Measuring Financial Anxiety

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There is a scarcity of information concerning the emotional aspects of financial management. Two studies were conducted to evaluate the measurement of conscious and intuitive emotional anxiety toward one's personal finances. Along with a self-reported financial anxiety questionnaire, a modified Emotional Stroop Test (EST) and Dot-Probe Paradigm (DPP) were separately utilized to evaluate financial anxiety. In both studies, the self-reported financial anxiety questionnaire correlated significantly with the implicit measures. Furthermore, the DPP was predominantly characterized by avoidance of financial information. Financial anxiety was shown to be a separate construct from depression and general anxiety. These findings indicate that those who report having financial anxiety also display reaction latencies in the processing of financial information. Accordingly, financial behavior could be more comprehensively evaluated and policy could be better determined by incorporating financial anxiety into economic models of financial illiteracy, mismanagement, and debt.

Keywords: financial anxiety, dot-probe paradigm, emotional Stroop Test, student debt, financial policy

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The ability to make informed and effective decisions regarding the management of money is important for individual success (Jorgensen, 2007). The requirement for financial competence is particularly essential in the current financial climate. Instead, individuals display surprisingly poor financial literacy and a widespread lack of knowledge on fundamental economic concepts (Jump$tart Coalition, 2004; NCEE, 2005; Warwick & Mansfield, 2000), patterns of overspending (Roberts & Jones, 2001), and careless financial behavior (Henry, Weber, & Yarbrough, 2001). These problems are interlinked and financial illiteracy has been associated with both financial mismanagement (Hastings & Tejeda-Ashton, 2008) and debt (Lusardi & Tufano, 2009). The combined result is that individuals find themselves in substantial debt that can leave them seriously indebted for years, situated in a "debt cycle" (Beal & Delphachitra, 2003; Wang & Xiao, 2009).

Debt is not only problematic in itself, but is related to negative psychological repercussions including a decreased sense of ability to manage one's money, lower self-esteem, decreased sense of financial wellbeing, lower productivity, and higher levels of overall stress (Garman, Leech, & Grable, 1996; Joo & Grable, 2000; Lange & Byrd, 1998). This is exemplified by Roberts, Golding, Towell, and Weinreb's (1999) finding that British students who have considered leaving university for financial reasons were more likely to report poorer mental health and social functioning. Furthermore, in a nationally representative household sample, Jenkins et al. (2008) found that 23.8% of people with a mental disorder (i.e., neurotic disorder, psychotic disorder, alcohol dependence, or drug dependence) were in debt compared to 8.1% of people without these disorders, and the more debts people had, the more likely they were to have a mental disorder. Future research would

be beneficial in determining the causal pathways of debt and mental illness.

The combination of financial illiteracy and mismanagement denotes that a substantial number of individuals face the foreseeable risk of considerable debt and associated psychological difficulties (Warwick & Manfield, 2000). Researchers and policymakers have generally assumed that a lack of knowledge is responsible for financial illiteracy and mismanagement (though a causal link has not been proven to the authors' knowledge). Contrary to this view, there is beginning to be awareness of the important emotional component to effective decision making and financial competence (Burchell, 2003; Hanoch, 2002). While initially it became recognized through neurobiological studies that an absence of emotions leads to suboptimal decisions (Damasio, 1994), psychological research has confirmed that strong emotional responses are also associated with poor decisions (particularly those of a financial nature) (Ackert, Church, & Deaves, 2003). As Rolls (1999) explains, positive feelings improve individuals' ability to organize and assimilate information, problem-solve, negotiate, and make efficient decisions. Burchell's (2002) combination of in-depth interviews followed by a telephone survey of 1,000 adults suggested that avoidant reactions were specific to personal finances, and did not necessarily spill over into other domains such as financial responsibilities in the workplace. Furthermore, Burchell (2002) found that out of three psychometrically sound subscales measuring "knowledge," "importance" and "emotion" toward finances, the emotional scale was the best predictor of financial behavior.

Based on this emerging research, it seems plausible that a strong negative emotional response of financial anxiety is associated with financial illiteracy and mismanagement. Financial anxiety has been defined as a psychosocial syndrome whereby individuals have an uneasy and unhealthy attitude toward engaging with, and administering their personal finances in an effective way (Burchell, 2003); this study gave rise to the term *financial phobia* being widely discussed in the popular media. However, financial anxiety, despite having important repercussions for understanding financial behavior, remains largely understated and uninvestigated. The purpose of the two studies described below

was to add to the relatively meager literature by investigating financial anxiety through developing a self-report questionnaire (FAS) and adapting intuitive tools (the Emotional Stroop Test and the Dot-Probe Paradigm) to measure this phenomenon.

