Journal of Numerical Cognition

PsychOpen GOLD

Empirical Research

Math Anxiety and Financial Literacy: The Role of Math Avoidance

Allie Tung[1], Dominic J. Gibson[1]

[1] *foundry10, Seattle, WA, USA.*

Journal of Numerical Cognition, 2026, Vol. 12, Article e17297, https://doi.org/10.5964/jnc.17297

Received: 2025-03-11 • **Accepted:** 2026-03-31 • **Published (VoR):** 2026-07-09

Handling Editor: Christian Peake, Universidad Diego Portales, Santiago, Chile

Corresponding Author: Allie Tung, foundry10, 2157 N Northlake Way Suite 110 Seattle, WA 98103, USA. E-mail: allie@foundry10.org

Supplementary Materials: Code, Data, Materials, Preregistration [see Index of Supplementary Materials]

Abstract

Math anxiety is a pervasive phenomenon that negatively impacts individuals' ability to perform mathematical tasks, yet its implications for functioning in a society where math is often helpful if not necessary remain underexplored. This study examines the relations between math anxiety, financial anxiety, and financial literacy in a nationally representative sample of young adults in the U.S. (n = 393). As math anxiety and financial anxiety have previously been linked to avoidance of mathematical and financial content, we also examined the role of avoidance in their relations to financial literacy. Consistent with prior research, math anxiety, financial anxiety, and gender were related to financial literacy. Further analysis revealed that math-anxious individuals and women showed a greater tendency to avoid responding to financial literacy questions. These findings clarify the negative association between math and financial anxiety and financial literacy, suggesting that a tendency to avoid financial content may help explain the link between math anxiety and financial literacy. This study contributes to a broader understanding of the implications of math anxiety for young people's educational and financial lives and offers insight into the mechanisms that underlie these relations. Insights for interventions targeting math anxiety and their potential for boosting financial literacy are discussed.

Keywords

math anxiety, math avoidance, financial anxiety, financial literacy

Basic mathematical knowledge and the confidence to apply that knowledge are essential for many responsibilities in adulthood, including managing personal finances. Concepts such as percentages, ratios, and probability underlie important financial topics like interest and inflation. However, many individuals struggle with math due to math anxiety, which can impair one's ability to focus and perform in math-related settings (Ashcraft & Moore, 2009). Math anxiety has many negative effects on young people's learning and can even shape their future professional lives (Ashcraft, 2002; Ashcraft & Moore, 2009; Song et al., 2023).

Although a large body of research focuses on the negative consequences of math anxiety (see Luttenberger et al., 2018 for a review), fewer studies have considered the potential implications for individuals' ability to understand and manage their personal finances. Recently, two studies have begun to address this question by identifying possible relations between math anxiety, financial anxiety, and financial literacy (Skagerlund et al., 2018; Storozuk & Maloney, 2023). In addition to seeking to replicate the relations between math anxiety, financial anxiety, and financial literacy in a large, nationally representative sample of young adults in the United States, the current study also investigates the role of avoidance in explaining these relations, as both math anxiety and financial anxiety have been linked to a tendency to avoid situations involving math or financial content (Ashcraft, 2002; Shapiro & Burchell, 2012). These findings can help us better understand the consequences of math anxiety on people's lives and the mechanisms that underlie these consequences.

Math Anxiety

Although math skills are necessary for many professions and everyday tasks, many people struggle to understand and apply mathematical concepts. In addition to cognitive factors (e.g., working memory, attention), a range of affective factors relate to an individual's math performance (see Skagenholt et al., 2025; Wu et al., 2017). Math attitudes such as math enjoyment, self-concept, confidence, and gender stereotypes about math ability have been linked to differences in students' math performance (see Wen & Dubé, 2022 for a review). A particularly important affective factor in math achievement is math anxiety, or feelings of anxiety, tension, or worry when faced with situations involving math (Richardson & Suinn, 1972). Math-anxious individuals may experience anxiety in math classes, while taking math exams, or even in everyday situations like calculating a tip at a restaurant (Luttenberger et al., 2018).

There are several non-mutually exclusive accounts for how math anxiety and math achievement are related (see Lau et al., 2024 for a review). One group of theories, referred to as Reduced Competency Theory, suggests that individuals with low math achievement may tend to develop negative beliefs about their math abilities, which consequently increases their anxiety about math (Maloney & Beilock, 2012; Ramirez et al., 2018). Another class of theories, termed Disruption Theory or Processing Efficiency Theory, indicates

that higher math anxiety may also directly impact math performance by disrupting cognitive processing. Specifically, when faced with a math problem, ruminations related to math anxiety may use working memory resources, hindering an individual's ability to attend to and perform multistep mathematical operations (Ashcraft & Moore, 2009; Ramirez et al., 2018).

A potentially important factor in both classes of theories is math avoidance. Reduced Competency Theory suggests that math avoidance behaviors may develop as another consequence to individuals' negative attitudes toward math. Individuals with these beliefs may avoid math activities because they view them as a threat to their self-esteem (Skaalvik, 2018). Relatedly, Processing Efficiency Theory indicates that math anxiety may directly increase avoidance behaviors. Studies in this area have found that avoidance behaviors such as decreased engagement in math classes and with math homework may mediate the relationship between math anxiety and math achievement (Quintero et al., 2022; Song et al., 2023). The link between math anxiety and avoidance has been observed both in the moment, through avoiding attending to mathematical stimuli (Pizzie & Kraemer, 2017) and solving difficult math problems (Choe et al., 2019), as well as in broader decision-making, such as avoiding taking elective math classes (Ashcraft, 2002) and pursuing careers in STEM fields (Ashcraft & Moore, 2009).

