

**MORE THAN MAKING ENDS MEET: DEFINING FINANCIAL ANXIETY AND
ESTABLISHING ITS RELATIONS TO FINANCIAL LITERACY**

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Abstract

Many Canadian adults are not financially literate, negatively impacting individual financial well-being and societal economic stability. Lower levels of financial literacy have been linked to both increased math anxiety and financial anxiety. However, previous research has oversimplified these relations by treating financial literacy as a singular construct rather than as a multifaceted one comprised of financial knowledge, confidence, attitudes, and behaviour. Additionally, inconsistencies in how financial anxiety is conceptually and operationally defined have complicated our understanding of its relation to financial literacy. Such issues of content validity hinder our ability to form collective knowledge on the relations between these constructs.

This dissertation refines the conceptual and operational understanding of financial anxiety and examines how it relates to the four subconstructs of financial literacy. The results of Study 1 demonstrated negative relations between financial anxiety and most subconstructs of financial literacy, suggesting it is more important in our understanding of financial literacy than previously thought. In Study 2, a scoping review revealed significant overlap between the conceptual and operational definitions of financial anxiety and financial stress. To address this limitation, in Study 3, I developed a novel measure of financial anxiety called the Financial Anxiety Feelings and Engagement Scale (FAFES). This measure, validated across two samples, demonstrated excellent model fit and test-retest reliability. In Study 4, I replicated the findings from Study 1 using the FAFES, providing further evidence to suggest that higher levels of financial anxiety are related to lower levels of financial literacy. By refining the conceptualization and measurement of financial anxiety, this dissertation offers a clear direction for the development of financial education strategies aimed at reducing financial anxiety. This targeted approach could potentially enhance the efficacy of such interventions across Canada.

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Chapter 1: General Introduction

General Introduction

Statement of Need

Many Canadian adults are not financially literate (OECD, 2016, 2020). They lack the knowledge, confidence, attitudes, and skills necessary to effectively manage their financial resources (FCAC, 2015; OECD, 2016, 2022b), which can negatively impact both their individual financial well-being and the economic stability of the society in which they live (Sánchez Santos, 2020; Vidovičová, 2019). Indeed, people with lower levels of financial literacy engage more frequently in high-cost credit card behaviour (Lusardi & Tufano, 2015; Mottola, 2013), are less likely to consult a financial advisor for advice (Calcagno & Monticone, 2015), and ultimately, accumulate less wealth over their lifetime (Lusardi & Mitchell, 2014). Alternatively, people who are financially literate save more money (Lusardi, 2019), are more likely to prepare financially for retirement (Boisclair et al., 2017; Mustafa et al., 2023; van Rooij et al., 2011b), and are more likely to take part in financial markets (Chen et al., 2023; van Rooij et al., 2011a) with more diversified portfolios (Nguyen et al., 2023; Von Gaudecker, 2015). Importantly, the positive outcomes of financial literacy have a ripple effect for society more broadly, promoting financial inclusion (Grohmann et al., 2018) and contributing to economic stability (OECD, 2012, 2022a; Sánchez Santos, 2020).

The investment in individual financial literacy is essential as economies shift financial responsibility from industries to individuals (Kempson et al., 2017; Lusardi, 2012; Lusardi & Mitchell, 2014; OECD, 2019a; Świecka, 2019). The onus of saving, investing, and managing money largely falls on the shoulders of ill-equipped consumers. The gravity of this situation is compounded further by the increasing complexity and availability of financial products and services (Government of Canada, 2020; Lusardi, 2015a). Consumers are required to make

comparisons across various factors like fees, interest rates, contracts, and risk exposure from various providers (OECD, 2019a). It is no surprise that both researchers and policy makers consider financial literacy an imperative skill for individual financial well-being (FCAC, 2015; Lee et al., 2020; OECD, 2019a; U.S. Financial Literacy and Education Commission, 2020). This recognition extends to global forums. Comprised of representatives from major economies worldwide, the G20 has placed significant emphasis on the importance of financial literacy within its initiatives, acknowledging its value in fostering economic stability and growth on a global scale (GPFI, 2016, 2023; OECD, 2022a).

The rising interest in financial literacy is substantiated not only by increased complexity of the financial landscape, but also in shifting trends of population demographics (OECD, 2019a). For instance, increased life expectancy means people must prepare for a longer retirement period by accumulating greater savings than was required by previous generations (Decady & Greenberg, 2014; Fornero et al., 2021). The increasing pressure is compounded by the transition from defined-benefit retirement plans, which have largely been replaced by defined-contribution plans (Moore, 2011). This shift further burdens individuals, who now shoulder the responsibility of saving and investing for their retirement. As the population ages, there is a projected rise in the need for eldercare (OECD, 2019a). Decreasing birth rates indicate that working-age adults might bear the tax burden for this expenditure, all while juggling potential student loan repayments and striving to save for their own retirement (Fornero et al., 2021; Lusardi, 2015b; Toronto Centre, 2018). This changing demographic landscape of the Canadian population emphasizes the need for increased individual financial preparedness.

Due to the significance of financial literacy, many researchers have attempted to identify the factors that are associated with it. Lower levels of financial literacy have been linked to both

increased math anxiety (Guerrero, 2020; Skagerlund et al., 2018) and financial anxiety (Archuleta et al., 2013b; Grable et al., 2015; Kim et al., 2022; Medyanik, 2020; Skagerlund et al., 2018). However, I contend that previous research has oversimplified these relations by adopting a broad definition of financial literacy, failing to consider the nuances between the subconstructs that it contains. Financial literacy should not be viewed as one-dimensional, but rather as multifaceted construct comprised of four subconstructs: financial knowledge, financial confidence, financial attitudes, and financial behaviour (FCAC, 2015; OECD, 2016). The current literature inadequately addresses whether anxiety about math or finances relates to one, multiple, or all subconstructs that comprise financial literacy. Further contributing to this lack of clarity is the inconsistency in how financial anxiety is conceptually and operationally defined. For instance, the term “financial anxiety” is frequently used interchangeably with the term “financial stress” (e.g., Doehring, 2018; Grable et al., 2015; Medyanik, 2020). Such issues of content validity muddle our understanding of how these constructs relate and hinder efforts to design successful financial education strategies.

As a result of this dissertation, there is an opportunity to inform the development of future financial literacy interventions and increase the efficacy of interventions across Canada. Traditional intervention strategies aimed at improving financial literacy have been largely unsuccessful (Fernandes et al., 2014; Willis, 2021). These interventions often assume that low financial literacy stems from knowledge deficits and thus focus on increasing financial knowledge directly (e.g., Cole et al., 2016; Lusardi, 2003). However, efforts aimed solely at increasing financial knowledge often fail to result in consistent and lasting changes in behaviour (Fernandes et al., 2014; Soman & Mazar, 2012; Willis, 2011, 2021). These interventions may be unsuccessful because they tend to ignore critical individual differences that impact a person’s

level of financial literacy (Estelami & Estelami, 2023; Fernandes et al., 2014; Skagerlund et al., 2018). I propose that anxiety about finances and math may be important individual characteristics in relation to financial literacy. Should I find evidence to support this hypothesis, policy makers and educators looking to improve financial literacy could benefit from implementing strategies to reduce anxiety related to finances and math.

Summary of Dissertation

The purpose of this dissertation is to better understand how anxiety about finances and math relates to financial literacy. To accomplish this, I conducted four studies that contribute to answering my ten hypotheses (see Appendix A for a summary of all hypotheses). In Study 1, I built upon previous research that suggests people higher in financial and math anxiety tend to have lower levels of financial knowledge compared to those with less anxiety. I conducted a series of regression analyses, with each subconstruct of financial literacy (i.e., knowledge, confidence, attitudes, and behaviour) as its own dependent variable. The results suggested that, when considering each subconstruct individually, financial anxiety is more important in relation to financial literacy than previously thought, while math anxiety is less integral in our understanding of this construct. This finding guided the development of Study 2. In Study 2, I conducted a scoping review of the empirical research on financial anxiety and related terms (i.e., financial stress and financial worry) to inform my conceptual understanding of financial anxiety. The results suggested that financial anxiety and financial stress are conceptually confounded across studies and that there is substantial overlap between scales used to assess these constructs. To address this limitation, in Study 3, I used the results of the scoping review to inform the development of a new measure of financial anxiety. I performed an exploratory factor analysis (EFA) to evaluate my initial pool of items and identify potential underlying factors. With a

separate sample, I then conducted a confirmatory factor analysis (CFA) to validate the structure of the scale identified in the EFA. The model demonstrated excellent fit and test-retest reliability. In Study 4, I used this novel measure to determine whether the results obtained in Study 1 replicate with a theoretically driven measure of financial anxiety. Through a series of regression analyses, I found that people with higher levels of financial anxiety demonstrated lower levels of financial literacy across all four subconstructs, compared to those with lower financial anxiety levels. The importance of this work lies in its potential to guide targeted financial education programs aimed at reducing the negative impact of financial anxiety. By refining the concept and measurement of financial anxiety, this research provides clearer insights for developing effective interventions to improve financial literacy.

Review of the Literature

Financial Literacy

The term “financial literacy” first appeared in the academic literature in a 1992 report, where it was defined as the “ability to make informed judgments and take effective decisions regarding the use and management of money” (Noctor et al. as cited by Świecka, 2019, p. 1). Since then, the term has gained popularity in the academic and grey literature, resulting in numerous interpretations and definitions. Authors often use financial literacy as an umbrella term to refer to a cluster of related constructs, including financial knowledge, financial confidence, financial attitudes, financial behaviour, financial education, and financial well-being (see Table 1 for definitions of each construct; for reviews see Cude, 2021, Goyal & Kumar, 2021, or Świecka, 2019). In this dissertation, I define financial literacy as a combination of financial knowledge, confidence, attitudes, and behaviours necessary to achieve individual financial well-being (FCAC, 2015).

Table 1*Terminology and Definitions of Key Constructs*

Construct	Term	Definition
Parent Construct	Financial literacy	A combination of knowledge, confidence, attitudes, and behaviour necessary to achieve financial well-being (FCAC, 2015; OECD, 2016).
Subconstruct	Financial knowledge	“Knowledge acquired through education and/or experience specifically related to essential personal finance concepts and products” (Huston, 2010).
Subconstruct	Financial confidence	A person’s subjective rating of their level of financial knowledge, also referred to as ‘subjective financial knowledge’ (Lind et al., 2020).
Subconstruct	Financial attitudes	Spending versus saving preferences and attitudes towards planning for the future.
Subconstruct	Financial behaviour	The extent to which a person behaves in financially literate ways (OECD, 2016).
Deliverable	Financial education	“The process by which financial consumers/investors improve their understanding of financial products, concepts and risks and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being” (OECD, 2005).
Outcome	Financial well-being	“A state of being wherein a person can fully meet current and ongoing financial obligations, can feel secure in their financial future, and is able to make choices that allow enjoyment of life” (CFPB, 2015).

Components of Financial Literacy

Knowledge. While there is currently not a single agreed upon definition of financial literacy (Goyal & Kumar, 2021; Huston, 2010; Świecka, 2019), a common thread running through previous definitions is the presence of financial knowledge (Cude, 2021; Nicolini, 2019). Nicolini (2019) argues that even if a definition of financial literacy does not explicitly mention “knowledge,” its inclusion is implicitly assumed due to the hierarchical relation between

knowledge and behaviour. That is, although knowledge is fundamental for behaving in financially literate ways, having knowledge does not necessarily result in ideal behaviour. For example, some financially knowledgeable people may still make choices detrimental to their financial well-being (Nicolini, 2019).

Despite authors generally agreeing on its inclusion within financial literacy, achieving consensus on the specific components that comprise financial knowledge has proven challenging. Kabaci (2012, as cited in Cude, 2021) sought to establish agreement on the aspects of knowledge most relevant for college students' financial literacy by employing a Delphi study technique but found little agreement. Huston (2010) offers a broad definition of financial knowledge, characterizing it as knowledge acquired through education and/or experience pertaining to essential personal finance concepts and products. Remund (2010) suggests that financial knowledge encompasses budgeting, saving, borrowing, and investing, which aligns with the perspective of Knoll and Houts (2012), whose 20-item financial knowledge scale includes these topics. Other researchers acknowledge the difficulty in arriving at a one consistent definition (Cude, 2021), opting instead to concentrate on specific aspects of financial knowledge such as investment (Clark et al., 2017; Glaser & Walther, 2012; Lusardi, 2015a; van Rooij et al., 2011a), debt (Lusardi & Tufano, 2015; Soll et al., 2013; Xiao & Kim, 2022), or tax literacy (Nichita et al., 2019; Pham et al., 2020).

Confidence. Another component of financial literacy is financial confidence, which refers to one's self-assessment of their financial knowledge. This construct is also called subjective financial knowledge (Lind et al., 2020) or financial self-efficacy (Rothwell & Wu, 2017, 2019). According to Bandura (1997), self-efficacy refers to one's belief in their ability to effectively perform the necessary behaviours to achieve desired results. Therefore, financial

confidence can be thought of as self-efficacy in the domain of financial management (Rothwell & Wu, 2017). This confidence empowers people to make informed decisions and undertake actions concerning their finances, thereby driving financial behaviour.

Attitudes. Increasingly recognized as integral to understanding financial literacy are financial attitudes. Financial attitudes, as assessed in the OECD/INFE 2020 International Survey of Adult Financial Literacy, are determined by attitudes towards spending versus saving, and short-term versus long-term financial planning (OECD, 2020). A person who focuses exclusively on the short term and demonstrates a preference for spending is considered to have less financially literate attitudes than someone who prefers longer-term security and favours saving money (OECD, 2016).

Behaviour. The final and perhaps most crucial aspect of financial literacy is financial behaviour, which represents the extent to which a person behaves in financially literate ways. These behaviours encompass practices such as budgeting, thoughtful decision-making before purchases, timely bill payments, and saving for retirement (OECD, 2016). It is important, however, to consider the positionality of these value judgments and definitions. While someone may be financially knowledgeable, their ability to act on this knowledge can be influenced by their financial circumstances. People facing poverty may find it challenging to prioritize “financially literate” actions, even if they possess the knowledge and skills to do so. Poverty can lead people to prioritize immediate needs over long-term financial obligations as a strategic adaptation to navigating limited resources and chronic stress (Mullainathan, 2013; Shafir, 2017; Shah et al., 2015). Buying food instead of paying a bill on time, for example, may be a prudent decision given their immediate needs. Similarly, poverty can significantly impact decision-making processes, self-control, and attention (Mullainathan & Shafir, 2013; Shafir, 2017; Shah et

al., 2012). Recognizing these dynamics is crucial in understanding the complexities of financial behaviour and its relation to financial well-being.

Theoretical Framework of Financial Literacy

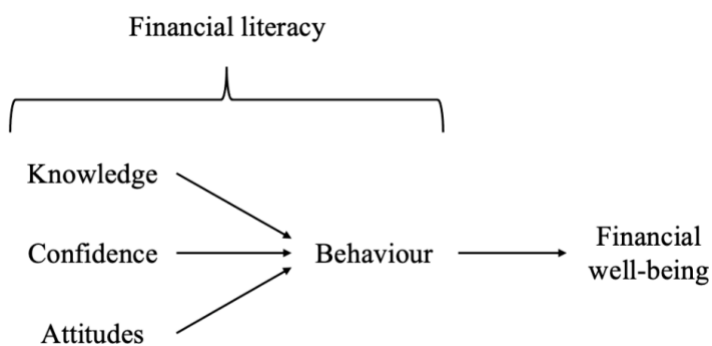
Current conceptualizations of financial literacy are dominated by behaviourally driven theoretical frameworks. The Financial Consumer Agency of Canada states that “financial literacy is not an end goal but is rather a means to improve one’s financial well-being in a personally meaningful way” (FCAC, 2020, p. 8). Prominent global organizations such as the OECD, Financial Consumer Agency of Canada, and G20 place significant emphasis on financial behaviour in achieving financial well-being (BCFP, 2018; OECD, 2016, 2017, 2020, 2022b). This sentiment is echoed by many researchers in the field. For instance, Delgadillo (2014) conceptualizes financial literacy as financial knowledge and application of this knowledge when making financial decisions. Similarly, Huston (2010) presents financial literacy as comprising two dimensions: understanding (knowledge) and use (behaviour). Lusardi (2015a) defines financial literacy as “the ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions” (p. 260). Aligned with these perspectives, Hung et al. (2009) emphasize both knowledge and skills, highlighting the importance of using financial knowledge effectively to manage financial resources. These frameworks highlight that possessing knowledge is not sufficient to be considered financially literate; people must actively apply this knowledge with the intention of enhancing their financial well-being (Atkinson & Messy, 2012).