Methodological Note

The measurement of individuals' financial anxiety toward dealing with their personal finances remains largely uninvestigated and no tools (to the authors' knowledge) currently measure this phenomenon. However, tools developed in recent years and applied to the measurement of other phobias might be usefully employed to measure financial anxiety.

The construct of financial anxiety developed from investigations of financial attitudes (Lim & Sng, 2006). It is therefore not surprising that the few self-report measures that test for financial anxiety are subscales developed to measure more general, "multidimensional" money attitudes. The two foremost money-attitudes measures are Yamauchi and Templer's (1982) Money Attitude Scale (MAS), and Furnham's (1984) Money Beliefs and Behavior Scale (MBBS). There is encouraging overlap between these scales (Roberts & Jones, 2001), but while the longer (60-item) MBBS has been criticized for low reliability, the (29-item) MAS has instead shown stable factor structure and loadings in multinational and ethnically diverse samples (Baker & Hagedorn, 2008; Medina, Saegert, & Gresham, 1996). However, neither of these anxiety subscales would be applicable to studying financial anxiety because questions on these subscales were consumer specific (e.g., "I am bothered when I have to pass up a sale") and inappropriate for measuring general financial anxiety among all ages (e.g., "I save now to prepare for my old age"). Only Burchell (2003) has created a self-report (5-item) scale measuring general emotional orientation of individuals toward their personal finances.

That emotional responses have been associated with psychophysiological signals (Damasio, 1994) indicates that financial anxiety can be measured by subconscious measures as well as conscious, subjective reports. Researchers have studied emotion's interference with attention through utilizing different variants of the Stroop task or the Dot-Probe Paradigm. In order to

measure financial anxiety, the two studies presented in this paper developed a self-reported Financial Anxiety Scale (FAS) and adapted two well-established implicit instruments (i.e., Emotional Stroop Test and Dot-Probe Paradigm), which have not hitherto been applied to measuring financial anxiety. These tools were developed to measure financial anxiety and investigate how reported financial anxiety is related to the involuntary processing bias of financial anxiety.

As Miu, Miclea, and Houser (2008) explain, the theoretical and methodological changes in studying emotions have stemmed from multi-disciplinary efforts bridging psychology, physiology and neuroscience. These studies extend this works in its methodology of measuring financial anxiety.

Study 1

The first study utilized the Emotional Stroop Test (EST), which is commonly used to demonstrate the existence of attentional biases in a wide range of psychological disorders (Williams, Macleod, & Mathews, 1996). In the EST, emotionally relevant ("threat") words have been found to capture the attention of the individual and cause an attentional bias toward threatening information (Amir et al., 1996; Williams et al., 1996).

Though a popular methodology to test a wide range of anxieties, the EST has not been adapted to measure financial anxiety. This study adapted the EST to measure a subliminal bias to financial words and developed a financial anxiety scale (FAS) to measure self-reported financial anxiety. This study seeks to evaluate whether a reported financial anxiety is related to a subliminal bias in processing financially loaded words.

Hypothesis. It was hypothesized that there would be a negative relationship between the difference in RTs of the financial and neutral words on the FEST with the self-reported responses on the Financial Anxiety Scale (FAS).[1]

Method

Participants. The participants in this study were 38 unpaid volunteers, 22 males and 16

females, 19–22 years of age [M = 20.17, *SD* = .78], who were full-time undergraduate students responding to fliers and emails. Similar to Rofey, Corcoran, and Tran (2004), this study excluded those participants who were colorblind as this would have been problematic on the Emotional Stroop Test, as well as those who are not fluent in English.

Instruments and measures.

Financial Emotional Stroop Test (FEST). The Financial Emotional Stroop Test (FEST) used eight words that were presented twice in four different colors (as in the original Stroop): red, green, blue, and yellow (see Table 1). The four different colors must be read aloud, while ignoring the word that is colored. For example, the word *overdraft* colored in blue must be read as *blue*, and the presentation of the word *overdraft* should be ignored.