It is especially important to consider these effects for women, as women tend to experience higher levels of math anxiety than men, despite there being a minimal or nonexistent gender gap in math achievement (Dowker et al., 2016). Although multiple possible explanations for women's greater math anxiety have been discussed (see Dowker et al. 2016 for a review), some evidence suggests that gender stereotypes about math (i.e., that women have lower math ability than men) may play an important role. Several studies have suggested that women's belief in these negative stereotypes may help to explain their higher math anxiety (Bieg et al., 2015; Justicia-Galiano et al., 2023).

Math Anxiety and Financial Literacy

While previous studies have primarily focused on understanding the mechanisms through which math anxiety and math achievement are linked, less research has focused on understanding how math anxiety relates to individuals' broader functioning in a numerate society. For instance, financial literacy–an individual's understanding of financial topics and skills–relies on an understanding of basic mathematical concepts. Several recent studies have linked math anxiety to lower financial literacy (Skagerlund et al., 2018; Storozuk & Maloney, 2023). Storozuk and Maloney (2023) investigated how math anxiety relates to different subcomponents of financial literacy and found that math anxiety specifically related to mathematical financial knowledge. Their findings suggested that this relation is partially driven by numeracy, such that individuals with math anxiety lack the numerical skills critical to understanding mathematical financial concepts. However, numeracy does not fully explain the association between math anxiety and financial

literacy (Skagerlund et al., 2018; Storozuk & Maloney, 2023), raising questions about what other factors might help to explain this relation.

Some evidence suggests that the association between math anxiety and math avoidance (Ashcraft, 2002; Ashcraft & Moore, 2009; Choe et al., 2019; Song et al., 2023) may extend to financial contexts, providing another possible link between math anxiety and financial literacy. Several studies have observed that math-anxious individuals may struggle with financial decision-making during tasks related to calculating and comparing item prices (Storozuk et al., 2023; Suri et al., 2013). Specifically, individuals with math anxiety show a greater tendency to avoid difficult price calculations, which may lead to undesirable financial decisions (Feng et al., 2014). An important next step is to explore whether math avoidance may help to explain the relation between math anxiety and financial literacy, especially within the context of other known predictors of financial literacy.

Financial Anxiety and Financial Literacy

Researchers have also investigated financial anxiety as a related but distinct construct from math anxiety. Financial anxiety refers specifically to anxiety or worry about managing one's finances (Gignac et al., 2023) and is fairly common in the U.S., particularly among young adults. One survey found that 69% of 18- to 34-year-olds were anxious about their personal finances (Lin et al., 2022). Financial anxiety tends to be higher among individuals experiencing financial hardship–such as student loans, debt, or unemployment (Archuleta et al., 2013; Hasler et al., 2021)–although national surveys suggest that financial anxiety is prevalent across all income levels (Hasler et al., 2021; Lin et al., 2022). Financial anxiety has also been found to be higher in women than men, even when controlling for other demographics, financial attitudes, and financial standing (Archuleta et al., 2013; Hasler et al., 2021).

Financial anxiety has been linked to lower financial literacy (Gignac et al., 2023; Storozuk & Maloney, 2023; Tinghög et al., 2021). For example, in Storozuk and Maloney's (2023) study, while math anxiety was only related to the mathematical subcomponent of financial knowledge, financial anxiety was related to both mathematical and conceptual financial knowledge. Although research explaining the link between financial anxiety and financial literacy is limited, Shapiro and Burchell (2012) identified one potential feature of this relation. In their study, financially-anxious individuals showed a tendency to avoid attending to and processing financial information. They concluded that individuals with financial anxiety may avoid financial content as a defense mechanism to combat feelings of stress or anxiety. Although the authors did not measure financial literacy in this study, their findings raise important questions about whether avoidance of financial content may help to explain the relation between financial anxiety and financial literacy.

Financial Literacy and the Role of Avoidance

Math anxiety and financial anxiety have both been connected to avoidance of financial content (Feng et al., 2014; Shapiro & Burchell, 2012), which suggests that avoidance may help to explain the relation between these anxieties and financial literacy. However, this question has not been investigated directly. Likewise, the literature on financial literacy has identified several other factors that may be related to both avoidance of financial content and measures of financial literacy. In general, studies that use the 'Big Three' financial literacy measure (Lusardi & Mitchell, 2007) have noted high rates of nonresponses (Brown & Graf, 2013; Lusardi & Streeter, 2023). In one study, over half of participants avoided responding to at least one of the three financial literacy questions, either by selecting "I don't know" or "I prefer not to say" (Lusardi & Streeter, 2023).

Women and individuals with fewer years of formal education typically avoid responding to financial literacy questions more frequently than their counterparts (Brown & Graf, 2013; Lusardi & Streeter, 2023). Although these populations also score lower on financial literacy measures more generally, research indicates that nonresponses should not be fully equated with a lack of knowledge. Indeed, at least one study found that nonresponses were also indicative of participants' lower confidence in their knowledge (Bucher-Koenen et al., 2021, but see Tinghög et al., 2021). This finding raises questions about whether individuals' underlying anxiety about math or financial content may relate to their lower confidence and avoidance of these measures. As of yet, few studies have bridged these two bodies of literature. However, it is necessary to examine the potential role of avoidance in order to more fully understand how math anxiety and financial anxiety relate to financial literacy. Therefore, the current study aimed to address the following research questions: 1) What are the relations between math anxiety, financial anxiety, and financial literacy? 2) Does avoidance of financial content help to explain these relations?

