (df = 11; 541)	6.271*** (df = 10; 508)	6.172*** (df = 11; 507)	13.981*** (df = 10; 542)	13.366*** (df = 11; 541)

Note: \* p<0.1; \*\* p<0.05; \*\*\* p<0.01