There are three groups of words in the FEST: (1) a "classic condition" whereby classic incongruent color words were presented, (2) a "financial condition" with financially loaded words, and (3) a "control condition" with neutral words that correspond to the financial condition (see Table 1). The classic words were based upon the original Stroop Test (Stroop, 1935), whereas the financial group of words and their neutral counterparts were designed for this experiment.

Using a computer ST opposed to a card ST was disregarded based on Kindt, Bierman, and Brosschot's (1996) study that showed "the highest test–retest correlation for the standard Stroop effect was found on the card format" (p.659). As specified in the German adaptation of the Stroop, participants in this study were instructed to read the colors of the words column-wise as quickly and accurately as possible (Baumler et al., 1985 as reported by Stetter, Ackermann, Bizer, Straube, & Mann, 1995). Word length and syllables in the financial and neutral-control group of words were matched so that word length and subvocalized reading was controlled (see Table 1).

Financial Anxiety Scale (FAS). The (FAS) measures an anxious disposition toward cognitive engagement with one's personal fi-

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[1] A greater difference in RTs of the financial and neutral words on the FEST indicates greater financial anxiety, while a greater score of the FAS indicates less financial anxiety.

Table 1
Groups of Words Used in FEST

	Classic condition	Financial condition	Control condition
	Orange	Overdraft	Navigates
	Green	Credit	Apron
	Brown	Bank	Shoe
	Purple	Loan	Chair
	Turquoise	Cost	Frog
	Yellow	Account	Mantle
	Red	Debt	Port
	Blue	Finances	Cinemas
Total number of syllables	12	14	14
Total number of letters	44	46	44

Note. A color version of this table is available online as Supplementary Material.

nances (see Table 2).[2] Some of the questions were borrowed from Burchell (2003) and Davies and Lea (1995), while the authors formulated other questions. Lower numbers indicate a higher level of financial anxiety on this 4-point Likert scale, which ranged from 1 *very true* to 4 *completely untrue*.

Procedure. The FAS was administered following the FEST. The neutral and financial words in the FEST were counterbalanced and no learning effect was found.[3]

3.2. Results

The data was analyzed using SPSS version 16.0 for MacOS X (SPSS Inc., 1989–2007). On average, the student population reported having a mean score of 2.9 on the FAS ($SD = 0.64$).[4]

In comparing the response times on the FEST, the highest latency was recorded for the classic condition [$M = 11.24$ s, $SD = 1.83$]. On average the financial condition had a slightly slower response time [$M = 8.48$ s, $SD = 1.45$] compared to the control condition [$M = 8.30$ s, $SD = 1.25$]. A paired sample t test was conducted to see if the mean of the financial condition is significantly greater than the mean of the neutral condition. The two-tailed t test revealed that these conditions means are not significantly different, $t(37) = -1.115$, *ns*.

The differential of the neutral response time and the financial response time was calculated for each participant, which was then correlated with each participant's FAS score. A one-tailed Pearson's product-moment correlation between the interface response time and FAS confirmed a negative correlation ($r = -.308$), which was significant ($p = .05$) and had a medium effect size.

Discussion

The results indicate that those who reported having higher levels of financial anxiety (on the FAS) also displayed a reaction latency on financially loaded words. This significant correlation indicates that a reported financial anxiety is related to a subliminal bias in processing financially loaded words.

While De Ruiter and Brosschot (1994) have argued that vigilance and avoidance processes may be detectable on the EST, other researchers have suggested that it is difficult to interpret whether the EST displays vigilance or avoidance to threat words because the unattended stimuli are spatially separate (as the financial and neutral words were tested and scored separately) (Fox, 1993; MacLeod, Mathews, & Tata, 1986).

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[2] An exploratory factor analysis found that three of the original variables included in the questionnaire were not associated with the same factor. This was confirmed by inspecting the correlation matrixes. These three questions were therefore excluded from the FAS (Table 2). The exclusion of these items increased the Cronbach's alpha ($\alpha = .809$ to $\alpha = .828$).

[3] Independent samples t-tests were run to see if the means of the neutral and financial conditions were significantly different between the two order-effect groups. For both the financial and neutral condition, it was found that the difference was not significant [$t_{Financial}(36) = .085$, ns; $t_{Neutral}(36) = -.413$, *ns*].