Method

Participants

We recruited a nationally representative sample of young adults in the U.S. through Qualtrics, an online recruitment and survey platform. Participants' data was only recorded if they completed an honesty commitment and successfully answered two attention check questions. Qualtrics also automatically rejected responses that had poor data quality (e.g., straightlining, duplicate responses). One participant was excluded from the sample due to missing data related to key measures. The final sample consisted of 393 participants ranging in age from 18 to 22 (M = 20.32, SD = 1.49). The sample was diverse in terms of gender, race, ethnicity, and income (see Table 1).

Table 1

Participant Demographics

Variable	%	*n*
Gender Identity		
Man	43.26	170
Woman	52.42	206
Non-Binary	3.56	14
Gender not listed	0.51	2
Prefer not to say	0.25	1
Education Level		
Less than high school	4.33	17
High school	39.39	154
Some college (no degree)	37.15	146
2-year/Associate's degree	9.67	38
4-year/Bachelor's degree	7.89	31
Graduate degree	1.78	7
Race		
African American or Black	12.21	48
Asian American or Asian	5.85	23
European American or White	63.61	250
Middle Eastern American or Arab	1.27	5
Multiracial	8.65	34
Native American or American Indian	2.04	8
Pacific Islander	0.51	2
None of these terms describe my identity	3.82	15
Prefer not to say	2.04	8
Ethnicity		
Hispanic, Latino/a, or Spanish origin	18.58	73
No Hispanic, Latino/a, or Spanish origin	81.42	320
Annual Household Income		
$0-25,000	20.36	80
$25,001-50,000	21.88	86
$50,001-75,000	26.46	104
$75,001-100,000	13.49	53
Above $100,000	17.81	70

Procedure

This study received approval from an institutional review board before data collection began. Recruitment was conducted through the Qualtrics platform, which uses online panels to recruit research participants. Qualtrics established quotas for gender, race,

ethnicity, and household income, so that the final sample was nationally representative. Eligible participants completed a survey on the Qualtrics platform, which included a consent form and demographic questions as well as the measures listed below. Participants also completed questions about their social media use and experience with financial advice on social media, which are not reported on here. Participant compensation was managed by Qualtrics, which involved compensating participants based on the length of the survey.

Measures

Math anxiety was measured using the Single-Item Math Anxiety scale (SIMA), which has previously been validated with multiple-item math anxiety scales (Núñez-Peña et al., 2014). Participants rated one statement about their anxiety around math on a scale from 1 (low anxiety) to 5 (high anxiety). Although single-item scales are limited in terms of their internal consistency, the SIMA has been shown to be reliable and have strong score stability (Núñez-Peña et al., 2014). Further, the single-item scale is an easier and more efficient approach when completing survey research with large samples, making it preferable for this study.

The SIMA was also adapted to measure participants' reading anxiety. We used reading anxiety as a control to explore whether any relations between math anxiety, financial anxiety, and financial literacy were unique to those forms of anxiety or whether reading anxiety showed similar patterns.

Financial anxiety was measured using the twelve-item Financial Anxiety Scale (Shapiro & Burchell, 2012). The scale includes items such as "Discussing my finances can make my heart race or make me feel stressed". Participants rated each statement on a scale of 1 (completely untrue) to 4 (very true). The scale was found to be reliable, $\alpha = 0.82$. Participants' financial anxiety score was calculated by averaging their responses to each item.

Financial literacy was measured using the Big Three measure devised by Lusardi and Mitchell (2007). Participants answered three multiple-choice questions assessing their knowledge of interest rates, inflation, and risk diversification. Importantly, all questions in the Big Three measure include nonresponse options (i.e., "I don't know" and "I prefer not to say"), meaning that for each question, participants either select the correct response, an incorrect response, or a nonresponse. Participants' financial literacy was scored by whether or not they selected the correct response for all three questions (Lusardi, 2019). We opted to use this scoring method in order to align with previous studies. Although this approach to scoring the measure treats nonresponses the same as incorrect responses, in our exploratory analyses we separated out these two options. We chose to investigate incorrect responses and nonresponses separately, since some research suggests that nonresponses may specifically reflect individuals' lower confidence about their knowledge (Bucher-Koenen et al., 2021).

Analysis

There was only one missing value in our dataset (0.01% of total data). This participant was excluded from analyses. Analyses between key variables were preregistered before data collection at https://osf.io/6jnwp. In addition, some exploratory analyses were conducted to further explore the relations between math and financial anxiety, avoidance, and financial literacy. All analyses were conducted using R statistical software (v4.2.2; R Core Team, 2022).

Results

Descriptive Statistics

Participants reported a moderate amount of math anxiety and financial anxiety and a lower level of reading anxiety (see Table 2). The majority of participants did not answer the Big Three financial literacy questions correctly (74.30%).

Table 2

Descriptive Statistics and Correlations for Study Variables

			Correlation		
Variable	***M***	***SD***	**1**	**2**	**3**
1. Math anxiety	2.83	1.36	–		
2. Financial anxiety	2.30	0.58	0.34	–	
3. Reading anxiety	1.75	1.09	0.22	0.23	–

Note. Math anxiety and reading anxiety were scored from 1 to 5 and financial anxiety was scored from 1 to 4.