Consistent with these frameworks, I contend that each component of financial literacy does not carry equal weight in contributing to financial well-being. Rather, behaviour is the most crucial piece. Efforts directed towards enhancing financial knowledge, confidence, and attitudes

are primarily geared towards influencing behaviour, as it is through actions that financial well-being is ultimately realized. Thus, while knowledge, confidence, and attitudes are essential, their impact on financial well-being hinges on their ability to drive meaningful behavioural change. This perspective aligns with previous models of financial literacy. For instance, Özkale and Özdemir Erdoğan (2022) developed the Colosseum Financial Literacy Model based on a review of financial literacy models for financial education. Their model includes financial behaviour as its central focus, whereby financial behaviour is surrounded by other components that shape it, including knowledge, skills, and personal factors. Similarly, in Hung et al.'s (2009) model, they propose that financial behaviour is influenced by three main factors: financial knowledge, skills, and confidence, and that financial behaviour, in turn, depends on these factors. These models largely align with my own, as they each emphasize financial behaviour as a central aspect of financial literacy. However, my model depicts financial well-being as the outcome, while other models consider different outcomes like financial health status (Huston, 2015) and life success (Shim et al., 2010), or do not specify an outcome and focus solely on financial literacy (Hung et al., 2009; Özkale & Özdemir Erdoğan, 2022). See Figure 1 for a visual representation of my theoretical model of financial literacy.

Figure 1

Theoretical Model of Financial Literacy



Note. This model depicts my proposed theoretical framework of financial literacy based on leading conceptualizations of the construct.

Increasing Financial Literacy Through Financial Education

My framework offers a clear direction for financial literacy initiatives. Positioning financial behaviour as the preceding factor leading to financial well-being highlights the practical application of my model by advocating for educational strategies that prioritize behavioural change. As noted in Canada's current National Strategy for Financial Literacy (2021), the purpose of financial literacy education is to increase people's ability to engage in behaviours that lead to positive financial outcomes. Efforts that do not lead to behaviour change are considered unsuccessful (FCAC, 2021). There have been attempts to address the issue of financial illiteracy through the implementation of financial education strategies in schools, workplaces, or other community-based organizations (Bartholomae & Fox, 2021; Brugiavini et al., 2020; Cole et al., 2016; Kalwij et al., 2019; Lusardi, 2003; Mandell & Schmid-Klein, 2009). For instance, Canada launched its first educational strategy, "Count me in, Canada" in 2015 (FCAC, 2015) and in 2020, the Government of Ontario integrated financial literacy into the elementary mathematics curriculum (Government of Ontario, 2020).

Evidence on the efficacy of such educational strategies and interventions, however, is mixed. While some educational interventions have demonstrated improvements in financial knowledge, they often fail to translate into improved financial behaviour or financial well-being (Barrafrem et al., 2020; Carpena et al., 2019; Sharif et al., 2020; Willis, 2021). Discouragingly, in a meta-analysis of 168 studies, Fernandes et al. (2014) found that interventions aimed at improving financial literacy accounted for a mere 0.1% of the variance in financial behaviours. The authors noted that correlation studies examining the relation between financial knowledge

and financial behaviour reported larger effect sizes than studies implementing financial education interventions (Fernandes et al., 2014). In line with these observations, a series of experiments conducted by Ambuehl et al. (2014) showed that educational interventions did increase financial knowledge and improve self-reported decision strategies, but they did not enhance the ability to make complex hypothetical decisions. This finding highlights a gap between conventional measures of success and actual improvements in decision-making quality, ultimately challenging the efficacy of existing educational strategies in changing financial behaviour.

Kaiser et al. (2022), on the other hand, presented counter evidence based on a meta-analysis of 76 randomised controlled trials, concluding that financial education programs have positive causal effects on both financial knowledge and downstream financial behaviour. However, Willis (2021)¹ challenged the usefulness of Kaiser et al.'s (2022) findings, pointing out that their meta-analysis failed to specify which interventions, in what contexts, and for which groups, influence knowledge versus behaviour. Further, the effects of interventions on financial behaviours reported in the meta-analysis were smaller compared to the improvements observed for financial knowledge, and evidence for the sustainability of these effects was inconclusive (Kaiser et al., 2022). Given these mixed findings, I cannot conclude that current strategies effectively improve financial well-being. Instead, they indicate significant room for improvement in designing and implementing financial education strategies.

Individual Differences in Financial Literacy

The OECD (2013a) stresses the importance of tailoring financial education initiatives to address the specific needs of nations and their populations. Both the Consumer Financial

¹ Willis (2021) critiques a working paper version of Kaiser et al.'s (2022) review, explaining why Willis' publication precedes the official publication year of the Kaiser et al. review.

Protection Bureau (2017) and the OECD (2019b) emphasize the necessity of personalized financial education programs tailored to meet individuals' unique requirements for financial success. While there is promise for the uptake of financial education strategies and improvements in financial literacy, the efficacy of such strategies, and the acquisition of financial literacy more generally, may be impacted by individual differences. For instance, Estelami and Estelami (2023) found that cognitive style moderated the relation between financial education and financial literacy. For people with analytic and intuitive cognitive styles, higher levels of financial education were associated with higher levels of financial literacy, but for people with adaptive cognitive styles, higher levels of financial education were associated with deficits in financial literacy (Estelami & Estelami, 2023). Evidence also suggests that certain demographic characteristics relate to a person's level of financial literacy. For example, financial literacy is positively associated with education (de Bassa Scheresberg, 2013; Lusardi & Mitchell, 2012) and income (Lusardi & Tufano, 2015), and demonstrates a non-linear effect with age, whereby middle-aged people are more financially literate compared to younger and older people (de Bassa Scheresberg, 2013; Finke et al., 2017; Lusardi & Mitchell, 2014). Financial literacy has also been linked to gender,² whereby men tend to outperform women on indices of financial literacy (Bucher-Koenen et al., 2017; Tinghög et al., 2021).

Though many factors are associated with financial literacy, I focus on individual differences in anxiety. Cognitive Behavioural Theory suggests that thoughts, emotions, and behaviours are interconnected (Fenn & Byrne, 2013; González-Prendes & Resko, 2012). However, researchers often fail to acknowledge how emotions, such as anxiety, shape human behaviour (Friman et al., 1998). By recognizing and addressing the affective barriers people face

² Note that the authors of these studies conceptualized gender within a binary framework, recognizing only the categories of men and women.

in managing their finances, educators and policymakers can better support people in developing the knowledge, skills, and confidence needed to make sound financial decisions. To ignore the emotional aspect of finances is to forfeit the opportunity to help people achieve financial well-being. In recognizing the essential role of emotions in fostering a financially resilient and empowered society, I felt it prudent to examine how two anxiety constructs relate to various components of financial literacy: math anxiety and financial anxiety.

Relations Between Math Anxiety and Financial Literacy

Many people feel fearful, tense, or apprehensive in situations involving numbers or computations, a phenomenon termed math anxiety (Ashcraft, 2002a; Maloney & Beilock, 2012). Math anxiety is highly prevalent in North America among both teenagers (OECD, 2013c) and adults (Hart & Ganley, 2019). There is an extensive body of research documenting the negative academic-related consequences of math anxiety, as well as its causes and treatments (for a review see (Ramirez et al., 2018). However, the literature largely overlooks the importance of addressing math anxiety in adulthood, a crucial period when people must make significant financial decisions, often with little guidance.

There is ample evidence to suggest that strong mathematical skills are necessary to make informed financial decisions (e.g., Gerardi et al., 2013; Lusardi, 2012; OECD, 2016). Numeracy—the ability to understand and apply simple numerical concepts—is thought to be intrinsic to some aspects of financial literacy (Darriet et al., 2021; OECD, 2019a). For instance, numeracy has been linked to ideal financial behaviour (for a review see Garcia-Retamero et al., 2019) and financial knowledge (Lusardi, 2012; Skagerlund et al., 2018), as well as financial well-being outcomes (de Bruin & Slovic, 2021). Of concern is the well-established negative relation between numeracy and math anxiety (Ashcraft & Kirk, 2001; Hembree, 1990; Hill et al., 2016).

Indeed, people who are higher in math anxiety tend to perform worse than those lower in math anxiety on assessments of numeracy (Ashcraft, 2002b; Hembree, 1990). Math anxiety is theorized to cause lower numeracy both in the moment because of anxiety-induced transient reduction in working memory (Ashcraft & Kirk, 2001; Hunt et al., 2014) and long term because of an increased avoidance of math and math-related activities, leading to fewer opportunities to develop ones' math skills (Daker et al., 2021; Gunderson et al., 2018; Maloney, 2016).

Given the positive link between numeracy and financial literacy, and the negative link between numeracy and math anxiety, it follows that people higher in math anxiety are at risk of underperforming on indices of financial literacy. Though research on this link is sparse, there is evidence supporting a negative relation between math anxiety and performance on various financial tasks. For example, Suri et al. (2013) found that consumers higher in math anxiety preferred discounts presented as dollar-off sales as opposed to percentage-off sales, even when it was to their financial detriment. Further, Storozuk et al. (2023) found that, when asked to choose the grocery product that represented the "better deal" (i.e., cost less per unit) between two options, participants higher in math anxiety were less likely to make the correct selection compared to those lower in math anxiety. These findings may be unsurprising, given that both financial tasks required participants to use numeracy. However, the distinction between what constitutes a mathematical task versus a financial task is unclear. These findings point to the possibility that the consequences of math anxiety extend beyond the classroom, negatively impacting performance in financial domains. Before I can draw such conclusions, more evidence is needed on how and if math anxiety relates to the various subconstructs that comprise financial literacy (i.e., financial knowledge, confidence, attitudes, and behaviour).

Relations Between Financial Anxiety and Financial Literacy

Just as people experience anxiety about math, many people feel a sense of doubt, insecurity, or unease when thinking about financial affairs or making financial decisions, a phenomenon termed financial anxiety (Fünfgeld & Wang, 2009). A financially anxious person may display unstable preferences, feeling regret over financial decisions either taken or not taken. Previous research has suggested that financial anxiety is highly prevalent in North America, with over half (53%) of respondents to the FINRA Foundation's 2018 National Financial Capability Study expressing anxiety about their finances (Lin et al., 2019). This finding is concerning, given that financial anxiety can prevent people from dealing effectively with their finances and, ultimately, impede personal economic growth. Indeed, people who are higher in financial anxiety are more likely than the overall population to borrow from themselves by making withdrawals from their retirement account (Hasler et al., 2021), max-out their credit card (Sages et al., 2013), and spend more money than they earn. They are also less likely to be interested when given the opportunity to seek assistance from a professional financial counselor compared to those lower in financial anxiety (Grable et al., 2015). This is consistent with the evidence suggesting financial anxiety is associated with the tendency to avoid finance-related information (Shapiro & Burchell, 2012).

In the context of financial literacy, there is evidence negatively linking financial anxiety to both financial knowledge (Gignac et al., 2023; Kim et al., 2022; Skagerlund et al., 2018) and financial confidence (Kim et al., 2022). That is, people who report being more financially anxious tend to obtain lower scores on assessments of objective and subjective financial knowledge. Though there is no research investigating the mechanisms underlying this relation, drawing from avoidance theory linking math anxiety to numeracy (Maloney, 2016), I could

speculate that this avoidance of financial information reduces people's opportunities to develop their financial knowledge and skills. It follows that individual experiences of financial anxiety should not be overlooked when considering a person's overall financial literacy. Despite Americans citing finances as a root cause of worry (American Psychological Association, 2015), empirical data on relations between financial anxiety and financial literacy is lacking. Specifically, it remains unclear whether financial anxiety relates to the other subconstructs that comprise financial literacy (i.e., financial attitudes and behaviour).

Chapter 2: What's math got to do with it?: Establishing nuanced relations between math anxiety, financial anxiety, and financial literacy

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Abstract

I investigate the relations between math anxiety, financial anxiety, and financial literacy while extending previous research in three ways. First, I examine the distinct subconstructs that comprise financial literacy (i.e., financial knowledge, confidence, attitudes, and behaviour). Second, I distinguish between financial knowledge items that are confounded with numeracy versus items that are not. Third, I control for trait anxiety. Using survey data from Canadian adults ($N = 241$), I demonstrate that math anxiety is negatively related to mathematical financial knowledge but is not related to conceptual financial knowledge, financial confidence, or financial behaviour. Financial anxiety, conversely, is negatively related to both mathematical and conceptual financial knowledge, financial confidence, and ideal financial behaviour. The data suggest that, when considering financial literacy holistically, financial anxiety is more important than previously thought. These findings highlight the importance of distinguishing between the subconstructs that comprise financial literacy when attempting to understand individual differences that relate to financial literacy. Educators and policymakers looking to improve financial literacy would seemingly benefit from employing a targeted approach to decrease anxiety toward both math and finances.

Keywords: financial literacy, financial anxiety, math anxiety, numeracy

Study 1 Relations Between Math Anxiety, Financial Anxiety, and Financial Literacy

Current measurement strategies for examining financial literacy pose a serious issue when drawing broader conclusions about financial literacy. Researchers often measure financial literacy using a set of three items devised by Lusardi and Mitchell, popularly referred to as the “Big Three” (Lusardi & Mitchell, 2008).³ In line with my definition of financial literacy, I would consider the Big Three a measure of the subconstruct financial knowledge—not financial literacy in general—because the scale does not capture the other fundamental components that comprise financial literacy (i.e., financial confidence, attitudes, and behaviours). Further, when considering the relation between math anxiety and financial literacy, use of the Big Three is not optimal, as it is heavily confounded with numeracy. Indeed, two of the three items require mathematical calculations to solve correctly. This makes it difficult to delineate the root of any relations associated with attitudes or affinity towards numbers.

This construct validity issue complicates the interpretation of studies that use the Big Three to evaluate financial literacy. For example, Skagerlund et al. (2018) identified math anxiety and financial anxiety as being negatively related to “financial literacy,” arguing that a large part of financial literacy can be attributed to numeracy. Their results provide compelling evidence that a person’s ability to use and understand numbers, as well as their emotions surrounding numbers, plays an important role in financial literacy. However, given their use of the Big Three, I would argue that the authors demonstrated relations between math anxiety,

³ The Big Three items are as follows: (1) Suppose you had \$100 in a savings account and the interest rate was 2 percent per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than \$102, exactly \$102, less than \$102? (2) Imagine that the interest rate on your savings account was 1 percent per year and inflation was 2 percent per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account? (3) Do you think that the following statement is true or false? Buying a single company stock usually provides a safer return than a stock mutual fund.

financial anxiety, and financial knowledge (which I view to be a sub-construct of financial literacy), as opposed to financial literacy per se. Further, interpretation of the relation between numeracy and financial knowledge is hindered by the numerical nature of the Big Three.

Financial knowledge encompasses many concepts that do not directly involve numbers or math, such as familiarity with the different types of investment vehicles or the rules and regulations of banking (Knoll & Houts, 2012). It is possible the relation between financial knowledge and math anxiety previously established by Skagerlund et al. (2018) is driven by the fact that people higher in math anxiety also tend to be lower in numeracy (Hembree, 1990). Echoing Skagerlund et al. (2018), I do not question the validity of a financial knowledge measure that contains numbers and calculations, as many aspects of financial knowledge rely on a strong mathematical skillset. However, to understand the mechanisms that contribute to the acquisition of financial knowledge, I must tease apart financial knowledge items that are confounded with numeracy from items that are not.

The Present Study

In Study 1 I build upon the contributions of Skagerlund et al. (2018) who identified numeracy, math anxiety, and financial anxiety as core factors related to financial knowledge (a subconstruct of financial literacy). While important, I cannot draw conclusions about relations to financial literacy more broadly as this work did not investigate whether math anxiety and financial anxiety relate to the other factors that comprise financial literacy (i.e., financial confidence, attitudes, and behaviour). I further contend that an important distinction can be made between financial knowledge items that require mathematical calculations versus those that do not, which may be particularly relevant for relations to math anxiety and numeracy.

I extend this previous work in three important ways. First, I examine relations between anxiety (i.e., math and financial) and financial knowledge items that are mathematical versus those that are conceptual (Objective 1). Second, I examine relations between anxiety (i.e., math and financial) and the other three components of financial literacy (i.e., financial confidence, attitudes, and behaviour) independently (Objective 2). Lastly, I control for trait anxiety in all models to confirm that the observed differences are not better explained by general anxiety (O’Leary et al., 2017).

Objectives and Hypotheses

My first objective is to replicate the finding that financial anxiety and math anxiety are negatively related to financial knowledge. I expect people higher in financial anxiety to perform worse on a measure of financial knowledge compared to those lower in financial anxiety. I do not expect these relations to vary as a function of question type, as financial knowledge items that contain mathematical content are still inherently financial (H1a). Further, I expect people higher in math anxiety to perform worse on a measure of financial knowledge and I expect these relations to vary as a function of the type of financial knowledge question. That is, compared to people lower in math anxiety, I expect people higher in math anxiety to perform worse specific to items that require numeracy (H1b).