[4] An average score of 1 indicates greatest possible anxiety, while a score of 4 indicates least possible anxiety on the FAS.

Table 2
Financial Anxiety Scale

#	Factor loading on component 1 before items a & d were deselected	Factor loading on component 1	Question
a°	.438	—	I find monitoring my bank or credit card accounts very boring
b	.736	.706	I prefer not to think about the state of my personal finances
c	.737	.740	Thinking about my personal finances can make me feel guilty
d°•	.373	—	There's little point in saving money and being careful with it, because you could lose it all through no fault of your own
e•	.486	.526	I am worried about the debt I will have when I complete my university education
f	.643	.687	Thinking about my personal finances can make me feel anxious
g	.642	.625	I get myself into situations where I do not know where I'm going to get the money to "bail" myself out
h	.693	.709	Discussing my finances can make my heart race or make me feel stressed
i•	.658	.652	I do not make a big enough effort to understand my finances
j	.572	.567	I do not think I am doing as well as I could academically because I worry about money
k*	.784	.782	I find opening my bank statements unpleasant
l*	.603	.623	I would rather someone else who I trusted kept my finances organized

Note. * New items incorporated into Study 2. • items that were excluded from Study 1's analysis based on an exploratory factor analysis and their Chronbach's alpha; however, these were retested because Study 1 had a small sample size (*N* = 38). ° items that were excluded from Study 2's analysis based on an exploratory factor analysis and their Chronbach's α.

Study 2

This study dealt with two potential criticisms of Study 1. First, both low mood and a general anxiety were not controlled in Study 1. As symptoms of depression and anxiety are prevalent among the student population (Ricciardi, 2008), it is possible that the devised questionnaire was vicariously being contaminated by these variables rather than financial anxiety. This study aimed to verify if a financial anxiety measure is distinct from more general symptoms of anxiety or depression.

Second, the previous study is a modified version of the EST. Despite wide use, the EST has been criticized as inconsistent, unable to directly compare threat and neutral words (Fox, 1993), and difficult to interpret (Morgan, Rees, & Curran, 2008). In response to the problems with the EST, MacLeod et al. (1986) developed the Dot-Probe Paradigm (DPP), which improves upon the EST as "it eliminates the pos-

sibility of response bias interpretations. . . . [and] it allows a test of the prediction that the presence of a threatening term can both facilitate and impair dot detection, in the same individual, depending on the threat word's position relative to the dot" (MacLeod et al., 1986, p.18; Tata, Leibowitz, Prunty, Cameron, & Pickering, 1996). Accordingly, the design of the DPP enables researchers to determine whether the mechanism underlying financial anxiety is one of vigilance or avoidance. The DPP has been used on clinical and nonclinical samples (Ehrman et al., 2002; Pflugshaupt et al., 2005; Townshend & Duka, 2001). However, only Morgan et al. (2008) have conducted the DPP with money-related words, but the focus of Morgan et al.'s study was the attentional bias of ketamine users (and money words were used as a nondrug incentive control). The DPP has not been used to test financial anxiety. Study 2 was therefore designed to retest and extend Study 1.

Hypothesis 1. It was hypothesized that financial anxiety is a measurable phenomenon that is distinct from depression and a generalized anxiety.

Hypothesis 2. Following the results from Study 1, it was hypothesized that a moderate relationship between self-reported financial anxiety (on the FAS) and implicit measured anxiety (on the DPP) would be replicated.

Hypothesis 3. It was hypothesized that avoidance would be the mechanism involved in financial anxiety (measured on the DPP) rather than attentional capture.

Method

Participant recruitment and retention. An a priori power calculation through G*Power was conducted to investigate how many participants were necessary for this study (Faul & Erdfelder, 1992). It was possible to conduct this analysis because parameter estimates could be based on the results from Study 1. Using the effect size (r = .308) and Alpha (0.05) from Study 1, and recognizing that ~~Cohen (1988) recommends~~ a power of 0.8 (Field, 2005), 61 participants were found to be necessary.

AQ: 3

To allow for dropouts and erroneous data, 79 unpaid volunteers were recruited by responding to fliers and emails. These were 40 males and 39 females between the ages of 18–22 [M = 20.05, SD = 1.19]. Recruitment requirements were fluency in English and that participants were full-time undergraduate students.