Preregistered Analyses

Math Anxiety, Financial Anxiety, and Reading Anxiety as a Function of Financial Literacy

Participants who could not answer all of the Big Three financial literacy questions correctly reported significantly higher math anxiety and financial anxiety than those who did answer all three financial literacy questions correctly (see Table 3). To understand the extent to which the associations between financial literacy and math and financial anxiety were unique to these types of anxiety, we also measured reading anxiety. To compare reading anxiety scores, we used a Welch *t*-test and calculated Cohen's *d* using a pooled standard deviation to account for unequal variances between the two groups. Although participants' reading anxiety was relatively low and the differences between participants were smaller, participants who could not answer all of the Big Three financial literacy

questions correctly did report significantly higher levels of reading anxiety than those who could.

Table 3

Differences in Math Anxiety, Financial Anxiety, and Reading Anxiety by Financial Literacy

	Answered all three financial literacy questions correctly						
	Yes (n = 101)		No (n = 292)				
Variable	***M***	***SD***	***M***	***SD***	***t*(391)**	***p***	**Cohen's *d***
Math anxiety	2.31	1.40	3.01	1.31	-4.60	< .001	-0.53
Financial anxiety	2.11	0.60	2.37	0.56	-3.83	< .001	-0.44
Reading anxiety	1.47	0.79	1.85	1.16	-3.72	< .001	-0.34

The Association Between Math Anxiety and Financial Anxiety

There was a significant positive correlation between math anxiety and financial anxiety, r = .34, p < .001, suggesting that individuals with higher levels of math anxiety also tended to have higher financial anxiety. A partial correlation found that the relation between math anxiety and financial anxiety remained when controlling for reading anxiety, r = .31, p < .001. This finding indicates that the connection between math anxiety and financial anxiety may be somewhat unique and not explainable by other types of anxiety.

Exploratory Analyses

Additional Factors Related to Financial Literacy

We conducted an exploratory logistic regression to further clarify the roles of math anxiety and financial anxiety in predicting financial literacy. We additionally included demographic variables as potential predictors to explore what other factors may relate to financial literacy. For the following analyses, participants who did not identify as a man or woman were excluded (n = 17). Descriptive statistics for key variables by participant gender are provided in the Supplementary Materials. The model was fit using a forward stepwise procedure; predictors were individually added to the model and the Akaike Information Criterion (AIC) was assessed at each step to determine whether the added predictor significantly improved model fit. Predictors were added sequentially until no further significant improvement in AIC was observed.

Several diagnostic measures were used to assess the fit of the model. The final model was statistically significant, $\chi^2(4, N = 376 \text{ participants}) = 53.44$, p < .001, and had a lower AIC (baseline AIC = 433.44, final AIC = 388.00), suggesting that it provided an improved fit relative to the intercept-only model. The Variance Inflation Factor (VIF) for each

predictor was less than 5, indicating a lack of multicollinearity among predictors. Tjur's R^2 indicated that the model explained 14% of the variance in financial literacy level.

The final model found that math anxiety, financial anxiety, gender, and education level significantly predicted financial literacy (see Table 4). The inclusion of both math anxiety and financial anxiety in the model suggests that each construct uniquely contributed to explaining financial literacy. Additional variance in financial literacy was explained by the demographic variables, such that men and individuals with more years of formal education had a higher likelihood of answering the Big Three questions correctly.

Table 4

Summary of Logistic Regression Model Predicting Financial Literacy

Variable	β	*OR*	*SE*	95% CI for *OR* [*LL, UL*]	*z*	*p*
Intercept	-1.00	0.37	0.65	[0.10, 1.30]	-1.54	.123
Math anxiety	-0.27	0.76	0.10	[0.62, 0.93]	-2.60	.009**
Financial anxiety	-0.50	0.61	0.23	[0.38, 0.95]	-2.15	.032*
Gender (0 = woman, 1 = man)	0.83	2.28	0.26	[1.37, 3.83]	3.16	.002**
Education level	0.46	1.59	0.11	[1.28, 2.00]	4.06	< .001***

*p < .05. **p < .01. ***p < .001.

The Role of Avoidance in Measuring Financial Literacy

Prior studies have linked math anxiety and financial anxiety to avoidance of financial content (Feng et al., 2014; Shapiro & Burchell, 2012). Based on these studies, we suspected that some of the relation between math and/or financial anxiety and financial literacy may be explained by participants who scored high on those measures avoiding answering the financial literacy questions. To measure avoidance, we used the nonresponse options included in the Big Three financial literacy measure (i.e., "I don't know", "I prefer not to say").

To explore the role of avoidance in the relations between math anxiety, financial anxiety, and financial literacy, we ran two additional generalized linear mixed models. The first model included all financial literacy questions and predicted the likelihood of participants not responding to that question (N = 1,128 responses from 376 participants). The second model predicted the likelihood of participants responding to a financial literacy question incorrectly. For the second model, questions with nonresponses were removed to focus only on whether participants responded incorrectly to questions that they actually answered (N = 822 responses from 349 participants). In addition to math anxiety and financial anxiety, we included the demographic predictors identified in the original linear model (i.e., gender and education level). Both models included participant-

level and question-level random effects to account for participants answering multiple questions and for variability in difficulty across the three questions.