My second objective is to examine financial literacy as an entire construct. Specifically, I aim to determine whether relations exist between anxiety (i.e., math and financial) and the other three key components of financial literacy (i.e., financial confidence, attitudes, and behaviour). I expect financial anxiety to be negatively related to financial confidence (H2a), financial attitudes (H3a), and financial behaviour (H4a). I expect math anxiety to be negatively related to financial confidence (H2b) and financial behaviour (H4b). However, given that financial attitudes (i.e.,

preference for the short- or long-term) do not necessitate a mathematical skillset, I do not expect there to be a relation between math anxiety and financial attitudes (H3b).

Methods

Participants

I recruited Canadian residents to complete a 30-minute online survey using multiple platforms: (1) Honeybee, a two-sided, online web platform that facilitates initial engagement between the researcher and the participants; (2) social media (i.e., Twitter, Facebook, Instagram); (3) word of mouth; (4) Prolific, a forum for online recruitment tailored specifically to scientific researchers; (5) advertisements in undergraduate classrooms at a Canadian university; and (6) a participant database from a Canadian university. I offered participants a \$5 (CAD) Amazon.ca gift card to thank them for completing the survey. Participants recruited through Prolific received £3.50 (approximately \$6 CAD). Participation in this survey was confidential. I sent compensation to the email addresses provided by the participants then deleted all addresses from the raw data as well as the outgoing emails from my mailbox. I am unable to link participants' email addresses to their survey responses. See Appendix B for the ethics certificate for Study 1.

There was evidence in my data to suggest I received fraudulent responses from bots (i.e., malicious software applications programmed to complete automated tasks online; for a review on bots see Storozuk et al., 2020). For example, 75 people enrolled in my survey through Honeybee, but I received 184 responses on the survey link reserved for participants recruited through this platform. Thus, it is likely that 109 of these responses were fraudulent. Considering that invalid data has the potential to significantly alter study results at rates as low as 5% (Credé, 2010), I applied a rigorous approach to data screening and cleaning based on guidelines provided by

Storozuk et al. (2020). I excluded a total of 192 respondents from the sample. Please refer to Appendix C for detailed information on the exclusion procedure.

The final sample consists of 241 participants ($n = 141$ female). Participants were between 18 to 69 years old ($M = 30.83$, $SD = 10.38$) and reported a range of educational experience: had not completed high school (0.4%), high school diploma (22.4%), college diploma (10.4%), Bachelor's degree (49.4%), Master's degree (14.9%), or Doctoral degree (2.5%).

Procedure

Each participant began the online survey by answering two comprehension items designed to be easy for humans to answer but difficult for bots (e.g., "If you were to arrange the following movies into alphabetical order, which movie title would come last?"). Participants only gained admittance to the survey if they answered both items correctly (see Appendix D for details on bot detection methods). After granting their consent to participate in the survey (see Appendix E for consent and debriefing forms), participants then answered demographic items, followed by measures of anxiety, cognition, and finance in a randomized order. Lastly, participants completed a math assessment. The average completion time was 26.13 minutes.⁴

Materials

Outcome Variables

Financial Knowledge. I measured level of financial knowledge using the 20-item full-form Financial Knowledge Scale (FKS) (Knoll & Houts, 2012). Items cover topics on interest, inflation, time and value of money, investing, diversification of risk, housing, debt management, retirement savings, life insurance, and annuities. Items are presented as either True/False or

⁴ To provide a more accurate representation of the average completion speed, I excluded participants ($n = 4$) who completed the survey more than three standard deviations above the average completion time from this computation.

multiple choice (see Appendix F for full measure). Scores range from zero to 20, with higher scores indicating a better understanding of financial matters. Note that I rearranged the items, first presenting conceptual items, followed by mathematical items. Previous validation exercises supported the appropriateness of the scale, with scale scores predictive of outcomes known to be associated with financial literacy (Knoll & Houts, 2012). This measure has previously demonstrated good marginal reliability (interpretation similar to alpha coefficient; 0.85). Cronbach's alpha for the current sample was 0.82.

Financial Confidence. I measured financial confidence by asking participants to rate their own financial knowledge on a scale from *Very Low* (1) to *Very High* (7) (Bannier & Schwarz, 2018). Scores range from one to seven, with higher scores indicating higher levels of confidence in their financial knowledge.

Financial Attitudes. I measured participants' financial attitudes using the OECD's (2016) three-item "Financial Literacy Survey." This survey includes three attitude statements to gauge respondents' attitudes towards money and planning for the future. Each of the statements focuses on preferences for the short term through "living for today" and spending money (e.g., Money is there to be spent; see Appendix L for full measure). Participants answered items on a five-point Likert scale ranging from *Completely Agree* (1) to *Completely Disagree* (5). Scores range from three to 15, with lower scores indicating a tendency to favour the short-term and higher scores indicating a tendency to favour the long-term. This measure has previously demonstrated acceptable internal consistency ($\alpha = 0.61$; OECD, 2016). Cronbach's alpha for the current sample was 0.69.

Financial Behaviour. I measured financial behaviour using the 15-item Financial Management Behaviour Scale (FMBS; Dew & Xiao, 2011). The FMBS assesses four domains of

financial behaviour: (1) savings and investments, (2) insurance, (3) cash management (e.g., keeping a financial record and paying bills on time), and (4) credit management (see Appendix M for full measure). Participants responded to items on a five-point Likert scale ranging from *Never* (1) to *Always* (5) or *Not applicable to me*.⁵ Scores range from 15 to 75, with higher scores indicating increased engagement in favourable financial behaviours. The FMBS has previously demonstrated good internal consistency ($\alpha = .81$; Dew & Xiao, 2011). Cronbach's alpha for the current sample was 0.76.

Variables of Interest

Financial Anxiety. I measured financial anxiety using the four-item Financial Anxiety Scale (Fünfgeld & Wang, 2009). The scale contains statements such as “I am anxious about financial and money affairs” and “I get unsure by the lingo of financial experts” (see Appendix G for full measure). Participants answered items on a five-point Likert scale ranging from *Strongly disagree* (1) to *Strongly agree* (5). Scores range from four to 20, with higher scores indicating higher levels of financial anxiety. Cronbach's alpha for the current sample was 0.80.

Math Anxiety. I measured math anxiety using the nine-item Abbreviated Math Anxiety Scale (AMAS; Hopko et al., 2003). Participants rated how anxious they would feel in a variety of situations (e.g., “Thinking about an upcoming math test one day before”) on a five-point Likert scale ranging from *Low Anxiety* (1) to *High Anxiety* (5; see Appendix H for full measure). Scores range from five to 45, with higher scores indicating higher levels of math anxiety. This measure has previously demonstrated good to excellent internal consistency ($\alpha = .83$ to $.90$) and

⁵ If a respondent selected “Not applicable to me,” I included a follow-up question asking them to briefly explain why they felt that item does not apply to them. In the current data, I deemed all responses of “Not applicable to me” to be appropriate. I computed weighted averages to ensure participants' scores were not artificially deflated by questions that did not apply to them.

good test-retest reliability ($r = .83$; Hopko et al., 2003). Cronbach's alpha for the current sample was 0.90.

Control Variables

Demographics. I asked participants a series of demographic questions including age, gender, income, and education (see Appendix I for full measure). I did not ask participants to disclose their ethnic background.

General anxiety. General anxiety refers to feelings of stress, worry, or discomfort towards a wide range of experiences and situations (Spielberger et al., 1982). Though general anxiety is moderately correlated with math anxiety ($r = 0.44$; Hart & Ganley, 2019) and with financial anxiety ($r = .39$; Shapiro & Burchell, 2012), these anxiety constructs are widely considered to be distinct from each other (Ashcraft & Ridley, 2005; Dowker et al., 2016; Hart & Ganley, 2019; Hembree, 1990; Shapiro & Burchell, 2012).

I measured trait anxiety using the 20-item trait subscale of the State-Trait Anxiety Inventory (STAI-T; Spielberger et al., 1982). Participants answered items on a four-point Likert scale ranging from *Not at all* (1) to *Very much so* (4). The questionnaire included positive (e.g., I am a steady person) and negative (e.g., I worry too much over something that really doesn't matter) items, with positive items being reversed scored and combined with the negative items (see Appendix K for full measure). Scores range from 20 to 80, with higher scores indicating higher levels of trait anxiety. This measure has previously demonstrated good internal consistency ($\alpha = 0.78$) and good test-retest reliability ($r = 0.85$; Vitasari et al., 2011). Cronbach's alpha for the current sample was 0.94.

Numeracy. I measured numeracy using the 10-item Brief Mathematics Assessment 3 (BMA-3; Steiner & Ashcraft, 2012). Participants completed arithmetic (whole numbers and

fractions) and algebra computation procedures that do not require a calculator. For example, one question asked participants to write .025 as a fraction in the lowest terms (see Appendix J for full measure). Although there are 10 items, one item is a two-part question. Thus, scores range from zero to 11, with higher scores indicating greater math achievement. This measure has previously demonstrated good internal consistency ($\alpha = .69$) and correlates ($r = .66$) with the commonly used Wide Range Achievement Test 4 (Steiner & Ashcraft, 2012). Cronbach's alpha for the current sample was 0.68.

Results

I conducted all analyses using IBM SPSS Statistics for Macintosh Version 28.0 (IMB, 2021). See Table 2 for the zero-order correlations and the descriptive information for all continuous variables in Study 1.

Table 2*Correlations and Descriptive Statistics for All Continuous Variables in Study 1*

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Age	--	.173**	-0.126	-.201**	-0.094	-.177**	.190**	.282**	.193**	0.072	.262**
2. Income		--	0.035	-0.057	-0.083	-.164*	.272**	.274**	.271**	.150*	.383**
3. Numeracy			--	0.020	-.196**	-0.025	.263**	.175**	0.085	0.109	0.008
4. General Anxiety				--	.358**	.483**	-.149*	-.170**	-.173**	-0.085	-.285**
5. Math Anxiety					--	.390**	-.356**	-.246**	-.195**	0.080	-.149*
6. Financial Anxiety						--	-.353**	-.406**	-.518**	-0.103	-.406**
7. Mathematical FK							--	.562**	.436**	0.082	.296**
8. Conceptual FK								--	.573**	0.115	.409**
9. Financial Confidence									--	0.042	.441**
10. Financial Attitudes										--	.342**
11. Financial Behaviour											--
N per measure	241	241	239	241	241	241	241	241	240	240	241
Mean	30.83	4.28	7.56	46.23	21.44	11.81	2.71	9.81	4.00	10.30	51.79
SD	10.38	1.56	2.04	11.38	7.72	3.55	1.10	3.42	1.32	2.64	11.59
Minimum Score	18	1	3	20	9	4	0	0	1	3	22
Maximum Score	69	6	11	80	45	20	4	16	7	15	75
Possible Range	18+	1–6	0–11	20–80	9–45	4–20	0–4	0–16	1–7	3–15	15–75

Note. Income is measured from 1 (<\$15,000) to 6 (>\$100,000). FK = Financial knowledge. *p < .05. **p < .01.

Preliminary Analyses

Missing Data Analysis

Not all participants completed every measure. As such, I noted the sample size for each analysis. Occasionally, some participants did not respond to an item in a scale (<1.3%). To confirm that data was missing completely at random (MCAR), I performed Little's MCAR test. Non-significant results indicate that the data was MCAR, $\chi^2 (1350) = 1382.46, p = .264$. Thus, to address missing data, I conducted multiple imputation with a maximum of 50 iterations. If a participant did not complete any items on a given scale, I did not impute values.

Assumption Testing

I first determined that my data met the assumptions necessary to perform multiple regression analyses. For relations to financial knowledge, there was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.729. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no leverage values greater than 0.2 or values for Cook's distance above 1. The assumption of normality was met, as assessed by a Q-Q Plot. Based on these results, I proceeded with the analysis.

Analyses for Objective 1: Relations to Financial Knowledge

As stated above, I expected people higher in financial anxiety to perform worse compared to people lower in financial anxiety on both mathematical and conceptual financial knowledge items (H1a). I expected people higher in math anxiety to perform worse on an assessment of financial knowledge (compared to people lower in math anxiety) specific to items that require

numeracy (H1b). To test these hypotheses, I conducted two multiple regressions to determine whether math anxiety and financial anxiety are related to mathematical and conceptual financial knowledge. In examining relations to mathematical financial knowledge there were no outliers. In examining relations to conceptual financial knowledge, I removed two participants flagged as outliers (i.e., studentized deleted residuals greater than -3.29 standard deviations; Tabachnick & Fidell, 2013).

For each regression, Model 1 includes variables known to be related to financial literacy (i.e., age, gender, education, income, and numeracy)⁶ and Model 2 includes general anxiety (as a control), math anxiety, and financial anxiety (see Table 2). In the first regression, the dependent variable is performance on mathematical items of the FKS, and in the second regression, the dependent variable is performance on conceptual items of the FKS. I then conducted t-tests for dependent correlations to determine if math anxiety and financial anxiety are more strongly related to either financial knowledge items that are mathematical or conceptual.

Relations to Mathematical Financial Knowledge

I first conducted a multiple regression analysis to determine whether math anxiety and financial anxiety relate to mathematical financial knowledge. The model of interest (Model 2), which included age, gender, education, income, numeracy, as well as general, math, and financial anxieties, significantly related to performance on mathematical items of the FKS, $F(8, 230) = 13.720, p < .001$, adjusted $R^2 = .300$. This indicates that, above and beyond the variance explained by variables known to be related to financial literacy in Model 1 (adjusted $R^2 = .227$), Model 2 accounted for an additional 8.0% of the variance in mathematical financial knowledge.

⁶ Note that the published version of this article includes recruitment method as a control variable. I removed this variable from the present analyses because it is not a continuous variable, and the small sample sizes of some groups made it unsuitable for inclusion as a dummy-coded categorical variable in the model. Its removal did not significantly affect the results.

Both math anxiety ($\beta = -.208, p < .001$) and financial anxiety ($\beta = -.197, p = .004$) were significantly related to mathematical financial knowledge, where higher levels of math and financial anxiety related to lower scores on mathematical items of the FKS. See Table 2 for all regression coefficients, standard errors, and confidence intervals.

Relations to Conceptual Financial Knowledge

I then conducted a parallel multiple regression analysis to determine whether math anxiety and financial anxiety relate to conceptual financial knowledge (see Table 2). The model of interest (Model 2) significantly related to conceptual financial knowledge, $F(8, 230) = 13.616, p < .001$, adjusted $R^2 = .298$. The inclusion of anxiety constructs accounted for an additional 7.4% of the variance in performance on conceptual financial knowledge. Notably, math anxiety was not related to conceptual financial knowledge. Financial anxiety was significantly related to conceptual financial knowledge ($\beta = -.294, p < .001$), whereby higher levels of financial anxiety related to lower scores on conceptual items of the FKS.

Strength of the Relations Between Financial Anxiety and Financial Knowledge

I then conducted a t-test for comparing dependent correlations to test the hypothesis that financial anxiety does not relate more strongly to either financial knowledge that is mathematical or conceptual (H1a). A comparison of the semi-partial correlations controlling for age, gender, education, income, numeracy, general anxiety, and math anxiety demonstrated that financial anxiety relates more strongly to performance on conceptual items of the FKS ($r = -.251$) compared to mathematical items ($r = -.152$), $t(240) = 1.69, p = .046$. Thus, my second hypothesis was only partially supported, as financial anxiety was negatively related to both mathematical and conceptual financial knowledge (as predicted) but was more strongly related to conceptual items compared to mathematical items (counter to my prediction).

Given that math anxiety was not related to conceptual financial knowledge, I did not conduct a follow up t-test to test the hypothesis that math anxiety relates more strongly to mathematical financial knowledge than conceptual financial knowledge. However, the absence of a relation between math anxiety and conceptual items of the FKS supports my hypothesis that math anxiety is only related to financial knowledge through items that contain mathematical content (H1b).

Analyses for Objective 2: Relations to Financial Literacy

I conducted a series of multiple regressions to determine whether relations exist between anxiety (i.e., math and financial) and the other three subconstructs of financial literacy (i.e., financial confidence, attitudes, and behaviour). The independent variables in Model 1 include variables known to be related to financial literacy (i.e., age, gender, education, income, and numeracy). In Model 2, I add general anxiety (as a control), math anxiety, and financial anxiety.