One participant was initially excluded because of a problem with their inputted data. A further four participants were excluded because they either had too many errors (less than 119 correct out of 136 trials), a mean reaction time (RT) of less than 200 ms (indicating that the subject consistently initiated a response before the onset of the target), or a mean RT of greater than 1,000 ms (indicating anomalous processing such as inattention to task) (Townshend & Duka, 2001). In total, 6.3% of participants were excluded (n = 5). There were no significant differences in the excluded participants' demographic characteristics.

Instruments and measures.

Questionnaires. Three self-reported questionnaires were administered. The FAS (used in Study 1) measured 10 questions on a 4-point Likert Scale, which were equally weighted in a cumulative score (see Table 2) and then averaged so to represent a score out of four. The Spielberger's State–Trait Anxiety Inventory (STAI) and Center for Epidemiologic Studies Depression Scale (CES-D), both scored on a 4-point Likert Scale, were respectively used to evaluate whether higher anxiety or low mood can account for financial anxiety. The STAI measures feelings such as tension, nervousness, and confusion (VanderZee, Sanderman, & Heyink, 1996), while the CES-D addresses items such as enjoyment of life, hopefulness, and feelings of loneliness during the past week (Costello & Devins, 1989; Radloff, 1977; Zich, Atkison, & Greenfield, 1990).

Dot-Probe Paradigm. The computerized Dot-Probe Paradigm was modified and programmed according to the specifications of MacLeod et al. (1986). The program was run on a Microsoft Windows XP PC and stimuli were presented on a 17-in. monitor.

This task had 136 trials. There were eight baseline-neutral practice words at the beginning of the task, and 32 experimental word pairs were then presented and repeated four times in a computer-randomized order for each individual. The 32 experimental words were a part of three trial conditions: (a) *eight positive money words* (e.g., *jackpot*) with their matched controls (e.g., "jasmine"), (b) *eight negative money words* (e.g., *debt*) with their matched controls (e.g., *hunt*), and (c) *16 neutral money* words (e.g., *bank*) with their matched controls (e.g., *camp*) (see Table 3). Each capitalized word was ideographically matched for number of letters, number of syllables, Kuèera–Francis written frequency, concreteness rating and for its common part of speech (Wilson, 1987) and presented at random. Furthermore, control words that would have a special meaning for students (e.g., *term*) or that had a positive or negative connotation (e.g., *laughter*, *evicted*), were excluded. The variation between the word groups was explored and the means and standard deviations were not found to differ beyond the bounds of variability (see Table 4).

AQ:4,T3

T4

On each trial, the participant was first presented with a fixation point at the center of the computer screen followed by a pair of words presented for 500 milliseconds. The experimental words were presented at random. Once the

Table 3
Words Used in DPP, by Condition and Their Respective Control Words

Positive words		Negative words		Neutral words			
Positive words	Control words	Negative words	Control words	Neutral words	Control words	Neutral words	Control words
Bonus	Comet	Credit	Handle	Bank	Camp	Financial	Immediate
Jackpot	Jasmine	Debt	Hunt	Account	Measure	Salary	Agency
Earnings	Bathroom	Unemployed	Changeable	Finance	Suspect	Cash	Tape
Scholarship	Measurement	Loan	Fill	Money	Woman	Dollar	Pocket
Bursary	Caribou	Bill	Club	Cost	Turn	Cheap	Stiff
Grant	Shift	Bankrupt	Converse	Paid	Hear	Expensive	Collected
Bingo	Flour	Mortgage	Friction	Economic	Military	Insurance	Selection
Rich	Fair	Rent	Jump	Spending	Describe	Invoice	Channel

words simultaneously disappeared, a "dot probe" appears and replaces one of the two words. The difference in RTs when a dot probe replaces the threat or neutral word either indicates an avoidance or attentional capture ("vigilance") to the threat words (MacLeod et al., 1986; Mogg, Bradley, Bono, & Painter, 1997). The dot probe remained on the screen until the participant responded or for a total of 4 seconds if there was no response. Response latencies were recorded to the nearest millisecond through Visual Basic.

Procedure. After the participant read the instructions for the DPP, the participants completed a practice trial, which was followed by the probe detection task. The implicit DPP task was conducted before the questionnaires were administered so that the reporting on one's finances would not prime participants' DPP result. Participants then completed the questionnaires. On average, the study was completed in 25 minutes.