There was a significantly improved fit compared to a random intercept-only model for both the nonresponse model, $\chi^2(4, N = 1{,}128) = 62.24$, $p < .001$ (baseline AIC = 1157.50; final AIC = 1103.26), and incorrect response model, $\chi^2(4, N = 822) = 39.68$, $p < .001$ (baseline AIC = 830.93; final AIC = 799.26). The VIF for all predictors was below 5, indicating a lack of multicollinearity. See Table 5 for a summary of both models.

Table 5

Summary of Generalized Linear Mixed Models Predicting Financial Literacy Responses

Variable	β	*OR*	*SE*	95% CI for *OR* [*LL*, *UL*]	*z*	*p*
Model 1: Nonresponses						
Intercept	-1.05	0.35	0.86	[0.06, 1.90]	-1.22	.224
Math anxiety	0.28	1.33	0.09	[1.10, 1.60]	3.01	.003**
Financial anxiety	0.26	1.30	0.22	[0.84, 2.00]	1.18	.237
Gender (0 = woman, 1 = man)	-1.04	0.35	0.25	[0.22, 0.58]	-4.10	< .001***
Education level	-0.53	0.59	0.13	[0.46, 0.75]	-4.25	< .001***
Model 2: Incorrect responses						
Intercept	-2.63	0.07	0.67	[0.02, 0.27]	-3.92	< .001***
Math anxiety	0.26	1.30	0.08	[1.11, 1.52]	3.21	.001**
Financial anxiety	0.54	1.72	0.19	[1.20, 2.48]	2.92	.003**
Gender (0 = woman, 1 = man)	-0.24	0.79	0.21	[0.53, 1.18]	-1.17	.243
Education level	-0.24	0.78	0.10	[0.65, 0.95]	-2.49	.013*

*$p < .05$. **$p < .01$. ***$p < .001$.

Math anxiety, but not financial anxiety, significantly predicted nonresponses, such that higher math anxiety predicted an increased tendency to avoid answering a financial literacy question. Women and individuals with fewer years of formal education also had a higher likelihood of not responding to financial literacy questions. In contrast, both math anxiety and financial anxiety predicted the likelihood of answering questions incorrectly. While education level remained significant, gender was not significantly related to answering questions incorrectly. Therefore, math anxiety was associated with an increased likelihood of answering financial literacy questions incorrectly and an increased likelihood of avoiding financial literacy questions entirely. In contrast, financial anxiety only related to the likelihood of providing an incorrect response, while gender only related to the likelihood of avoiding responding.

Discussion

While math anxiety is known to have negative consequences for young people's educational and professional futures, the current study adds to an emerging understanding of math anxiety's implications for individuals' financial lives (Feng et al., 2014; Skagerlund et al., 2018; Storozuk & Maloney, 2023). In this study, we found that both math anxiety and financial anxiety related to lower financial literacy. Math anxiety and financial anxiety were moderately correlated with each other, but both were included in our final model, suggesting that they each uniquely contributed to explaining financial literacy. This finding strengthens past research identifying relations between math anxiety, financial anxiety, and financial literacy among adults in Sweden (Skagerlund et al., 2018) and Canada (Storozuk & Maloney, 2023) by highlighting similar relations among a nationally representative sample of young adults in the United States. The inclusion of both math anxiety and financial anxiety in our model may support Storozuk and Maloney's conclusions that these constructs relate to different subcomponents of financial literacy.

Math Anxiety, Avoidance, and Financial Literacy

Our study identified two mechanisms that may underlie the negative relation between math anxiety and financial literacy. First, math anxiety was related to the likelihood of answering a financial literacy question incorrectly. This finding aligns with previous work on the topic, which has primarily explained the link between math anxiety and financial literacy in terms of math-anxious individuals' lower mathematical financial knowledge (Storozuk & Maloney, 2023). However, previous studies have raised questions about unidentified mechanisms that help to explain the relation between math anxiety and financial literacy (Skagerlund et al., 2018; Storozuk & Maloney, 2023). Our study suggests that math avoidance may be another pathway through which these factors relate. Higher math anxiety, but not financial anxiety, was associated with a greater tendency to avoid financial literacy questions. Although math-anxious individuals are known to avoid situations involving difficult math problems (Choe et al., 2019) and financial calculations (Feng et al., 2014), it has not yet been shown that they are more likely to avoid financial literacy questions specifically.

Both Reduced Competency Theory and Processing Efficiency Theory offer possible explanations for the role of avoidance in the relationship between math anxiety and financial literacy. One possibility, in line with Reduced Competency Theory, is that individuals with low math achievement tend to hold negative attitudes about math, which subsequently leads to the development of both math anxiety and math avoidance behaviors (see Lau et al., 2024). In this context, participants in our study may avoid financial literacy questions because of previous struggles with math performance and negative attitudes toward their ability on tasks involving math. Similarly, Processing Efficiency Theory suggests that math anxiety may directly impact math avoidance (see

Lau et al., 2024). From this perspective, participants' math anxiety may lead them to avoid engaging in tasks that they find stressful, such as financial literacy questions involving mathematical concepts. While further research should continue examining the links between these related constructs, our findings nevertheless support both theories' inclusion of math avoidance as an important behavioral factor associated with math anxiety and performance.