Relations to Financial Confidence

I conducted a multiple regression to determine whether math anxiety and financial anxiety relate to financial confidence (see Table 3). I removed one participant flagged as an outlier and the data met all other assumptions necessary to perform a multiple regression.⁷ The model of interest (Model 2) was significantly related to financial confidence, $F(8, 229) = 14.746$, $p < .001$, adjusted $R^2 = .317$. The addition of anxiety constructs to the model accounted for an additional 17.4% of the variance in a person's financial confidence. In partial support of my second hypothesis, financial anxiety was significantly related to financial confidence (H2a; $\beta = -.495$, $p < .001$). However, I did not find a relation between math anxiety and financial confidence (H2b).

⁷ Durbin-Watson statistic of 1.896.

Relations to Financial Attitudes

I then conducted a multiple regression to determine whether math anxiety and financial anxiety relate to financial attitudes (see Table 4). I removed one participant flagged as an outlier and the data met all other assumptions.⁸ The model of interest (Model 2) was significantly related to financial attitudes, $F(8, 229) = 3.191, p = .002$, adjusted $R^2 = .069$. The addition of anxiety constructs to the model accounted for an additional 3.3% of the variance in financial attitudes. My third hypothesis was not supported, as financial anxiety was not related to financial attitudes (H3a). Further, though I did not expect a relation between math anxiety and financial attitudes (H3b), my data demonstrated a positive link between these constructs ($\beta = .189, p = .008$). This indicates people who are more anxious about math were more likely to demonstrate long-term preferences with their money. However, it should be noted that Model 2 did not account for a large proportion of variance (only 3.3%). This result should therefore be interpreted with caution and requires further investigation.

Relations to Financial Behaviour

I conducted a final multiple regression to determine whether math anxiety and financial anxiety relate to financial behaviour (see Table 5). The data met all assumptions.⁹ The model of interest (Model 2) was significantly related to financial behaviour, $F(8, 230) = 14.172, p < .001$, adjusted $R^2 = .307$. The addition of anxiety constructs to the model accounted for an additional 9.4% of the variance in financial behaviour. In partial support of my fourth hypothesis, financial anxiety was significantly related to financial behaviour (H4a), $\beta = -.289, p < .001$. However, I did not find a relation between math anxiety and financial behaviour (H4b).

⁸ Durbin-Watson statistic of 1.985.

⁹ Durbin-Watson statistic of 1.884.

Table 3*Multiple Regression Assessing Factors Related to Mathematical and Conceptual Financial Knowledge*

Variable	Mathematical Financial Knowledge											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.197	0.106		-0.011	0.406	0.064	0.497	0.131		0.238	0.756	<.001
Age	0.004	0.002	0.146	0.001	0.007	0.020	0.003	0.002	0.121	0.000	0.006	0.044
Gender	-0.129	0.033	-0.231	-0.193	-0.065	<.001	-0.093	0.032	-0.167	-0.157	-0.030	0.004
Education	0.043	0.016	0.167	0.011	0.074	0.008	0.032	0.015	0.124	0.001	0.062	0.042
Income	0.039	0.010	0.223	0.019	0.060	<.001	0.033	0.010	0.189	0.014	0.053	0.001
Numeracy	0.351	0.087	0.235	0.179	0.522	<.001	0.293	0.085	0.196	0.126	0.459	0.001
General Anxiety							0.191	0.125	0.099	-0.055	0.437	0.127
Math Anxiety							-0.337	0.100	-0.208	-0.533	-0.140	0.001
Financial Anxiety							-0.305	0.104	-0.197	-0.510	-0.101	0.004
R^2	.227						.300					
ΔR^2	.227						.080					
F	14.95					<.001	13.72					<.001
Conceptual Financial Knowledge												
Constant	0.245	0.082		0.084	0.406	0.003	0.449	0.102		0.249	0.650	<.001
Age	0.005	0.001	0.233	0.002	0.007	<.001	0.004	0.001	0.207	0.002	0.007	0.001
Gender	-0.097	0.025	-0.225	-0.147	-0.048	<.001	-0.067	0.025	-0.155	-0.116	-0.018	0.008
Education	0.034	0.012	0.171	0.010	0.058	0.006	0.025	0.012	0.125	0.001	0.048	0.040
Income	0.030	0.008	0.217	0.014	0.046	<.001	0.024	0.008	0.177	0.009	0.040	0.002
Numeracy	0.183	0.067	0.159	0.051	0.315	0.007	0.170	0.066	0.147	0.040	0.299	0.010
General Anxiety							0.133	0.097	0.088	-0.058	0.323	0.172
Math Anxiety							-0.081	0.077	-0.065	-0.234	0.072	0.296
Financial Anxiety							-0.353	0.080	-0.294	-0.512	-0.195	<.001
R^2	.231						.298					
ΔR^2	.231						.074					
F	15.31					<.001	13.62					<.001

Note. Mathematical $N = 238$; Conceptual $N = 237$; B = unstandardized regression coefficient; SE_B = standard error of the coefficient; β

= standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit; ΔR^2 = adjusted

R^2 change; gender 1 = male, 2 = female. Education is measured from 1 (I have not completed high school) to 6 (Doctoral degree).

Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table 4*Multiple Regression Assessing Factors Related to Financial Confidence*

Variable	Financial Confidence											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	2.694	0.530		1.649	3.739	<.001	4.397	0.619		3.177	5.616	<.001
Age	0.017	0.008	0.138	0.001	0.034	0.036	0.012	0.008	0.096	-0.003	0.027	0.106
Gender	-0.600	0.163	-0.225	-0.921	-0.279	0.000	-0.314	0.151	-0.118	-0.613	-0.016	0.039
Education	0.157	0.080	0.129	-0.001	0.314	0.051	0.077	0.073	0.063	-0.067	0.221	0.291
Income	0.200	0.052	0.237	0.097	0.303	<.001	0.149	0.047	0.178	0.056	0.243	0.002
Numeracy	0.415	0.438	0.058	-0.449	1.279	0.345	0.402	0.401	0.056	-0.387	1.192	0.316
General Anxiety							1.092	0.591	0.118	-0.073	2.257	0.066
Math Anxiety							0.113	0.471	0.015	-0.815	1.040	0.811
Financial Anxiety							-3.655	0.491	-0.495	-4.623	-2.687	<.001
R^2	.148						.317					
ΔR^2	.148						.174					
F	9.20					<.001	14.75					<.001

Note. $N = 237$; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = male, 2 = female. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table 5*Multiple Regression Assessing Factors Related to Financial Attitudes*

Variable	Financial Attitudes											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.418	0.076		0.269	0.567	<.001	0.425	0.097		0.234	0.617	<.001
Age	0.000	0.001	0.007	-0.002	0.002	0.918	0.000	0.001	-0.002	-0.002	0.002	0.983
Gender	0.027	0.023	0.075	-0.019	0.072	0.246	0.031	0.024	0.087	-0.016	0.078	0.191
Education	0.026	0.011	0.162	0.004	0.049	0.020	0.025	0.011	0.151	0.002	0.047	0.031
Income	0.012	0.007	0.105	-0.003	0.026	0.111	0.011	0.007	0.101	-0.003	0.026	0.126
Numeracy	0.110	0.062	0.116	-0.012	0.232	0.077	0.145	0.063	0.152	0.022	0.269	0.021
General Anxiety							-0.098	0.092	-0.080	-0.279	0.083	0.286
Math Anxiety							0.195	0.073	0.189	0.050	0.339	0.008
Financial Anxiety							-0.103	0.076	-0.104	-0.253	0.047	0.177
R^2	.047						.069					
ΔR^2	.047						.033					
F	3.33					.006	3.19					.002

Note. $N = 237$; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = male, 2 = female. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table 6*Multiple Regression Assessing Factors Related to Financial Behaviour*

Variable	Financial Behaviour											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.427	0.056		0.317	0.537	<.001	0.624	0.069		0.489	0.759	<.001
Age	0.002	0.001	0.127	0.000	0.003	0.043	0.001	0.001	0.083	0.000	0.003	0.166
Gender	-0.006	0.017	-0.022	-0.040	0.027	0.707	0.018	0.017	0.060	-0.016	0.051	0.298
Education	0.032	0.008	0.241	0.016	0.049	<.001	0.024	0.008	0.176	0.008	0.040	0.004
Income	0.029	0.006	0.309	0.018	0.040	<.001	0.025	0.005	0.274	0.015	0.036	<.001
Numeracy	0.004	0.046	0.005	-0.087	0.094	0.936	0.015	0.044	0.019	-0.072	0.102	0.740
General Anxiety							-0.102	0.065	-0.100	-0.230	0.027	0.120
Math Anxiety							0.042	0.052	0.049	-0.061	0.144	0.426
Financial Anxiety							-0.236	0.054	-0.289	-0.342	-0.129	<.001
R^2	.220						.307					
ΔR^2	.220						.094					
F	14.41					<.001	14.17					<.001

Note. $N = 239$; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = male, 2 = female. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Discussion

Financial literacy levels in Canada have been below an acceptable standard for decades (OECD, 2016, 2020), but attempts to improve financial literacy through educational strategies have been unsuccessful (Cole et al., 2016; Fernandes et al., 2014; Mandell & Schmid-Klein, 2009). One explanation for this failure could be that educational interventions tend to focus on content knowledge and ignore the role of individual differences (e.g., Estelami & Estelami, 2023). In Study 1, I highlight a subset of affective factors that relate to financial literacy. To my knowledge, the relations between math anxiety, financial anxiety, and financial literacy have been studied only once before (see Skagerlund et al., 2018). Using the work of Skagerlund et al. (2018) as a departure point, I replicated the finding that math anxiety and financial anxiety are negatively related to financial knowledge while controlling for general anxiety and variables known to be related to financial literacy (i.e., age, gender, education, income, and numeracy). I extended the previous work by measuring financial knowledge using a tool less confounded with mathematical content, which is imperative when considering relations to both math anxiety and numeracy. Further, I moved beyond relations to financial knowledge and measured financial literacy using a nuanced approach, also assessing relations to financial confidence, attitudes, and behaviour.

When considering all subconstructs that comprise financial literacy (i.e., financial knowledge, confidence, attitudes, and behaviour), my data indicates that financial anxiety is a more important factor in relation to financial literacy than previously thought (e.g., Skagerlund et al., 2018). Financial anxiety was negatively related to all components of financial literacy, apart from financial attitudes. Though financial anxiety was negatively related to both mathematical and conceptual financial knowledge, financial anxiety was more strongly related to conceptual

financial knowledge. Perhaps people with higher levels of financial anxiety consider mathematical financial knowledge items as “math questions” as opposed to “finance questions.” Indeed, people who are anxious about finances are not necessarily also anxious about math. By focusing on the mathematical aspect of the question, people with financial anxiety may experience less of the negative effects associated with their anxiety when completing mathematical items compared to the conceptual items.

My findings further support the negative relation established by Skagerlund et al. (2018) between math anxiety and financial knowledge but provide further clarity on the mechanisms through which this relation occurs. Namely, that the negative relation between math anxiety and financial knowledge appears to be driven by the negative link between math anxiety and numeracy. Being anxious about math was not related to a person’s conceptual understanding of financial topics (e.g., knowing the difference between stocks and bonds), but was related to their ability to arrive at a correct response for items that required numeracy (e.g., understanding the additive nature of compound interest). This finding may seem unsurprising, given that people who are higher in math anxiety tend to perform worse on assessments of numeracy (Hembree, 1990). However, until now, our empirical understanding of how math anxiety relates to financial knowledge derived from relations to a tool largely confounded with numeracy (i.e., the Big Three; Lusardi & Mitchell, 2008).

One theory as to why math anxiety is negatively related to numeracy is that math anxiety co-opts important working memory resources needed to perform mathematical computations (Ashcraft & Kirk, 2001; Hunt et al., 2014). Another possibility is that being anxious about math has led to a lifetime of avoiding opportunities to enhance numeracy (Maloney, 2016). The correlational nature of my work does not permit me to make causal inferences about the roles

numeracy or math anxiety play in the acquisition of financial knowledge. It is worth noting, however, that the negative relation between math anxiety and mathematical financial knowledge remained even when accounting for a person's level of numeracy. This result suggests that being good at math is not enough to safeguard a person against the negative consequences of being anxious about math (in the context of a financial knowledge assessment with mathematical elements).

Further, and in line with previous research (Lusardi, 2012; Skagerlund et al., 2018), I found a positive relation between numeracy and both mathematical and conceptual financial knowledge. That is, people who obtained higher scores on the numeracy assessment were also more likely to obtain higher scores on the financial knowledge assessment, even if the items did not require numeracy to solve correctly. This finding suggests that having a firm understanding of, and ability to use, numbers is important when bolstering financial knowledge more broadly. This finding is consistent with the notion that efforts to improve financial knowledge may benefit by committing resources to enhancing numeracy (Skagerlund et al., 2018). However, while I agree that increasing numeracy is a worthwhile endeavor, my data suggests that, with respect to financial literacy, enhancing numeracy may only yield benefits for certain subconstructs. For instance, I did not find evidence of a link between numeracy and financial confidence or financial behaviour. Enhancing numeracy would thus have little effect on a person's confidence in their financial knowledge or their engagement in financial behaviours that would lend itself to financial well-being.

The lack of relation between numeracy and financial behaviour, however, is counter to the findings presented by Cole et al. (2016). The authors reported that an increase in math courses in the U.S. high school curriculum related to improvements in financial behaviours, such

as greater market participation, investment income, and better credit management (Cole et al., 2016). It is possible that these specific behaviours outlined in Cole et al.'s (2016) work require higher levels of numeracy compared to the financial behaviours measured in my current assessment. Just as I divided the financial knowledge assessment into mathematical versus conceptual items, the financial behaviour assessment may also benefit from separation based on numeracy. However, while it was relatively simple to distinguish between knowledge items that require numeracy from those that did not, this distinction is much less clear for financial behaviour items. For instance, it would not require numeracy for someone to maintain an emergency savings fund through automatic deductions from monthly paycheques. However, if someone made manual deposits to the savings fund based on a fluctuating income, one could argue this fund would require numeracy to maintain. The ambiguity in what constitutes a numerical financial task presents challenges, especially when attempting to delineate relations to numeracy and math anxiety. Indeed, this complication may provide one explanation as to why I also did not find a relation between math anxiety and financial behaviour. To better understand the intricacies of these relations, more research is needed on the links between specific financial behaviours, numeracy, and math anxiety.

Implications for Education

A greater understanding of the factors that underly individual differences in financial literacy is not only of theoretical importance—it is also necessary for the creation of educational strategies designed to increase financial literacy within a given population. The results suggest that people who experience greater degrees of financial anxiety may represent a financially vulnerable population. Current educational strategies tend to focus solely on content knowledge, ignoring the affective component associated with financial literacy (e.g., Cole et al., 2016;

Lusardi, 2003). Attempting a “one-size fits all” educational approach will not be successful. Rather, we must take a more holistic approach to tackling financial literacy by also addressing attitudes. Policy makers and educators looking to improve financial literacy may benefit from implementing intervention strategies aimed at lessening people’s financial anxiety.

My data further support the push to increase financial knowledge by lessening people’s math anxiety. When creating educational interventions designed to improve financial knowledge, it is necessary to consider the distinction between mathematical and conceptual knowledge. Interventions aimed at solely targeting math anxiety would only yield benefits for people’s financial knowledge that is inherently mathematical, but these benefits likely would not translate to conceptual financial knowledge. Thus, such interventions may not be as beneficial as researchers have previously thought when looking to improve financial knowledge in its entirety (Skagerlund et al., 2018). While finding a time and place to implement remediation strategies to counter math and financial anxiety in students is made relatively easy due to compulsory math courses and the school setting, finding a time and place to counter math and financial anxiety in adults is challenging. This is especially true given that highly math-anxious adults tend to avoid math courses, making them less likely to qualify for math-dependent careers (Ahmed, 2018; Daker et al., 2021; Hart & Ganley, 2019). It is therefore imperative to integrate both content and affective factors within future financial education strategies.

Limitations

One strength of this work is that it spans research typically done within both psychology and economics. While my sample size is considered adequate within many psychology literatures (e.g. Schönbrodt & Perugini, 2013; Wilson Vanvoorhis & Morgan, 2007), I acknowledge that my sample may be considered small from the perspective of an economics

audience. I also acknowledge the results of this study cannot be assumed to generalize to the entire population. In this respect, these data can be considered an initial approach to understanding how these factors relate in different subsets of the population. Indeed, while I collected data on age, gender, education, and income, I did not collect data on race or ethnicity. Further, in the current sample, I do not have balanced groups with respect to age or gender. The average age of the Canadian population in 2022 was 41.7 years (Statistics Canada, 2022), while the average age of the sample is 30.83 years ($SD = 10.38$). This suggests that the sample data are positively skewed and are not representative of age demographics in Canada. As well, more participants in the sample identified as women ($n = 141$) compared to men ($n = 100$). It is of course possible that the magnitude of the reported effects may vary as a function of these demographic factors. Future investigations would do well to explore if these additional demographic factors do, indeed, have moderating effects on the reported relations between math anxiety, financial anxiety, and the subconstructs of financial literacy.