Results: Data Reduction and Analysis

The data was analyzed using SPSS version 16.0 for MacOS X (SPSS Inc., 1989–2007).

Factor analysis on the FAS. An exploratory factor analysis was done to investigate whether the different variables in the FAS loaded onto the same underlying factor.[5] This analysis suggested that two of the original items included in the questionnaire were not associated with the same factor and slightly decreased the reliability of the scale (see Table 2). This was confirmed by observing the correlation matrices. These two questions were therefore ex-

cluded from the FAS. The exclusion of these items increased the Cronbach's alpha negligibly (α = .850 to α = .855),[6] but more importantly, reduced the components in the analysis (from three to one). This also made theoretical sense as the loading on question *a* seemed to be driven by boredom while *d* seemed to be driven by distrust, and both seemed weakly related to the factor component measuring financial anxiety.

An exploratory factor analysis of the remaining 10 items showed the scale was driven by a single component, making it a unidimentional scale.[7] A single financial anxiety score was computed into a new variable.

Investigation the shared variation of FAS with depression and state anxiety. The population had a mean score of 2.91 on the

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[5] This test was "exploratory" because ~~it was noted that~~ a factor analysis is most reliable when there are at least 10–15 participants per question or a sample of 300 or more, while the sample ~~in~~ this study (79 participants) did not satisfy either condition. However, a Kaiser-Meyer-Olkin measure of sampling adequacy (KMO; a statistic that indicates the proportion of variance in one's variables that might be caused by underlying factors) was found to be between .8 and .9, indicating that the patterns of correlations are reasonably compact and that the factor analysis would likely yield reliable results (Field, 2005). Also, a highly significant finding on the Bartlett's Test of Sphericity indicated that the variables in this factor analysis are related and therefore suitable for structure detection.

[6] The excluded variables were the only two whose deletion would increase Cronbach's α.

[7] Though only one component has been reported (with an eigen value of 4.26), the eigen value for the second factor was just above 1 (1.22). As noted above, a factor analysis with just 79 cases will produce unstable eigen values, but this is taken as evidence that there is not a strong case against the unidimentionality of this solution.

Fn5

Fn6

Fn7

AQ: 6

SHAPIRO AND BURCHELL

Table 4
Summary of Linguistic Property Variation (by Condition)

	Number of letters			Number of syllables			Written frequency			Concreteness rating		
	N	Mean	*SD*	*N*	Mean	*SD*	*N*	Mean	*SD*	*N*	Mean	*SD*
Positive words	8	6.50	2.27	8	2.00	.76	5	35.60	27.43	1	377.00	.
Positive control words	8	6.50	2.27	8	2.00	.76	6	30.00	27.42	1	413.00	.
Negative words	8	6.00	2.29	8	1.63	.74	8	39.25	46.73	5	435.00	57.34
Negative control words	8	6.00	2.39	8	1.63	.74	8	39.00	46.63	5	432.00	50.99
Neutral words	16	6.38	1.89	16	2.06	.93	15	98.60	83.42	11	458.91	104.23
Neutral control words	16	6.38	1.89	16	2.06	.93	16	87.81	75.00	12	457.58	98.49
Total words	64	6.31	2.04	64	1.94	.83	58	66.69	68.38	35	447.54	85.70

FAS (*SD* = 0.65), of 15.24 on the CES-D (*SD* = 8.84), and of 37.08 on the STAI (*SD* = 9.97).

The CES-D and STAI were significantly correlated, *r* = .721, *p* (two-tailed) <.001. Financial anxiety (FAS) was significantly correlated with low mood (CES-D), *r* = .461, and anxiety (STAI), *r* = .388 (all *ps* (two-tailed)<.001). It is important to note that first-order partial correlations were conducted to address the overlap in the variation of the scales and to determine the size of the unique portion of variance (controlling for the third scale).[8] The correlation between the STAI and the FAS was not significantly related when CES-D was controlled, *r* = .091, *ns*. When controlling for anxiety (STAI), there was a positive relationship between the FAS and CES-D, *r* = .283, *p* (two-tailed) <.05. Further, the partial correlation for the CES-D and STAI (controlling for FAS) was *r* = .663, *p* (two-tailed) <.001.