Our findings about the role of avoidance are especially concerning considering that there is no mandatory financial education in the US and personal finance courses are often offered only as electives (Council for Economic Education, 2024). Math anxiety has previously been linked to avoidance of math classes (Ashcraft, 2002), and it is therefore possible that math-anxious students may also be less likely to enroll in personal finance classes. Future research could explore this connection to understand the extent to which math anxiety may relate to longer-term avoidance of financial content and situations.

Additional Factors Related to Financial Literacy

We also examined financial anxiety to see whether it had a similar relation to financial literacy. Interestingly, although financial anxiety was related to lower financial literacy, it was not related to avoidance of financial literacy questions. Although there is prior evidence for a link between financial anxiety and avoidance of financial content (Shapiro & Burchell, 2012), our findings suggest that financial anxiety may not play a significant role in avoidance of financial literacy questions after accounting for math anxiety. This finding could indicate that financial anxiety specifically relates to lower knowledge about financial topics (Storozuk & Maloney, 2023) but may not be associated with individuals' confidence in their knowledge. However, as there are relatively few studies in this area, it is difficult to draw a conclusion about the relation between financial anxiety and avoidance. Further research is needed to establish whether financial anxiety may also relate to avoidance of financial literacy questions or whether that is unique to math anxiety.

We also found that women and participants with fewer years of formal education had lower financial literacy, even accounting for differences in math anxiety and financial anxiety. This finding is consistent with past research, which has found that although these anxieties are known to vary by gender (Dowker et al., 2016; Hasler et al., 2021), there is still a remaining effect of gender on financial literacy (Skagerlund et al., 2018; Storozuk et al., 2023). Our study suggests that women's tendency to avoid financial literacy questions may help to explain this remaining difference. When we examined just the financial literacy questions that participants responded to, we did not see a gender difference in their likelihood of responding correctly. This suggests that lower confidence may help to explain women's lower performance on financial literacy questions (Bucher-Koenen et al., 2021). Future research and educational efforts could also consider whether stereotype threat may play a role in this behavior. Research has found that informing

women about stereotype threat can eliminate gender gaps in math performance (Johns et al., 2005), suggesting this could be a promising avenue for boosting women's confidence and performance on financial literacy measures as well.

Limitations and Future Directions

It is important to note several limitations that can inform future research. First, recent studies have suggested that the Big Three financial literacy measure may be confounded with numeracy, as two out of the three questions involve numerical calculation (Storozuk & Maloney, 2023). We selected the Big Three measure because it is one of the most widely accepted and used measures of financial literacy (Lusardi & Mitchell, 2011) and it has been used in a previous study involving math anxiety (Skagerlund et al., 2018). However, its reliance on mathematical questions is important to note within this study, as it makes it difficult to separate out the mathematical and financial content. Storozuk and Maloney's (2023) study adds important context to our findings; they found that math anxiety related to mathematical, but not conceptual, financial literacy questions. Similarly, their findings could suggest that math anxiety might not be related to avoidance of non-mathematical financial literacy questions, though their study did not examine avoidance. Further investigation into the types of financial questions and experiences math-anxious young adults avoid is necessary for supporting math-anxious individuals who are reluctant to engage with financial content.

Future research could also expand on this study by including separate measures of avoidance and financial literacy. We used the nonresponse options in the Big Three financial literacy measure to measure participants' avoidance, but independent measures of financial literacy and financial avoidance could further clarify the mechanisms through which math anxiety and financial literacy are related. Finally, using a multi- rather than single-item scale to measure math anxiety could help establish the robustness of the present findings and provide further insight into the specific connections between math anxiety and financial literacy.

Conclusion

It is important for both researchers and practitioners to understand the variety of ways that math anxiety may interact with and potentially shape students' education, both in math itself and related topics such as financial education. Our study emphasizes the potential implications for young people's financial literacy, which in turn can inform future financial behaviors and wellbeing (Lusardi & Streeter, 2023). Specifically, math anxious individuals may exhibit lower financial literacy due to both lower performance on financial literacy questions and a greater tendency to avoid answering these questions. These findings suggest that efforts to improve young people's mathematical knowledge and confidence may also be effective in promoting financial literacy.

Funding: The authors have no funding to report.

Acknowledgments: The authors have no additional (i.e., non-financial) support to report.

Competing Interests: The authors have declared that no competing interests exist.

Data Availability: All research data, code, and materials to replicate the findings of this study are publicly available (Tung & Gibson, 2026S-a, 2026S-b, 2026S-c).

Supplementary Materials

The Supplementary Materials contain the following items:

- **Preregistration** (Tung & Gibson, 2022S)
- **Research Data and Codebook** (Tung & Gibson, 2026S-a)
  - *Dataset (CSV):* Full dataset including demographics (age, education, income, race, ethnicity, gender), domain-specific anxiety (math, finance, reading), and financial literacy
  - *Codebook (CSV):* Variable definitions and coding schemes
- **Code** (Tung & Gibson, 2026S-b)
- **Additional Materials** (Tung & Gibson, 2026-c)
  - Descriptive statistics by participant gender

Index of Supplementary Materials

Tung, A., & Gibson, D. J. (2022S). *Financial literacy, financial anxiety, and math anxiety in young adults - Addendum 11/9/22* [Preregistration]. OSF Registries. https://osf.io/6jnwp

Tung, A., & Gibson, D. J. (2026S-a). *Supplementary materials to "Math anxiety and financial literacy: The role of math avoidance"* [Research data and codebook]. PsychOpen GOLD. https://doi.org/10.23668/psycharchives.22277

Tung, A., & Gibson, D. J. (2026S-b). *Supplementary materials to "Math anxiety and financial literacy: The role of math avoidance"* [Code]. PsychOpen GOLD. https://doi.org/10.23668/psycharchives.22278

Tung, A., & Gibson, D. J. (2026S-c). *Supplementary materials to "Math anxiety and financial literacy: The role of math avoidance"* [Additional materials]. PsychOpen GOLD. https://doi.org/10.23668/psycharchives.22279

References

Archuleta, K. L., Dale, A., & Spann, S. M. (2013). College students and financial distress: Exploring debt, financial satisfaction, and financial anxiety. *Journal of Financial Counseling and Planning, 24*(2), 50–62.