Conclusion

The results of Study 1 suggest that people who experience greater degrees of financial anxiety may represent a financially vulnerable population. Math anxiety, on the other hand, is not central to our understanding of financial literacy as it was not related to conceptual financial knowledge, financial confidence, or financial behaviours. Though math anxiety was related to mathematical financial knowledge, knowing about finances is just one aspect of being financially literate. According to my theoretical model of financial literacy, behaviour is the driving force between financial literacy and financial well-being, and this connection is absent between math anxiety and financial behaviour. As such, in Study 2, I focus on the construct of financial anxiety, aiming to understand what, exactly, this construct represents and how best to measure it.

Chapter 3: Defining Financial Anxiety: A Scoping Review

Study 2 Determining How Financial Anxiety is Conceptually and Operationally Defined

Evidence from Study 1 suggests that financial anxiety is an important factor in relation to a person's level of financial literacy. This finding prompted me to delve deeper into the literature on financial anxiety. My intention was to gather evidence to develop a targeted intervention strategy to lessen financial anxiety which would, in theory, translate to improvements in financial literacy scores. However, a preliminary literature search revealed inconsistencies in how financial anxiety is conceptualized across studies. For example, some researchers use the terms financial anxiety and financial stress interchangeably (e.g., Archuleta et al., 2013a; Doehring, 2018; Grable et al., 2015; Grable et al., 2014; Medyanik, 2020; Tran et al., 2018). This may be problematic, as I consider financial anxiety and financial stress to represent distinct constructs.

Specifically, I conceptualize financial stress as an outcome resulting from financial instability or scarcity. For example, someone may experience financial stress if they do not have enough money to meet their basic needs, such as paying rent or buying groceries. This differs from my conceptualization of financial anxiety, which is characterized by feelings of doubt or unease when engaging with financial affairs or making financial decisions. For example, someone may experience financial anxiety when confronted with financial jargon with which they are not familiar. While these two concepts, as conceptualized here, may be related, they are nonetheless dissociable. Someone could be highly anxious about financial constructs, such as grasping an understanding of the stock market, but still be financially secure (i.e., high in financial anxiety, low in financial stress). The opposite is also true, wherein someone can experience difficulty paying rent but is not at all anxious to learn about the ins and outs of the stock market (i.e., low in financial anxiety, high in financial stress).

The lack of consistency in how financial anxiety is conceptualized across studies limits our empirical understanding of this construct by introducing ambiguity into the relations it shares with various psychological and physiological outcomes. For example, within the existing body of research, financial stress has been linked to adverse mental health outcomes, such as an increased prevalence of depressive symptoms (Cao et al., 2021; Guan et al., 2022), elevated risks of cardiovascular diseases (Swarup et al., 2024), and a higher likelihood of smoking (Guillaumier et al., 2017; Siahpush, Spittal, et al., 2007; Siahpush, Yong, et al., 2009). Studies also report negative associations between financial stress and outcomes like academic performance (Baker & Montalto, 2019; Joo et al., 2008), marital quality (Kelley et al., 2018), and overall happiness (Shaahu & Gire, 2023). The crucial point to emphasize is that while these relations are established for what the authors refer to as “financial stress,” it cannot be automatically assumed that “financial anxiety,” a term that is often used interchangeably with financial stress, shares these associations. Without a consistent definition of these constructs across studies, our knowledge on how financial anxiety relates to, interacts with, or is impacted by other variables is limited. This ambiguity effectively stifles the development of a comprehensive and cohesive understanding of its effects and implications.

The lack of consistency across conceptualizations also hinders opportunities to improve financial literacy outcomes. It is not possible to design effective intervention strategies aimed at lessening financial anxiety, and thus increasing financial literacy, without a consistent conceptual definition of the construct. Drawing from the literature in mathematical cognition, many interventions that have effectively reduced the link between math anxiety and poor math performance have been unrelated to training math concepts. Rather, several successful interventions target symptoms of anxiety (Hembree, 1990; Ramirez & Beilock, 2011). For

instance, interventions have effectively reduced the negative effects of math anxiety on math performance by asking people to reappraise the nature of their heightened arousal (Jamieson et al., 2010, 2016), by regulating emotions through guided breathwork (Brunyé et al., 2013) and mindfulness exercises (Bellinger et al., 2015), and by reducing intrusive thoughts through expressive writing (Park et al., 2014). In the case of financial anxiety, such interventions would only be beneficial when conceptualizing the term in line with my conceptualization of the construct. Alternatively, if financial anxiety is conceptualized in line with financial stress, it would be more beneficial to intervene by lessening financial burden through financial assistance programs. Before we can design effective interventions to lessen financial anxiety, and thus increase financial literacy, we must first establish construct validation of financial anxiety.

Construct Validation

Construct validation is essential when measuring, and ultimately understanding, a latent construct. According to Flake et al. (2017), construct validation is a systematic process in which researchers identify a construct, define it, develop a theory about its structure, decide how to measure it, and determine that it is appropriately represented by the measure. The recommended practice for conducting construct validation involves three sequential phases: substantive, structural, and external (Loevinger, 1957). In each phase, the researcher gathers validity evidence to support construct validation (Flake et al., 2017). The substantive phase involves building the theoretical base of the construct through literature reviews, construct conceptualization, item development and scale selection, and content relevance and representativeness. The structural phase involves factor analysis and reliability assessments. The external phase involves situating the construct in a broader context through convergent and discriminant validity, predictive analyses, and known group differences.

The Present Study

In Study 2, I conduct a scoping review on financial anxiety measures found in peer-reviewed journal articles across various social science disciplines. This approach aligns with the substantive phase of construct validation, as scoping reviews are commonly used to clarify concepts and definitions (Lockwood et al., 2019; Munn et al., 2018; Peters et al., 2020; Pollock et al., 2023).

Objectives and Hypotheses

The objective of Study 2 is to determine how researchers conceptually and operationally define financial anxiety. The results of this scoping review will inform the development of my own conceptual definitions of financial anxiety and financial stress that are rooted in an understanding of the current literature. I hypothesize that these constructs are largely confounded in the literature (H5). I expect some researchers will use the term financial anxiety in line with my conceptualization of the term, while others will use it in line with my conceptualization of financial stress. Some may even use the term financial anxiety to refer to both financial anxiety and financial stress (as I conceptualize these terms) or to another construct entirely.

Methods

Protocol

Search Strategy

Development and Databases. The review focuses on studies that assessed financial anxiety (or a related term) across age groups 17 and older. I explored five database options: APA PsycINFO (Ovid), Medline (Ovid), CINAHL, Scopus, and Web of Science. After entering the search terms, I reviewed the titles and abstracts of the first 25 hits from each database to assess their potential relevance to the review. I deemed articles irrelevant if they focused on broader

topics like general health or financial literacy without specifically addressing financial anxiety, financial stress, or financial worry. I also disregarded articles if they were positioned in unrelated contexts, such as corporate finance or economic policy, rather than in the context of individual psychological experiences. I discarded Scopus and Web of Science as these databases produced the most noise and the fewest relevant hits compared to the other databases (see Table 7). To ensure the remaining three databases produced an exhaustive review based on the search terms, I selected three validation articles (i.e., articles that should appear in the final review) and searched for these articles amongst the hits. All three validation articles (Archuleta et al., 2013a; Shapiro & Burchell, 2012; Tinghög et al., 2021) appeared in the searches from APA PsychInfo, Medline (Ovid), and CINAHL, suggesting that these databases were sufficient for the purposes of this review.

Table 7

Number of Hits from Proposed Search Strategy

Database	Total hits	Relevant hits (first 25)
APA PsycINFO (Ovid)	1387	9
MEDLINE (Ovid)	2075	7
CINAHL	1386	7
Scopus	5403	5
Web of Science	4328	5

Note. Search conducted on January 11, 2023.

Search Modifications. The search strategy, after the exclusion of articles identified by Scopus and Web of Science, was initially met with 3152 unique hits. To ensure feasibility, I modified the search. This is common practice in scoping reviews as article screening is an iterative process and modifications to the search strategy are expected (Arksey & O'Malley, 2005; Peters et al., 2020). I modified the search in five ways:

1. I excluded the term “debt” from the search based on the observation that searches including the word “debt” yielded limited useful results. This was determined by a review of titles and abstracts from the first ten articles sourced from all databases via the debt search line. I noted that the only relevant articles were also identified through alternative search lines, suggesting that the inclusion of “debt” did not contribute uniquely pertinent hits but increased irrelevant results and noise.
2. I omitted the term “ruminat*” to simplify the search as it did not contribute meaningful results. For instance, a comparison of searches on APA PsychInfo, one with “financ* and ruminat*” and another without these terms, revealed a negligible difference (1703 vs. 1702 hits, respectively). Moreover, the solitary additional hit procured with “ruminat*” would have been discarded in the initial screening stage, evidencing the term's lack of meaningful contribution across all database searches.
3. The criterion for word adjacency in searches was altered from three words to two. This adjustment aimed to reduce irrelevant results while ensuring a comprehensive review. For instance, a search in APA PsychInfo with “financ* adj3” resulted in 1702 hits, whereas modifying it to “adj2” reduced the hits to 1358. Among the 344 hits excluded by this modification, the initial 25 articles would have been disregarded in the first stage of screening. This pattern remained consistent across databases, substantiating the modification as a means to diminish noise without omitting relevant hits.
4. The search was constrained to a specific date range: January 1, 2010, to December 31, 2022. This restriction aimed to increase feasibility of the review by focusing the search on the more recent literature.

5. An additional search line was integrated to encompass finance and money attitudes. This inclusion, though yielding only a few extra hits, enriched the review by capturing studies employing the Money Attitudes Scale (Yamauchi & Templer, 1982), particularly its anxiety subscale.

Final Search Strategy. I conducted the final search on January 13, 2023. The search included the following key terms: financial anxiety, financial worry, and financial stress. I retrieved peer-reviewed journal articles from the following four databases: APA PsycINFO (Ovid), Medline (Ovid), CINAHL, and APA PsychTests (APA PsycNet). I used search tools including truncations and Boolean operators to retrieve variations on the search terms (e.g., AND, OR, *). Given that citations needed to be individually exported from APA PsychTests, I manually selected scales from the search output that I considered to be relevant to the review. See Appendix N for the final search strategy.

Screening Procedure

I used Covidence, a systematic review management software, to facilitate the screening process. To reduce potential errors and bias, and consistent with best practices for scoping reviews, I trained four undergraduate research assistants (RAs) to help me screen articles (Peters et al., 2020; Pollock et al., 2023). Training consisted of a meeting in which I outlined the inclusion and exclusion criteria (detailed below) and familiarized the RAs with Covidence software. I further provided the RAs with detailed written guidelines on the screening protocol for their reference (see Appendix O). I met with the research team weekly and answered questions via email throughout the screening process (Pollock et al., 2023).

Article screening consisted of two stages. In Stage 1, the research team independently screened article titles and abstracts. To meet Stage 1 inclusion criteria, each article must have (a)

been published in a peer reviewed journal; (b) mentioned one of the key terms or a related term; (c) used a human sample; and (d) been written in English. Two reviewers screened each article. If Covidence signaled a disagreement between reviewers, I decided if the article met Stage 1 criteria. In Stage 2, the research team independently screened the full texts of the articles remaining following Stage 1. To meet Stage 2 criteria, each article must have quantitatively measured financial anxiety (or a related term) using scales (i.e., items designed to represent the latent construct of financial anxiety). I also excluded articles based on the following criteria: (a) the sample included participants under 17 years old, (b) the scale items were developed or revised for a specific population (e.g., cancer survivors), (c) the article measured a specific type of financial anxiety (e.g., COVID-19-related financial anxiety, cancer-related financial anxiety), and/or (d) the scale was a single item dichotomous that asked about perceived anxiety or stress (e.g., “Are you stressed about finances?”). Two reviewers screened each article and if Covidence signaled a disagreement between reviewers, I decided if the full text met Stage 2 criteria.

Data Extraction

All members of the research team piloted the data extraction form together on three articles to ensure consistency across reviewers (Peters et al., 2020). I adapted the data extraction method developed by Ashley et al. (2023) to align with the objectives of the current scoping review. The extraction guide is based on the three phases of construct validation (Flake et al., 2017) and Pedhazur and Schmelkin’s (1991) integrated approach to measurement.

One reviewer extracted the data, and I reviewed all extractions to ensure accuracy and completeness (Pollock et al., 2023). We extracted demographic information of the sample (i.e., age, gender, ethnic majority of the sample, and location the study was completed) as well as information pertaining to the conceptual and operational definitions of the construct measured.

For the conceptual definitions, we indicated whether the researchers provided a specific conceptual definition of financial anxiety (or a related term). If so, we extracted the definition into a table to facilitate comparisons of the definitions across studies. For the operational definitions, we reported the title of the measure used to assess financial anxiety (if provided), the number of items, the scale each item is evaluated on, and dimensionality (i.e., unidimensional or multidimensional), and the word-for-word items used to measure the construct. If the scale was multidimensional, we reported the titles of the subscales and the number of items in each subscale. We also reported instructions for how the score was calculated and whether a standard was applied to interpret the score. See Appendix P for the data extraction method.

Qualitative Content Analysis

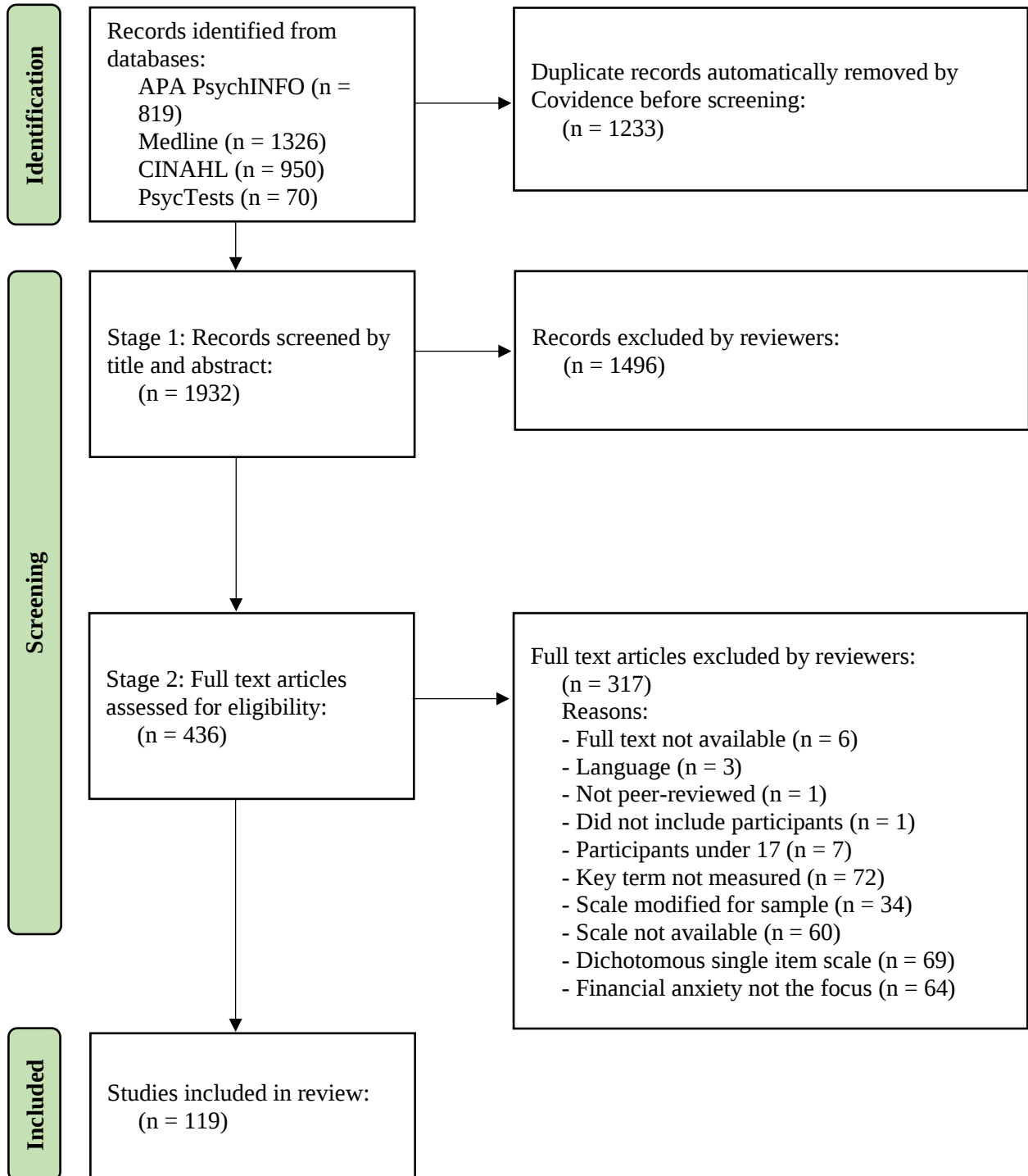
I analyzed construct definitions using quantitative content analysis (Pollock et al., 2023). This descriptive approach involves allocating concepts or characteristics into overall categories through the process of open coding (Peters et al., 2020). I followed the three phases of qualitative content analysis outlined by Elo and Kyngäs (2008), which include: preparation, organizing, and reporting. The preparation phase involves selecting the unit of analysis. The data I intend to analyze are the construct definitions extracted from the articles. According to Pollock et al. (2023), qualitative content analysis is the appropriate method to analyze construct definitions in the context of a scoping review. I took an inductive approach when organizing the data, whereby I developed my framework for the definitions during the data analysis process (Elo & Kyngäs, 2008; Pollock et al., 2023).