A linear regression model was conducted to see how much CES-D and STAI predicted financial anxiety (see Table 5). The assumption of no multicollinearity was tested and was found to not have been violated (Tolerance = .480). This model shows that STAI and CES-D together can account for 19.8% of the variance;

Table 5
Regression Model

Model	B	*SE* B	β
Constant	1.248	.807	
CES-D	.323	.125	.377*
STAI	.141	.177	.116

R² (adj) = .198.
p < .001.   * *p* < .05.

however, only CES-D significantly predicts FAS. This further suggests that the correlation between FAS and CES-D is real, but the correlation between FAS and STAI is spurious.

Analysis of the DPP. A repeated-measures ANOVA was conducted to investigate whether there was a significant difference by word group, threat word position, and probe position. Mauchly's test indicated that the assumption of sphericity had been violated for the interaction effect between probe location and threat word location, $\chi^2(2) = 12.41$, $p < .01$. The degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .86$). There was a significant interaction effect between probe location and threat location, $F(1, 72) = 4.075$, $p < .05$, *eta* = .23. This indicates that RT toward the threat word differed depending on the subsequent probe placement. Furthermore, there was no main effect of threat location, probe location or group. There was also no significant interaction effect between probe location × group, threat location × group, or threat location × probe location × group.

Avoidance or vigilance? For each word group on the DPP (positive, negative, neutral, as well as a combined group), the difference between the incongruent (threat word placed on top while the probe was placed on bottom, or visa versa) and congruent (threat and probe both placed on the top or on the bottom) RTs were calculated. This "direction" calculation compares the RT of a participant on conditions when the dot probe replaces the threat word

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[8] This was necessary because STAI and CES-D have a very large shared variation, $R^2 = .52$.

compared to when the dot probe replaces the control word. A positive score indicates avoidance whereas a negative score indicates vigilance.

All scales showed an average of a positive score, indicating that for most participants the overall mechanism was avoidance of financial words.

Relationship between FAS and the DPP. The negative financial word group in the DPP calculations significantly correlated with the FAS scale, $\rho = .218$, p (one-tailed) $<.05$. This indicates that those who reported having higher levels of financial anxiety (on the FAS) display a greater RT delay on negative threat words.

Discussion

The analysis of depression and general anxiety indicated that though interrelated, the FAS measure is a distinct construct from depression (CES-D) and general anxiety (STAI). It is counterintuitive that partial correlations indicated relatedness of the FAS with the CES-D, but not the STAI. This suggests that low mood and anxiety interacts with financial anxiety in different ways and while mood may relate directly, anxiety seems to relate indirectly through mood. Nevertheless, the finding that FAS is distinct from depression and general anxiety indicates that FAS is a useful tool in evaluating self-reported financial anxiety in future studies.

The validity of the FAS is further enhanced by the significant relationship that was found between the FAS and the involuntary, nondirectional DPP (on negative words). This finding constructively extends the first study that investigated the relationship between self-reported financial anxiety and the financially adapted EST. It is interesting that similar to other anxieties, a financial anxiety is associated with biased attention.

The relationship between the FAS and DPP was only observed for negative words (i.e., not positive or neutral financial word groups), which is understandable as negative financial words are most likely to provoke an anxious avoidant response. However, though the EST used mainly neutral words (which were presumably less sensitive to picking up anxiety compared to solely negative words), the EST still resulted in a slightly stronger effect ($r = .301$) than the negative words in the DPP ($r = .218$).

The slight difference in effect size between the studies may be nonsignificant given the small sample size in Study 1. However, this close replication gives credibility to the measurements used in these studies' convergent approach.

This finding does not suggest that anxiety is the only reason for financial avoidance. Indeed, the correlation between a self-reported financial anxiety and avoidance to financial stimuli only had a medium effect size ($r^2 = .09$). This indicates that while financial anxiety is important, there are other factors at work (e.g., a lack of interest in finances), which may need to be considered in understanding financial avoidance.

The DPP, a more sophisticated measure than the EST (for reasons described above), also provided insight into the mechanism of financial anxiety. On all the word groups (positive, negative and neutral), avoidance (rather than vigilance) was the most common strategy (even on positive financial words, e.g., *bonus*). This suggests that financial anxiety behaves like a phobia, whereby individuals involuntarily attempt to reduce their anxious mood state by minimizing their encounter with fear-relevant stimuli (Thorpe & Salkovkis, 1999). From a functional perspective, similar to other anxieties whereby avoidance is the predominant mechanism, most individuals who are financially anxious seemingly use avoidance as a defense mechanism (Miu et al., 2008).