Ashcraft, M. H. (2002). Math anxiety: Personal, educational, and cognitive consequences. *Current Directions in Psychological Science, 11*(5), 181–185. https://doi.org/10.1111/1467-8721.00196

Ashcraft, M. H., & Moore, A. M. (2009). Mathematics anxiety and the affective drop in performance. *Journal of Psychoeducational Assessment, 27*(3), 197–205. https://doi.org/10.1177/0734282908330580

Bieg, M., Goetz, T., Wolter, I., & Hall, N. C. (2015). Gender stereotype endorsement differentially predicts girls' and boys' trait-state discrepancy in math anxiety. *Frontiers in Psychology, 6*, Article 1404. https://doi.org/10.3389/fpsyg.2015.01404

Brown, M., & Graf, R. (2013). Financial literacy and retirement planning in Switzerland. *Numeracy, 6*(2), Article 6. https://doi.org/10.5038/1936-4660.6.2.6

Bucher-Koenen, T., Alessie, R. J., Lusardi, A., & van Rooij, M. (2021). *Fearless woman: Financial literacy and stock market participation* (Working Paper 28723). National Bureau of Economic Research. https://doi.org/10.3386/w28723

Choe, K. W., Jenifer, J. B., Rozek, C. S., Berman, M. G., & Beilock, S. L. (2019). Calculated avoidance: Math anxiety predicts math avoidance in effort-based decision-making. *Science Advances, 5*(11), Article eaay1062. https://doi.org/10.1126/sciadv.aay1062

Council for Economic Education. (2024). *Survey of the states 2024.* https://www.councilforeconed.org/wp-content/uploads/survey-of-states-2024.pdf

Dowker, A., Sarkar, A., & Looi, C. Y. (2016). Mathematics anxiety: What have we learned in 60 years? *Frontiers in Psychology, 7*, Article 508. https://doi.org/10.3389/fpsyg.2016.00508

Feng, S., Suri, R., & Bell, M. (2014). Does classical music relieve math anxiety? Role of tempo on price computation avoidance. *Psychology and Marketing, 31*(7), 489–499. https://doi.org/10.1002/mar.20710

Gignac, G. E., Gerrans, P., & Andersen, C. B. (2023). Financial literacy mediates the effect between verbal intelligence and financial anxiety. *Personality and Individual Differences, 203*, Article 112025. https://doi.org/10.1016/j.paid.2022.112025

Hasler, A., Lusardi, A., & Valdes, O. (2021). *Financial anxiety and stress among U.S. households: New evidence from the National Financial Capability Study and Focus Groups.* FINRA Investor Education Foundation and Global Financial Literacy Excellence Center. https://gflec.org/wp-content/uploads/2021/04/Anxiety-and-Stress-Report-GFLEC-FINRA-FINAL.pdf

Johns, M., Schmader, T., & Martens, A. (2005). Knowing is half the battle: Teaching stereotype threat as a means of improving women's math performance. *Psychological Science, 16*(3), 175–179. https://doi.org/10.1111/j.0956-7976.2005.00799.x

Justicia-Galiano, M. J., Martín-Puga, M. E., Linares, R., & Pelegrina, S. (2023). Gender stereotypes about math anxiety: Ability and emotional components. *Learning and Individual Differences, 105*, Article 102316. https://doi.org/10.1016/j.lindif.2023.102316

Lau, N. T. T., Ansari, D., & Sokolowski, H. M. (2024). Unraveling the interplay between math anxiety and math achievement. *Trends in Cognitive Sciences, 28*(10), 937–947. https://doi.org/10.1016/j.tics.2024.07.006

Lin, J. T., Bumcrot, C., Mottola, G., Valdes, O., Ganem, R., Kieffer, C., Walsh, G., & Lusardi, A. (2022). *Financial capability in the United States: Highlights from the FINRA Foundation National Financial Capability Study*. FINRA Investor Education Foundation. https://finrafoundation.org/sites/finrafoundation/files/NFCS-Report-Fifth-Edition-July-2022.pdf

Lusardi, A. (2019). Financial literacy and the need for financial education: Evidence and implications. *Swiss Journal of Economics and Statistics, 155*(1), Article 1. https://doi.org/10.1186/s41937-019-0027-5

Lusardi, A., & Mitchell, O. S. (2007). *Financial literacy and retirement preparedness: Evidence and implications for financial education programs* (Research Paper No. WP 2006-144). Michigan Retirement Research Center. http://www.ssrn.com/abstract=957796

Lusardi, A., & Mitchell, O. S. (2011). *Financial literacy around the world: An overview* (Working Paper No. 17107). National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w17107/w17107.pdf

Lusardi, A., & Streeter, J. L. (2023). Financial literacy and financial well-being: Evidence from the US. *Journal of Financial Literacy and Wellbeing, 1*(2), 169–198. https://doi.org/10.1017/flw.2023.13