Results

The database search yielded a total of 3165 references. Covidence software automatically removed 1233 duplicates, leaving 1932 articles for title and abstract review (Stage 1). Of these

articles, 1496 did not meet Stage 1 inclusion criteria, leaving 436 articles for full-text review (Stage 2). Of these articles, 253 did not meet Stage 2 inclusion criteria. A total of 183 articles remained. In consideration of the feasibility and manageability of the review, I narrowed my scope further by only including articles that focus on financial anxiety (or a related term). I determined this empirically by reviewing the hypotheses and research questions of all 183 articles. If the authors did not mention one of the key words (i.e., financial anxiety, financial stress, or financial worry) within the research questions or hypotheses, or if financial anxiety (or a related term) was only included as a covariate, I concluded that financial anxiety was not the primary focus of the article. I removed an additional 64 articles based on this criterion.

The final review consists of 119 articles. See Figure 1 for a flow chart outlining the included articles. The chart is derived from the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) 2020 statement (Page et al., 2021).

Figure 1*Study 2 PRISMA Flow Diagram*

Study Characteristics

This review includes articles published between January 1, 2010, and December 31, 2022, with most articles ($n = 72$, 60.5%) published between 2019 and 2022. See Figure 2 for a visual depiction of the number of articles published each year. Samples sizes across the studies ranged from 20 to 157,789 ($M = 7,642$, $SD = 22,486$). Women made up the majority (i.e., >55%) of most samples ($n = 66$, 50.4%), followed by samples with an even distribution of women and men (i.e., 45 to 55%; $n = 37$, 28.2%). Participants' ages across studies ranged from 17 to 92 (M of reported means = 35.9), however age was not reported in several studies ($n = 62$). Most studies were conducted in the United States ($n = 83$, 60.6%) and with people who identified as White/Caucasian ($n = 58$, 48.7%). The full breakdown of study characteristics is depicted in Table 8.

Figure 2

Number of Articles Published Between 2010 and 2022

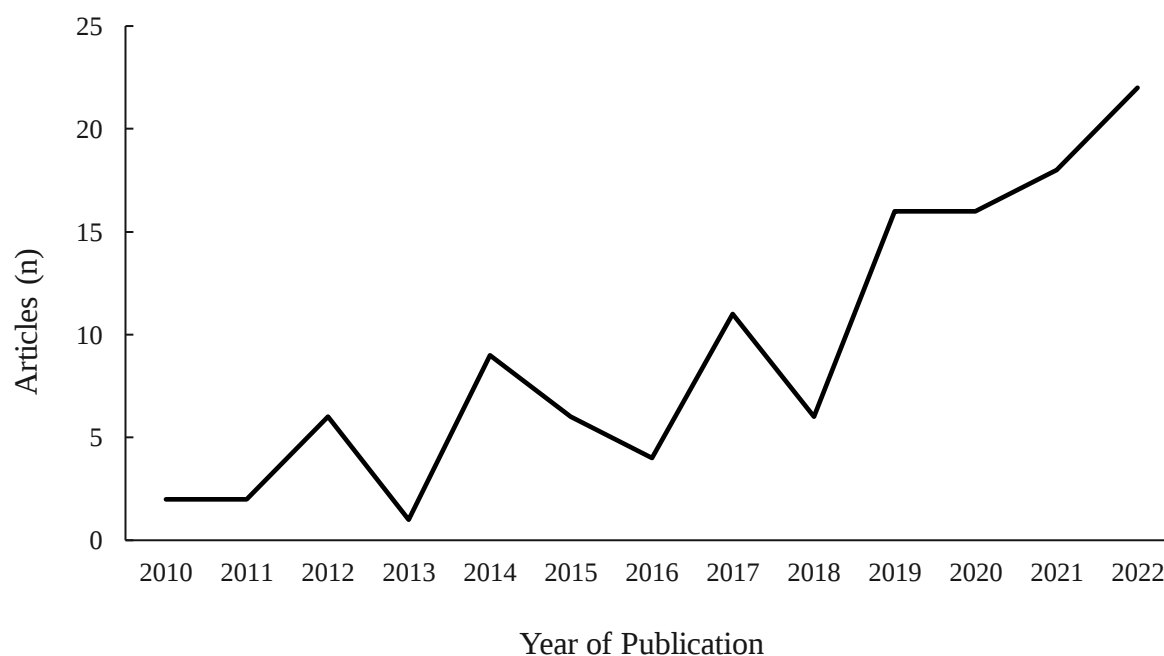


Table 8*Summary of Participant Demographics for Included Articles*

Demographics	<i>n</i> (%)
Age range	
Emerging adults only (17 to 25)	7 (5.9%)
Adults only (>25)	17 (14.3%)
Emerging adults to adults (17+)	49 (41.2%)
Not Reported	46 (38.6%)
Gender (<i>N</i> = 131)	
Majority women (i.e., >55%)	66 (50.4%)
Majority men (i.e., >55%)	11 (8.4%)
Even women and men (i.e., 45 to 55%)	37 (28.2%)
Not Reported	17 (13.0%)
Ethnic Majority	
White/Caucasian/European American	58 (48.7%)
Black/African American	6 (5.1%)
Hispanic/Latinx	4 (3.4%)
Asian	3 (2.5%)
Not reported	48 (40.3%)
Location of Study Completion (<i>N</i> = 137)	
USA	83 (60.6%)
Australia	11 (8.0%)
United Kingdom	9 (6.6%)
Canada	3 (2.2%)
Belgium	3 (2.2%)
Malaysia	3 (2.2%)
Sweden	3 (2.2%)
Netherlands	3 (2.2%)
China	2 (1.5%)
Germany	2 (1.5%)
India	2 (1.5%)
Italy	2 (1.5%)
Brazil	1 (0.7%)
Ghana	1 (0.7%)
Iran	1 (0.7%)
Lithuania	1 (0.7%)
Pakistan	1 (0.7%)
Russia	1 (0.7%)
Saudi Arabia	1 (0.7%)
Slovenia	1 (0.7%)
South Africa	1 (0.7%)
Spain	1 (0.7%)
Taiwan	1 (0.7%)
Not Reported	0 (0%)

Note. $N = 119$ unless otherwise stated. $N = 135$ for Location of Study Completion as some studies ($n = 6$) were conducted in multiple countries. $N = 131$ for Gender Majority as some articles ($n = 5$) reported multiple studies with differing samples.

Conceptual Definitions

Of the 119 articles included in the review, just over half ($n = 62$, 52.1%) included a formal conceptual definition. Of these 62 definitions, 10 defined financial anxiety (16.1%), 45 defined financial stress (72.6%), six defined financial worry (9.7%), and one defined financial scarcity (1.6%). I critically examined these definitions to evaluate their specificity, logical consistency, and similarity to other definitions. From this process, I extracted 60 unique definitions: six of financial anxiety, 48 of financial stress, and six of financial worry (see Tables, 9, 10, and 11, respectively). Definitions were deemed unique if the authors cited an original source.

Financial anxiety

Ten articles included conceptual definitions of financial anxiety, which resulted in 6 unique definitions (see Table 9). All six definitions suggest that financial anxiety is centered around feelings towards one's personal financial situation. Definitions differ in the extent to which they encompass the physical and behavioural responses associated with these feelings. For instance, definitions 2 and 6 explicitly identify the presence of unhealthy behaviours, like overspending and irresponsible credit card use, whereas definitions 1a, 1b, 4, and 5 focus solely on emotional aspects, such as anxiety and worry. Definition 1b uniquely includes physical symptoms, such as muscle tension and difficulty sleeping. Only definitions 3 and 4 reference anxiety related to one's future economic resources and an inability to afford necessities.

Table 9*Conceptual Definitions of Financial Anxiety*

#	Review articles that cite this definition	Definition of financial anxiety
1a	(Archuleta et al., 2013a, 2020; Basyouni & El Keshky, 2021; Jawahar et al., 2022; Vieira et al., 2021)	Financial anxiety can be described as feeling anxious or worried about one's financial situation (Archuleta et al., 2013a).
1b	(Archuleta et al., 2013a, 2020; Basyouni & El Keshky, 2021)	Financial anxiety can be formalized using criteria (i.e., anxiousness, irritability, difficulty controlling worry, difficulty sleeping, difficulty concentrating at work/school, muscle tension, and fatigue) set forth by the mental health disorder of Generalized Anxiety Disorder found in the Diagnostic and Statistical Manual of Mental Disorders-IV-TR (i.e., DSM-IV-TR) and applying similar criteria to one's financial situation (Archuleta et al., 2013a).
2	(Basyouni & El Keshky, 2021; Grable et al., 2014; Shapiro & Burchell, 2012; Vieira et al., 2021)	Financial anxiety is 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).
3	(Jawahar et al., 2022)	Expands Archuleta et al.'s (2013) definition of financial anxiety (1a) by including an appraisal that current and future economic resources are insufficient to afford the basic necessities of life (Lim & Sng, 2006).
4	(Jones & Heffner, 2022)	Financial anxiety is a type of psychological financial hardship that involves worry about one's financial future. Anxiety is often in anticipation of potential future problems, and financial anxiety is specific to possible inability to pay for future basic needs (food, shelter, clothing) and medical care and possible inability to save money.
5	(Kim et al., 2022)	Financial anxiety refers to the negative emotions associated with one's personal finances (Shapiro & Burchell, 2012).

- 6 (Potter et al., 2020) Financial anxiety is characterized by unhealthy responses to negative financial stimuli (O'Neill et al., 2006; Shapiro & Burchell, 2012) such as an avoidance of financial topics, spending that exceeds income, difficulty in paying bills, and reaching credit card maximums.

$N = 6$ unique definitions of financial anxiety. Definition 1 is divided into part a and b as not all authors who cite definition 1a included 1b in their conceptualization.

Financial stress

Forty-five articles included conceptual definitions of financial stress, which resulted in 48 unique definitions¹⁰ (see Table 10). Definitions 1 through 22 conceptualize financial stress as the objective reality of one's financial situation. That is, stress stemming from a persistent inability to meet one's financial responsibilities, such as paying bills, buying food, or other subsistence costs. This objective perspective centers on the idea that financial demands consistently surpass available financial resources. Definitions 23 through 38, on the other hand, conceptualize financial stress as the subjective assessment of one's financial situation. From this subjective perspective, it is the person's perception of their financial resources that contributes to their level of financial stress, not the reality of their financial situation. This perspective recognizes that two people sharing the same objective financial situation can differ in how they experience and perceive the situation. Definitions 39 through 45 find value in a combined perspective, whereby financial stress is a combination of objective financial demands and the subjective attitudes, beliefs, and perceptions a person holds regarding their financial situation. Definitions 46 to 48 build on this combined perspective by further acknowledging the physiological responses that may arise in relation to financial challenges.

¹⁰ The number of definitions exceeds the number of articles as some articles cited multiple conceptual definitions.

Table 10*Conceptual Definitions of Financial Stress*

#	Review articles that cite this definition	Definition of financial stress
Objective reality: Inability to meet basic financial responsibilities		
1	(Blanchette, 2020; Fosnacht & Calderone, 2017; Heckman et al., 2014; Kim et al., 2022)	Financial stress is an inability to meet existing financial demands and obligations (Heckman et al., 2014).
2	(Guillaumier et al., 2017; Martire et al., 2011)	Financial stress refers to the experience of economic hardship and may include financial anxiety, being in debt and being unable to afford consumer items such as food and clothing (Siahpush et al., 2003).
3	(Guillaumier et al., 2014; Martire et al., 2011)	Financial stress is an inability to pay important bills on time, such as electricity, telephone, or rent bills because of a shortage of money (Siahpush, Yong, et al., 2009).
4	(Botha et al., 2022)	Financial stress refers to an inability to pay regular bills (cash-flow issues) or being unable to meet basic needs (deprivation).
5	(Jones et al., 2022)	Financial stress is stress related to being able to pay bills or tuition.
6	(Koomson et al., 2022)	Financial stress is the difficulty faced by an individual or a household in meeting basic financial commitments due to a shortage of money (Bray, 2001).
7	(Loibl et al., 2022)	The material domain of financial stress reflects difficulty paying monthly bills and difficulty accumulating sufficient savings for emergencies or retirement (de Souza et al., 2017; Yabroff et al., 2015).
8	(Cao et al., 2021)	Financial strain is an inability to fulfill financial obligations (Staats et al., 2007).
9	(Du et al., 2021)	Financial stress is characterized by difficulty meeting financial obligations (Robb, 2017).
10	(Morgan et al., 2021)	Financial stressors can come in a variety of forms, including low income, poverty, financial crises, inability to afford food, pay bills, and having to forgo necessary services (Neppel et al., 2016).

11	(Sabri & Aw, 2020)	Financial stress occurs when one lacks or cannot manage resources (e.g., money) to handle the problem.
12	(Byaruhanga et al., 2019)	Financial stress is defined as the difficulty that an individual or household may have in meeting basic financial commitments due to a shortage of money (Nicol, 2010).
13	(Mahdzan et al., 2019)	Financial stress is defined as financial strains that occur when one is subjected to certain negative events such as changes to current financial position and facing an emergency that require a sum of money beyond the normal capacity of the individual (Kim et al., 2006; Voydanoff, 1990).
14	(Tran et al., 2018)	Financial stress is a lack of money for necessities.
15	(Fosnacht & Calderone, 2017)	Expands (Heckman et al., 2014)'s definition (1) of financial stress by focusing on the impact of financial shortcoming on individual planning (i.e., the absence of means for required or desired activities).
16	(Kutin et al., 2017)	Financial stress refers to household cash flow problems.
17	(Basu et al., 2015)	Financial stress refers to the condition of having inadequate savings or assets to pay for major expenses (Peirce et al., 1996).
18	(Montpetit et al., 2015)	Day-to-day stressors are often called demands (Reich & Zautra, 1983). Demands include financial obligations, such as paying rent and purchasing food. They also include things that indirectly require money, such as car repair and home maintenance.
19	(Agyei et al., 2014)	Financial stress refers to problems paying household bills.
20	(Åslund et al., 2014)	Financial stress is the persistent inability to afford the basic necessities of life.
21	(Guillaumier et al., 2014)	Financial stress is an inability to pay for household essentials and living expenses, such as food, bills, and rent, due to a shortage of money (Siahpush, Borland, et al., 2007; Siahpush, Spittal, et al., 2007; Siahpush, Yong, et al., 2009; Siahpush & Carlin, 2006).
22	(Martire et al., 2011)	Financial stress is an inability to pay for essential goods and services because of a shortage of money (Siahpush et al., 2003; Siahpush, Wakefield, et al., 2009; Siahpush, Yong, et al., 2009; Siahpush & Carlin, 2006).
Subjective experience: Attitudes, beliefs, and perceptions a person holds regarding their financial situation		
23	(Kuo et al., 2021, 2022)	Financial stress is defined as the perception of having inadequate financial resources to meet a typical standard of living (Steen & Mackenzie, 2013).