Future Research

This study developed novel instruments for measuring financial anxiety. In so doing, this study has answered but also raised questions. Examining financial anxiety in a larger and diverse population would be useful in further investigating the demographics of financial anxiety. As these studies were conducted in the U.K. in 2008–9, further studies would determine how generalizable these findings are across different countries, as well as determine the effect that the global economic recession may have had on financial anxiety. Specifically, the inclusion of age, income (or parental income), size and number of debts, and monthly budgets would be beneficial to better ascertain how these variables relate to financial anxiety.

Moreover, the results above are correlations and do not imply causation. Accordingly, a longitudinal approach would be suitable to test whether there is a causal link between financial anxiety and debt by investigating whether financial anxiety performance on the DPP could predict subsequent debt (See Marissen et al., 2006, who found performance on DPP to predict relapse in opiate-dependent individuals).

Though the correlations between the FAS and the FEST and between the FAS and the DPP indicate that the FAS contains a construct validity, further psychometrics of the FAS must be conducted on a larger sample size before the FAS is widely accepted and utilized as a measure of self-reported financial anxiety.

Furthermore, similar to Amin, Constable, and Canli (2004), in future neuroeconomic studies that investigate financial anxiety it would be useful to investigate brain activation (particularly of the amygdala), galvanic skin response, as well as a wider range of peripheral variables (e.g., cardiovascular activity, facial electromyography, salivary cortisol) in conjuncture to the DPP and FEST when possible (Dunn, Dalgleigh, & Lawrence, 2006). This would be informative in understanding how financial anxiety is neurologically similar to other phobias and how temporal and spatial aspects of attentional mechanisms are registered. Examining physiological responses of the general population toward their personal finances would usefully extend the work of Lo and Repin (2001), who studied the physiological characteristics of professional securities traders when they were engaging in live trading. Furthermore, neurobiological studies have strongly indicated that there is a biological basis to trait anxiety, and some of the genetic bases of trait anxiety have been identified (Miu et al., 2008). It is likely that this line of research will greatly advance our knowledge of the relationship between state and trait anxiety, as well as the relationships between specific and nonspecific anxiety disorders.

As Miu et al. (2008) explain, trait anxiety has been evaluated by examining attention (i.e., whether participant detect emotionally threatening stimuli vs. neutral stimuli), interpretation (i.e., whether participants interpret stimuli as potentially threatening), and memory (i.e., whether participants favor the recall of information that is related to the potential threat). This study has examined financial anxiety in relation to attention; however, future studies can extend upon this work by evaluating how financial anxiety relates to interpretation and memory of financial stimuli.

The evidence presented here suggests that financial anxiety behaves like a phobia (as measured by an individual's implicit reactions to financial stimuli); this suggests that treatments that have proven to be successful in the improvement of other phobias, such as Cognitive Behavioral Therapy, might be an effective way of helping individuals with high levels of financial anxiety. Further research would be necessary to evaluate what may improve one's financial anxiety.

Lastly, the integration of financial anxiety, attitudes, behaviors, and decisions into a model of student debt would be useful in explaining how these factors are interrelated and which are especially problematic for student finances. The particular role of depression should be incorporated into future work. This would require a meta-analysis and model development (Robert & Jones, 2001).

Concluding Remarks

Financial anxiety can become devastating for the individual as well as an obstacle to the goal of governments in creating financially self-sufficient citizens (Burchell, 2003). Personal financial products continues to grow in number and complexity; for instance, Internet loans have recently become a big business, providing fast loans with typical annual interest rates in excess of 2,000%. It is in the interest of governments to take financial anxieties seriously and help citizens cope better with their personal finances. For example, it is important to make financial knowledge more accessible and financial products more consumer-friendly, which may reduce individuals' financial anxiety.

In both studies presented above, the self-reported financial anxiety questionnaire correlated significantly with the implicit measures. These findings indicate that those who report having financial anxiety also display reaction latencies in the processing of financial information. The development of these reported and subliminal tools that measure financial anxiety can be usefully employed in future research to better understand financial anxiety. Accord-

ingly, financial behavior could be more comprehensively evaluated and policy could be better determined by incorporating financial anxiety into ~~economic~~ models of financial illiteracy, mismanagement, and debt.

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