Luttenberger, S., Wimmer, S., & Paechter, M. (2018). Spotlight on math anxiety. *Psychology Research and Behavior Management, 11*, 311–322. https://doi.org/10.2147/PRBM.S141421

Maloney, E. A., & Beilock, S. L. (2012). Math anxiety: Who has it, why it develops, and how to guard against it. *Trends in Cognitive Sciences, 16*(8), 404–406. https://doi.org/10.1016/j.tics.2012.06.008

Núñez-Peña, M. I., Guilera, G., & Suárez-Pellicioni, M. (2014). The Single-Item Math Anxiety Scale: An alternative way of measuring mathematical anxiety. *Journal of Psychoeducational Assessment, 32*(4), 306–317. https://doi.org/10.1177/0734282913508528

Pizzie, R. G., & Kraemer, D. J. M. (2017). Avoiding math on a rapid timescale: Emotional responsivity and anxious attention in math anxiety. *Brain and Cognition, 118*, 100–107. https://doi.org/10.1016/j.bandc.2017.08.004

Quintero, M., Hasty, L., Li, T., Song, S., & Wang, Z. (2022). A multidimensional examination of math anxiety and engagement on math achievement. *British Journal of Educational Psychology, 92*(3), 955–973. https://doi.org/10.1111/bjep.12482

Ramirez, G., Shaw, S. T., & Maloney, E. A. (2018). Math anxiety: Past research, promising interventions, and a new interpretation framework. *Educational Psychologist, 53*(3), 145–164. https://doi.org/10.1080/00461520.2018.1447384

R Core Team. (2022). *R: A language and environment for statistical computing* [Software]. R Foundation for Statistical Computing. https://www.R-project.org/

Richardson, F. C., & Suinn, R. M. (1972). The Mathematics Anxiety Rating Scale: Psychometric data. *Journal of Counseling Psychology, 19*(6), 551–554. https://doi.org/10.1037/h0033456

Shapiro, G. K., & Burchell, B. J. (2012). Measuring financial anxiety. *Journal of Neuroscience, Psychology, and Economics, 5*(2), 92–103. https://doi.org/10.1037/a0027647

Skaalvik, E. M. (2018). Mathematics anxiety and coping strategies among middle school students: Relations with students' achievement goal orientations and level of performance. *Social Psychology of Education, 21*(3), 709–723. https://doi.org/10.1007/s11218-018-9433-2

Skagenholt, M., Skagerlund, K., & Träff, U. (2025). Numerical cognition across the lifespan: A selective review of key developmental stages and neural, cognitive, and affective underpinnings. *Cortex, 184*, 263–286. https://doi.org/10.1016/j.cortex.2025.01.005

Skagerlund, K., Lind, T., Strömbäck, C., Tinghög, G., & Västfjäll, D. (2018). Financial literacy and the role of numeracy–How individuals' attitude and affinity with numbers influence financial literacy. *Journal of Behavioral and Experimental Economics, 74*, 18–25. https://doi.org/10.1016/j.socec.2018.03.004

Song, S., Li, T., Quintero, M., & Wang, Z. (2023). The link between math anxiety and math achievement: The role of afterschool learning. *Journal of Numerical Cognition, 9*(3), 418–432. https://doi.org/10.5964/jnc.11325

Storozuk, A., & Maloney, E. A. (2023). What's math got to do with it? Establishing nuanced relations between math anxiety, financial anxiety, and financial literacy. *Journal of Risk and Financial Management, 16*(4), Article 238. https://doi.org/10.3390/jrfm16040238

Storozuk, A., Retanal, F., & Maloney, E. A. (2023). Consumers with math anxiety, a financially vulnerable group? Unpacking the negative relation between math anxiety and performance on a price comparison task. *Journal of Numerical Cognition, 9*(1), 1–15. https://doi.org/10.5964/jnc.10001

Suri, R., Monroe, K. B., & Koc, U. (2013). Math anxiety and its effects on consumers' preference for price promotion formats. *Journal of the Academy of Marketing Science, 41*(3), 271–282. https://doi.org/10.1007/s11747-012-0313-6

Tinghög, G., Ahmed, A., Barrafrem, K., Lind, T., Skagerlund, K., & Västfjäll, D. (2021). Gender differences in financial literacy: The role of stereotype threat. *Journal of Economic Behavior & Organization, 192*, 405–416. https://doi.org/10.1016/j.jebo.2021.10.015

Wen, R., & Dubé, A. K. (2022). A systematic review of secondary students' attitudes towards mathematics and its relations with mathematics achievement. *Journal of Numerical Cognition, 8*(2), 295–325. https://doi.org/10.5964/jnc.7937

Wu, S. S., Chen, L., Battista, C., Smith Watts, A. K., Willcutt, E. G., & Menon, V. (2017). Distinct influences of affective and cognitive factors on children's non-verbal and verbal mathematical abilities. *Cognition, 166*, 118–129. https://doi.org/10.1016/j.cognition.2017.05.016

Journal of Numerical Cognition (JNC) is the official journal of the Mathematical Cognition and Learning Society (MCLS).

PsychOpen GOLD is a publishing service provided by the Leibniz Institute for Psychology (ZPID), Germany.

Journal of Numerical Cognition
2026, Vol. 12, Article e17297
https://doi.org/10.5964/jnc.17297