- 24 (Mansor et al., 2022; Northern et al., 2010) Financial stress is a subjective assessment of one's financial state, including the perceived ability to pay expenses, satisfaction with one's financial situation, amount of savings and investment, and debt anxiety (Kim et al., 2003).
- 25 (Fan & Henager, 2022) Financial stress is a psychological factor representing an increased uncertainty about one's financial situation and perceived financial hardship (Baker & Montalto, 2019; Lim et al., 2014).
- 26 (Xiao & Kim, 2022) Financial stress is defined as a psychological state of worrying about personal finance (Archuleta et al., 2013a; Friedline et al., 2021; Serido et al., 2014).
- 27 (Kuo et al., 2021) Financial stress has been defined as a subjective perception of having insufficient financial resources to meet basic requirements for a regular standard of living. As a subjective perception, financial stress consists of several constructs, including perceived inability to pay monthly bills, perceived inability to meet life necessities, and worrying about current or future financial status as an individual or household (Agrigoroaei et al., 2017; Block et al., 2009).
- 28 (Heo et al., 2021) Financial stress is the unpleasant feeling that one is unable to meet financial demands, afford the necessities of life, and have sufficient funds to make ends meet (Davis & Mantler, 2004). The feeling normally includes the emotions of dread, anxiety, and fear, but may also include anger and frustration.
- 29 (Taylor et al., 2021) Financial stress is worry about subsistence spending (e.g., monthly bills, housing).
- 30 (Petitta et al., 2020) Financial stress refers to the distressed emotional reaction associated with individuals' perceived likelihood of the occurrence of unwanted and threatening events related to income loss and financial difficulties.
- 31 (Tsuchiya et al., 2020) Financial strain is defined as the individual's perception of financial resources available to adequately meet one's needs. Individuals with similar income levels may face differing degrees of financial strain due to the various demands (or domains) on income including food, health care, transportation, and housing (Huang et al., 2010).
- 32 (Kramer et al., 2019) Financial stress is the level of stress and wellbeing emanating from one's personal financial condition (Prawitz et al., 2006).
- 33 (Schenck-Fontaine & Panico, 2019) Subjective financial stress refers to the subjective evaluation of economic circumstances.

34	(Wang & Pullman, 2019)	Financial stress is defined as perceived comfort with their family's financial situation (Defense Manpower Data Center, 2016).
35	(Liu & Merritt, 2018)	Financial stress manifests as perceived psychological hardship (Masarik & Conger, 2017).
36	(Meuris & Leana, 2018)	Financial scarcity is defined as the perception that one does not have sufficient financial resources to meet one's needs (Mani et al., 2013).
37	(White & Perrone-McGovern, 2017)	Financial stress is defined as an individual's judgments about and emotional responses to his or her financial condition (Prawitz et al., 2006).
38	(Serido et al., 2014)	Financial stress is the extent to which individuals perceive that their financial demands exceed their ability to meet those demands (Lazarus & Folkman, 1984).
Combination of objective reality and subjective perceptions		
39	(Buabang et al., 2022)	The at-risk-of-poverty threshold defines poverty based purely on the objective measure of income. However, this definition fails to address how individuals perceive their financial situation. The same income can be perceived differently by different individuals (Prawitz et al., 2006), creating unique subjective experiences of financial stress.
40	(Mansor et al., 2022)	Financial stress is when a person is concerned about their finances, such as pressure from debt, or inability to meet obligations (Suprpto & Cecilia, 2020)... Financial stress is a complicated interaction between financial responsibilities and a shortage of funds (Netemeyer et al., 2018).
41	(Blanchette, 2020)	Financial stress is one's level of stress and well-being based on the subjective perception of one's financial situation (Kim & Garman, 2004). Financial stress is often the emotional response to financial pressure and the ability to meet necessary financial expenses.
42	(Heckman et al., 2014)	Financial stress may be defined as the inability to meet one's financial obligations but can also include psychological or emotional effects (Northern et al., 2010).
43	(Ponnet, 2014)	This study conceptualizes financial stress as a combination of financial need (difficulties affording much more than the basics), financial burden (costs which impose a financial burden or struggle) and financial insecurity (concerns about the future financial situation).

44	(Shah et al., 2012)	Financial stress is the experience of financial anxiety, being in debt that cannot be paid off easily, and not being able to afford essential consumer items such as food and clothing. However, financial stress is an individualized experience dependent upon a person's stress associated with expected financial loss, risk, or uncertainty (Illing & Liu, 2006).
45	(Northern et al., 2010)	Financial stress is not only an inability to meet one's economic responsibilities, but also being influenced by psychological factors such as attitudes, beliefs, and cognitive appraisals of demands and available resources. (Aldana & Liljenquist, 1998; Kim et al., 2003).
Psychophysiological		
46	(Choi et al., 2020)	Financial stress is defined as a combination of physical arousal and emotional responses influenced by financial stimuli such as urgent payment (Grable et al., 2014).
47	(Heo et al., 2020)	Financial stress is a psychophysiological response to the perception of imbalance, uncertainty, and risk in the realm of financial resource management and decision making. Financial stress encompasses three aspects: (a) affective; (b) relational; and (c) physiological. The affective perspective emphasizes the role stressors play in shaping the way people feel about their current financial situation. The relational perspective examines the effect of stress on cognitive and behavioural phenomena within a social context, while the physiological perspective focuses on the way in which the human body reacts (i.e., stress phenomena) when coping with stressors.
48	(Seely & Mickelson, 2019)	In transactional model of stress (Cohen et al., 1995; Lazarus & Folkman, 1987), stress is viewed as a process consisting of exposure to an environmental stimulus and appraisal of the stimulus as stressful, thereby creating a psychological and physiological response that leads to coping processes and a reappraisal of the stressor. Put differently, stress is neither the environmental stressor nor the appraisal of said stressor, but instead a combination of these two elements. Focusing specifically on financial stress, the environmental stressor would be an individual's objective financial hardship, such as homelessness, poverty, or low-socioeconomic status (SES); whereas the appraisal of the stressor would be the subjective financial stress (i.e., does the individual feel upset or concerned about the financial hardship?).

Note. This table categorizes definitions based on their resemblance in terms of objective, subjective, combined (subjective and objective), and physiological perspectives in defining financial stress. Each category is constructed to reflect a common foundation shared among definitions, although not all definitions within these categories necessarily cite the same authors. The grouping is intended to facilitate comparisons of diverse definitions by acknowledging their underlying similarities and differences.

Financial worry

Six articles included conceptual definitions of financial worry, which resulted in six unique definitions (see Table 11). Definitions 1 through 3 do not define financial worry per se, but rather encompass financial aspects within a broader definition of worry. Definitions 4 through 6 share a financial focus but differ in terms of the specific aspects of financial worry that they emphasize. For instance, definition 4 provides a broad and general definition of financial worry, whereas definition 5 narrows the focus to financial concerns related to housing, medical care, and education, and the psychological burden associated with these concerns. Definition 6 adds the dimension of objective financial resources in relation to worry.

Table 11

Conceptual Definitions of Financial Worry

#	Review articles that cite this definition	Definition of financial worry
1	(Barlett & Barlett, 2019; de Bruijn & Antonides, 2020; DeRigne et al., 2019; Magwegwe et al., 2022)	Based on (Borkovec et al., 1983)'s definition of worry, which is an uncontrollable and negatively affect-laden thought pattern regarding a future issue that may have negative outcomes.
2	(DeRigne et al., 2019; Magwegwe et al., 2022)	Worry clusters around five areas of life: (1) relationships, (2) lack of confidence, (3) aimless future, (4) work incompetence, and (5) finance (Tallis et al., 1992).

3	(Barlett & Barlett, 2019)	Worry can be partitioned into macro-level (worry about societal or world issues) and micro-level (worry about self or in-group issues) subtypes that each have several domains (health, environment, social relations, achievement, economics, and safety) (Boehnke et al., 1998).
4	(de Bruijn & Antonides, 2020; Magwegwe et al., 2022)	Financial worry is defined as repeated and negative thinking about the uncertainty of one's (future) financial situation.
5	(Arega et al., 2022)	Financial worry consists of concern about the costs of housing, medical care, and education, and the psychological burden associated with these concerns.
6	(Meuris & Leana, 2018)	Financial worry is distinct from one's objective financial resources (Ackerman & Paolucci, 1983; Leana & Meuris, 2015). However, decreases in the availability of financial resources are often accompanied by an increased propensity to be worried, as economic shocks will tend to be more frequent and/or impactful with limited money at one's disposal.

$N = 6$ unique definitions of financial worry. Definitions 1 through 3 define the broader construct of worry, whereby financial worry is conceptualized as a subconstruct of worry. Definitions 4 through 6 provide a definition of financial worry beyond the parent construct of worry.

Categorization of Conceptual Definitions

Consistent with the “organizing” phase of the qualitative content analysis approach (Elo & Kyngäs, 2008; Pollock et al., 2023), I coded the definitions for each construct into categorizations, whereby the content of each category derives directly from the conceptual definitions (see Table 12). When comparing the categories and codes across these constructs, clear distinctions and similarities emerged. For instance, financial anxiety and financial worry share a strong emotional component, whereby the former centers on feelings like anxiety, worry, irritability, and unease, and the latter centers on worry and concern. While subjective financial stress also includes negative emotions such as worry and distress, it primarily emphasizes the subjective perception of financial demands rather than specific emotional states. Objective

financial stress, on the other hand, does not incorporate any emotional states or perceptions. Additionally, behavioural patterns differ across conceptualizations of the constructs. Some conceptual definitions of financial anxiety include behaviours like overspending or reaching credit card maximums, while financial stress focuses on the objective and subjective factors contributing to this stress rather than specific behavioural responses. Definitions of financial worry do not include behavioural elements but rather focus exclusively on negative, uncontrollable, and repeated thought patterns. Physiological symptoms, such as difficulty sleeping, muscle tension, and fatigue, arise only in conceptualizations of financial stress and financial anxiety and are not explicitly mentioned in definitions of financial worry.

Table 12

Categorization Matrix of Conceptual Definitions

Construct	Category	Code
Financial anxiety	Emotions	• Anxiety • Worry • Irritability • Unease
	Finances	• Personal finances • Ineffective administration • Inability to meet financial demands (e.g., bills or other necessities) • Current and future finances
	Physical symptoms	• Difficulty sleeping • Muscle tension • Fatigue
	Behaviours	• Overspending • Reaching credit card maximums
Financial stress	Objective	• Inability to meet financial demands (e.g., bills or other necessities) • Shortage of money • Debt • Inadequate savings • Low income
	Subjective	• Perceived inability to meet financial demands • Satisfaction • Uncertainty

Financial worry		• Negative emotions (e.g., worry, stress, distress)
	Combined	• Inability to meet financial demands and the perception of these demands • Psychological factors (e.g., attitudes, beliefs, cognitive appraisals) • Concern about current and future finances
	Psychophysiological	• Physical arousal • Emotional response • Bodily reactions to stress
	Emotions	• Worry • Concern • Uncertainty
	Thought patterns	• Negative • Uncontrollable • Repeated
	Finances	• Basic necessities • Current and future finances

Operational Definitions

I analyzed the operational definitions by reporting the measure content, including dimensionality, the scale each measure was evaluated on, and the exact wording of scale items. I critically examined these scales to evaluate their specificity, logical consistency, and similarity to other scales. The articles used 86 unique scales to measure the following constructs: financial stress ($n = 69$; 80.2%), financial anxiety ($n = 6$; 7.0%), financial worry ($n = 7$; 8.1%), or other related constructs (e.g., money anxiety; $n = 4$; 4.7%). Given the large number of scales, Table 13 only displays items for scales cited by at least two articles in the review ($n = 13$, 15.1%). Please see Appendix Q for all scales including the items, scale responses, and scoring instructions.

Table 13*Scales Used in the Scoping Review Articles*

Measure	Construct	Dim	# of items	Items	Articles that used this measure
Financial Anxiety Scale ^a (Archuleta et al., 2013a)	Financial anxiety	Uni	7	(1) I feel anxious about my financial situation. (2) I have difficulty sleeping because of my financial situation. (3) I have difficulty concentrating on my school/or work because of my financial situation. (4) I am irritable because of my financial situation. (5) I have difficulty controlling worrying about my financial situation. (6) My muscles feel tense because of worries about my financial situation. (7) I feel fatigued because I worry about my financial situation.	Archuleta et al. (2013) Archuleta et al. (2020) Basyouni et al. (2021) Carlson et al. (2015) Grable et al. (2014) Greene et al. (2016) Jawahar et al. (2022) Jones et al. (2021) Jones et al. (2022) Moss et al. (2018) Potter et al. (2020) Tran et al. (2018) Vieira et al. (2021)
The Personal Financial Well-Being Scale (also known as the InCharge Financial Distress/Financial Well-Being Scale) (Prawitz et al., 2006)	Financial stress	Uni	8	(1) What do you feel is the level of your financial stress today? (2) On the stair steps below, mark (with a circle) how satisfied you are with your present financial situation. The “1” at the bottom of the steps represents complete dissatisfaction. The “10” at the top of the stair steps represents complete satisfaction. The more dissatisfied you are, the lower the number you should circle. The more satisfied you are, the higher the number you should circle. (3) How do you feel about your current financial situation? (4) How often do you worry about being able to meet normal monthly living expenses? (5) How confident are you that you could find money to pay for a financial emergency that costs about \$1,000?	Blanchette (2020) Blanchette et al. (2021) Buabang et al. (2022) King et al. (2019) Kramer et al. (2019) Mende & van Doorn (2015) Richardson et al. (2022) White & Perrone-McGovern, (2017)

				(6) How often does this happen to you? You want to go out to eat, go to a movie or do something else and don't go because you can't afford to? (7) How frequently do you find yourself just getting by financially and living paycheck to paycheck? (8) How stressed do you feel about your personal finances in general?	
Financial Anxiety Scale (Shapiro & Burchell, 2012)	Financial anxiety	Uni	10	(1) I prefer not to think about the state of my personal finances. (2) Thinking about my personal finances can make me feel guilty. (3) I am worried about the debt I will have when I complete my university education. (4) Thinking about my personal finances can make me feel anxious. (5) I get myself into situations where I do not know where I'm going to get the money to "bail" myself out. (6) Discussing my finances can make my heart race or make me feel stressed. (7) I do not make a big enough effort to understand my finances. (8) I do not think I am doing as well as I could academically because I worry about money. (9) I find opening my bank statements unpleasant. (10) I would rather someone else who I trusted kept my finances organized.	Begun et al. (2017) Fenton-O'Creevy et al. (2021) Shaprio & Burchell (2012) Tambling et al. (2021) Vosylis et al. (2020)
NR ^b (Siahpush, Spittal, et al., 2007)	Financial stress	Uni	7 to 9	In the past six months, did any of the following happen to you because of lack of money? (1) Could not pay electricity, gas, or telephone bills on time; (2) could not pay the mortgage or rent on time; (3) Pawned or sold something; (4) Went without meals; (5) Was unable to heat home;	Byaruhanga et al. (2019) Guillaumier et al. (2014) Guillaumier et al. (2017) Koomson et al. (2022)

				(6) Asked for financial help from friends or family; (7) Asked for help from a welfare or community organization (8) Could you raise AUD\$2000 in a week if there was an emergency? (9) Household spends more money than it gets (over the past 12 months)	Kutin et al. (2017)
Derived from the Ohio Student Financial Wellness Survey (Lim et al., 2014)	Financial stress	Uni	6	(1) I feel stressed about my personal finances in general. (2) I worry about being able to pay monthly expenses. (3) I worry about having enough money to pay for school. (4) How much stress does the total amount of money you owe cause you? (5) How much stress does credit card debt cause you? (6) How much stress does student loan debt cause you?	Collier et al. (2020) Du et al. (2021) Lim et al. (2014) White, Watkins, McCoy, Muruthi, & Byram (2021)
Adapted from the Boston Longitudinal Study (Agrigoroaei et al., 2017)	Financial stress	Uni	3	(1) How would you rate your current financial situation? (2) In general, would you say you (and your family living with you) have more money than you need, just enough for your needs, or not enough to meet your needs? (3) How difficult is it for you (and your family) to pay your monthly bills?	Agrigoroaei et al. (2017) Kuo et al. (2021) Kuo et al. (2022)
Money Anxiety Subscale ^c (from the Attitudes Towards Money Scale) (Lim & Teo, 1997)	Money anxiety	Uni	4	(1) I worry about my finances much of the time. (2) Compared to most other people I know, I believe that I think about money much more than they do. (3) I often feel inferior to others who have more money than me. (4) I often feel anxious and defensive when asked about by personal finances.	Amani & Shabahang (2017) Kersten et al. (2019)
Derived from the National Health Interview Survey ^d	Financial worry	Uni	9	How worried are you right now about (1-8): (1) not having enough money for retirement? (2) medical costs of a serious illness or accident? (3) not being able to maintain the standard of living you enjoy? (4) not being able to pay medical costs for normal healthcare? (5) having enough money to pay for your children's college?	Arega et al. (2022) DeRigne et al. (2019)

				(6) not having enough to pay your normal monthly bills? (7) not being able to pay your rent, mortgage, or other housing costs? (8) not being able to make the minimum payments on your credit cards? (9) If you get sick or have an accident, how worried are you that you will be able to pay your medical bills?	
Derived from the Weekly Stress Inventory ^e (Mosley et al., 1996)	Financial stress	Uni	5	Participants were asked whether they had experienced any of these financial problems over the previous week: (1) not enough money for basics (2) ran out of pocket money (3) had unexpected bills (4) had problems paying bills (5) not enough money for fun	Moran et al. (2019) Sonnenblick et al. (2022)
APR Financial Stress Scale (Heo et al., 2020)	Financial stress	Mult i	24	Affective Reaction: (1) I feel depressed because of my financial situation. (2) I feel sad because of my financial situation. (3) I am fearful because of my financial situation. (4) I feel anxious because of my financial situation. (5) I worry a lot because of my financial situation. (6) I am easily irritated because of my financial situation. (7) I feel emotionally drained because of my financial situation. (8) I feel frustrated because of my financial situation. Relational/ Interpersonal Behaviour: (1) My financial situation interferes with my daily job performance. (2) I frequently pass on social events at work due to my financial situation. (3) I often get into trouble at work because of my financial situation.	Choi et al. (2020) Heo et al. (2020)

				(4) My financial situation frequently interferes with my relationship with co-workers/colleagues. (5) I often argue with my spouse/significant other because of financial matters. (6) I find it difficult to talk about money with my spouse/significant other. (7) I frequently avoid attending family events because of my financial situation. (8) My financial situation frequently interferes with my family relationship Physiological Responses: (1) I have stomach aches frequently because of my financial situation. (2) My heartbeat increases because of my financial situation. (3) I feel cold because of my financial situation. (4) I have more sweat because of my financial situation. (5) I have more frequent muscle pain because of my financial situation. (6) I have fatigue frequently because of my financial situation. (7) I am sensitive to noise because of my financial situation. (8) I find flaws/cracks/chips of general objects more frequently than before because of my financial situation.	
NR ^f	Financial stress	Mult i	13	Financial Need: (1) It is difficult to afford much more than the basics with our current income (2) I feel that our current income allows me to maintain a desirable standard of living (reverse-scored) (3) With our current income, it is difficult to make ends meet Financial Insecurity: (4) I am worried that I will not be able to pay my bills in the near future	Ponnet (2014) Ponnet et al. (2016)

				(5) I think that I will have to scale down my living standards in the following months (6) I often worry about my future financial situation (7) I am frightened that I or my partner will lose our jobs (8) I think that I (or my household) will experience financial difficulties in the following months Financial Burden: Rated the extent to which five sources of costs imposed a financial burden on their household. (9) medical (10) car/fuel (11) child-care or other child-related costs (12) house-related costs (13) mortgages/loans	
NR (Siahpush, Yong, et al., 2009)	Financial stress	Uni	1	(1) In the last month, because of shortage of money, were you unable to pay any important bills on time, such as electricity, telephone or rent bills?	Siahpush et al. (2012) Martire et al. (2011)
Derived from the Ohio Student Financial Wellness Survey ^g (Heckman et al., 2014)	Financial stress	Uni	5	(1) I have enough money to participate in most of the same activities as my peers do. (2) I regularly spend more than I have by using credit or borrowing. (3) I pay my bills on time every month. (4) Do you currently have debt from any source, including student loans, credit cards, car loans, personal loans from financial institutions or from family/friends, or any other type of credit or loans?" (5) How much student loan debt do you expect to accumulate by the time you graduate?	Heckman et al. (2014) Kim et al. (2022)

Note. This table only displays scale items for measures cited by at least two articles included in the review. NR = Not reported. Dim =

Dimensionality. Uni = Unidimensional. Multi = Multidimensional.

^aArchuleta et al. (2020) omitted items 2 and 3, and Carlson et al. (2015) omitted items 4, 6, and 7 from the Financial Anxiety Scale (FAS). Vieira et al. (2021) added an additional item to the scale: “My financial situation causes me insecurity.” Grable et al. (2014) used this scale to measure the construct of financial stress.

^bByaruhanga et al. (2019) and Koomson et al. (2022) used items 1 to 7. Guillaumier et al. (2014) and Guillaumier et al. (2017) included item 8. Kutin et al. (2017) used items 1, 3-8, and included item 9.

^cKersten et al. (2019) omitted item 4 from the Money Anxiety Subscale.

^dDeRigne et al. (2019) added item 9 to the National Health Interview Survey.

^eThe Weekly Stress Inventory has 87 items and Moran et al. (2019) pulled a subset of 5 items to represent financial stress.

^fThe financial burden items were adapted from the EU Statistics on Income and Living Conditions (EU-SILC) instrument (Eurostat 2008). No citation was provided for the financial need or insecurity items.

^gKim et al. (2022) omitted items 4 and 5 as they were not relevant to their sample.

Financial anxiety

Across 21 articles, authors used six scales to measure financial anxiety (see Appendix Q Table Q1 for all scales). The scales share an emphasis on feelings of anxiety or apprehension in relation to personal finances. Operationalization of financial anxiety was dominated by two scales, with most articles using either Archuleta et al.'s (2013) ($n = 12$; 57.1%) or Shapiro and Burchell's (2012) ($n = 5$; 23.8%) Financial Anxiety Scales. Beyond measuring the affective aspects of financial anxiety, both scales include physiological aspects such as difficulty sleeping and muscle tension. However, only one conceptual definition of financial anxiety included mention of such physiological elements (definition 1b; Archuleta et al., 2013a), and is cited by only two articles in the review (Archuleta et al., 2013a, 2020; Basyouni & El Keshky, 2021). This highlights a disconnect between conceptualization and measurement of financial anxiety.

Shapiro and Burchell (2012) further incorporate items related to engagement with their finances, gauging people's efforts to comprehend their financial situations. Most scales used by authors to measure financial anxiety focus on anxiety related to current financial situations, but some scales address concerns about the future, such as debt after completing education (Shapiro & Burchell, 2012) or running out of money in retirement (Heo et al., 2021). Yamauchi and Templer (1982) incorporate items related to financial behaviours, such as spending money to alleviate emotional distress and reactions to sales. Lim et al. (1997) include items linking financial anxiety to social contexts, such as feelings of inferiority in comparison to wealthier peers, deviating from most scales which primarily focus on general feelings of anxiety.

Financial stress

Authors used 69 scales to measure financial stress (see Appendix Q Table Q2 for all scales). Of these, a staggering 58 scales (84.1%) were used in only one article. The most

frequently used scale was the Personal Financial Well-Being Scale, cited by only eight articles (11.6%). Based on the categories identified in the qualitative content analysis of the conceptual definitions, I coded the operational definitions by inclusion of items that tap into objective, subjective, or physiological aspects of financial stress. Of the 69 scales, 58 included at least one objective item (e.g., I have difficulty paying for food; Chuang et al., 2017), 27 included at least one subjective item (e.g., I worry about running out of money in retirement; Heo et al., 2021), and seven included at least one physiological item (e.g., I have stomach aches frequently because of my financial situation; Heo et al., 2020). Most scales ($n = 42$; 60.9%) reflect a purely objective approach, assessing only pragmatic aspects such as income, expenses, savings, and the ability to meet financial obligations [e.g., (Agrigoroaei et al., 2017; Campbell et al., 2014; Chuang et al., 2017; Siahpush, Yong, et al., 2009)]. In contrast, some scales ($n = 7$; 10.1%) reflect a purely subjective approach, focusing only on cognitive and affective aspects such as satisfaction with their financial situation or the degree of stress they associate with their finances [e.g., (Field et al., 2012; Lazarevic et al., 2016; Lim et al., 2014; Prawitz et al., 2006)]. Others adopted a combined approach ($n = 20$; 29.0%) to assess financial stress: 13 articles included both objective and subjective items, four included both subjective and physiological items, and three included objective, subjective, and physiological items.

Financial worry

Authors used seven scales to measure financial worry (see Appendix Q Table Q3 for all scales). Cited by only two articles, the most frequently used financial worry scale was derived from the National Health Interview Survey (National Center for Health Statistics, 2019), while the remaining six scales were each used in only one article. Despite the lack of consensus on a dominant scale, all scales shared a subjective viewpoint, evaluating a person's own perception of

their financial situation, with an emphasis on concerns covering essential expenses like bills, housing, and medical care. Indeed, most scales included items assessing worry about having enough money to meet current (de Bruijn & Antonides, 2020; Meuris & Leana, 2018; Millar & Gallagher, 1996; National Center for Health Statistics, 2014, 2019; Richardson et al., 2022; Zheng et al., 2020) and future (de Bruijn & Antonides, 2020; Magwegwe et al., 2022; Millar & Gallagher, 1996; National Center for Health Statistics, 2019; Zheng et al., 2020) financial demands. The scale used by Magwegwe et al. (2022) also assesses physiological aspects, such as a racing heartbeat when talking about their finances, while Richardson et al. (2022) include items tapping into financial behaviours, such as impulsive spending.

Discussion

Over the past decade there has been an increase in academic attention towards financial anxiety, financial stress, and financial worry. However, the clarity on the distinction between these terms has been compromised by researchers using them interchangeably. Thus, the purpose of Study 2 was to systematically review researchers' conceptual and operational definitions of these constructs to assess the consistency of their definitions. In this scoping review, I identified 119 articles focused on financial anxiety, financial stress, or financial worry published between 2010 and 2022. Most articles included in the review were published between 2019 and 2022 ($n = 72$, 60.5%). This upward trend in publications not only highlights rising interest in financial anxiety (and related terms) but reinforces the need for consistent and distinct conceptualizations and operationalizations across studies as this body of research grows.

Prior to conducting this review, I hypothesized that the terms financial anxiety, financial stress, and financial worry would be largely confounded in the literature (H5). The results suggest there is considerable room for interpretation regarding the conceptualization of these

terms. Indeed, only half of the articles ($n = 62$, 52.1%) included in my review offered conceptual definitions. This is problematic, as conceptual definitions are necessary to prevent ambiguity and ensure researchers have a precise understanding of the parameters to be measured or observed in a study (Dunn, 2021). Without a formally defined construct, Wacker (2004) cautions that it is “not possible to develop ‘good’ theory-building empirical research” (p. 633). Among those who offered a conceptual definition, researchers generally exhibited a reasonable consistency in how they defined financial anxiety and financial worry. Most researchers shared a foundational conceptualization of financial anxiety as negative feelings (e.g., anxiety, unease) towards one’s personal financial situation. Separately, they defined financial worry as a construct that represents repetitive negative patterns of thinking about the uncertainty of one’s financial situation. However, there was considerable variation in the definitions provided for financial stress. A content analysis of financial stress definitions revealed that half of the articles endorsed an objective view (financial stress as the inability to meet financial demands), while the other half endorsed either subjective (arising from attitudes and perceptions), combined (integrating both objective and subjective elements), or physiological perspectives (considering bodily reactions). With half of the articles failing to provide an explicit conceptual definition, coupled with the inconsistency in how financial stress is defined, this variability enables diverse interpretations and conclusions derived from the same body of research.

A second related difficulty is that some conceptual definitions for these constructs have overlapping terms. For example, some definitions of financial stress and financial worry both included reference to uncertainty about one’s financial situation (Fan & Henager, 2022; Heo et al., 2020; Shah et al., 2012) and risk (Heo et al., 2020; Shah et al., 2012), while all three constructs included mention of worry about personal finance (Archuleta et al., 2013a; S. M.

Jones & Heffner, 2022; Kuo et al., 2021; Taylor et al., 2021; Xiao & Kim, 2022) and concerns about one's future financial situation (Archuleta et al., 2013a; Jones & Heffner, 2022; Kuo et al., 2021; Ponnet, 2014). Some authors propose financial stress includes the experience of financial anxiety (Guillaumier et al., 2017; Shah et al., 2012), debt anxiety (Mansor et al., 2022), or anxiety more generally (Heo et al., 2021). This lack of consistency in terminology not only hinders researchers' abilities to synthesize research findings, but ultimately undermines efforts to build cumulative theory related to these constructs (Wacker, 2004; Ward, 2012). Further, using similar terms within each conceptual definition could result in statistically significant relations between constructs that would not exist if each construct had its own distinct definition (Wacker, 2004).

Beyond conceptualizations of these terms, researchers have operationalized financial anxiety, financial stress, and financial worry in diverse ways that pose a serious threat to their construct validity. The overwhelming majority of scales used to measure financial stress (84.1%) were only used in a single article, demonstrating the lack of a standardized approach to measuring financial stress. Similarly, there was little consistency in how financial worry was measured across studies despite consensus on its conceptual definition. Specifically, only one financial worry scale was used in two articles, while the remaining scales were each used in only one article. Though the measurement of financial anxiety was largely dominated by two scales (Archuleta et al., 2013a; Shapiro & Burchell, 2012), there was considerable overlap between the content of these scales and items used to assess financial stress. For instance, the most frequently cited measure of financial stress (Prawitz et al., 2006) includes items prompting respondents to indicate how overwhelmed, stressed, and worried they feel about their financial situation; items that align more closely to conceptual and operational definitions of financial anxiety.

Further, though researchers' conceptualizations of financial worry were distinct from both financial anxiety and financial stress, the items comprising the financial worry scales also showed significant overlap with items used to assess financial stress. For instance, the most frequently cited financial worry scale prompts respondents to indicate how worried they are about nine financial demands, including medical costs, monthly bills, and housing (National Center for Health Statistics, 2019). Similar content is reflected in most other financial worry scales. The only scale conceptually aligned with the construct of financial worry is the Financial Worry Scale, developed by de Bruijn & Antonides (2020). This scale includes items such as "I constantly think about the uncertainty of my financial future" or "I think a lot about how to solve financial problems" which tap into the repetitive thinking aspect that makes financial worry distinct from financial anxiety or financial stress. The other financial worry scales lack such language, making their content similar to that of subjective financial stress scales or financial anxiety scales.

The overlap in these measures call into question the empirical knowledge tied to financial anxiety research. Indeed, constructing independent variables with domains of the desired dependent variable will inflate the effect of the IV because the two variables share a common concept. For example, a researcher looking to determine whether financial stress (conceptualized as ability to meet financial demands) predicts financial anxiety should not use nearly a third of the financial stress measures identified in the review because they include items that assess the cognitive and emotional manifestations of financial anxiety. If such scales were used, analyses would result in financial stress predicting financial anxiety because of the shared construct (and thus shared variance) regardless of the true relation between financial stress and financial anxiety. When financial anxiety, stress, and worry are combined in their measurement, it

becomes impossible to measure them distinctly or understand their relations accurately (Wacker, 2004). This confounding leads to inflated results, thus undermining the validity of conclusions drawn.

My review also revealed potential issues concerning the theoretical foundation of some measures. Nearly a third of the financial stress scales lacked a cited source, suggesting that several researchers used items they believed captured financial stress rather than drawing from established theories. The absence of a theoretical framework renders research vulnerable to Type I errors, potentially leading to findings that are not replicable (Oberauer & Lewandowsky, 2019). This can ultimately undermine the validity of conclusions made (Flake et al., 2017), impeding scientific progress and potentially misleading future studies. Addressing such theoretical gaps is necessary to enhance the accuracy and validity of conclusions drawn from these measures.

Further, the foundational basis of Archuleta et al.'s (2013) Financial Anxiety Scale has limitations as the dominant assessment of financial anxiety. Archuleta et al. (2013) developed their scale by adapting diagnostic criteria for Generalized Anxiety Disorder (GAD) from the DSM-IV-TR (American Psychiatric Association, 2000) to a person's financial situation. This approach raises validity concerns as the DSM criteria are developed and validated for diagnosing mental disorders in clinical settings. Much as the name suggests, GAD is a *generalized* disorder. The applicability of these symptoms to specific contexts like finances may not be well-established. Though Archuleta et al. (2013) acknowledge that their scale is not intended for diagnostic purposes, a scale based solely on GAD criteria may lack practical utility when assessing financial anxiety in non-clinical settings. It is possible that people with financial anxiety may be more prone to anxiety in general, and therefore could experience overlap between symptoms of GAD and financial anxiety (such as excessive worry). However, financial

anxiety may manifest uniquely through behaviours like avoiding financial discussions, feeling overwhelmed by financial decisions, or disengaging from financial information. Relying solely on GAD criteria to assess financial anxiety overlooks these distinct dimensions of financial anxiety. Therefore, a measure tailored specifically to assess financial anxiety would be more practical and relevant in these contexts.

Limitations

The present scoping review has limitations. First, the review only includes articles that focus on ‘financial anxiety,’ ‘financial stress,’ or ‘financial worry’ as evidenced by use of the term in the research questions or hypotheses. As such, the results are only generalizable to articles that met this criterion and may overlook relevant studies approaching the topic from different perspectives. For example, articles that use different terms, such as ‘financial distress’ or ‘economic hardship’ could be conceptually similar to studies focused on financial anxiety. However, the review’s search terms yielded a wide range of studies across four commonly used psychology databases, suggesting that it is a good representation of the literature on financial anxiety. Second, the review is limited to published, peer-reviewed articles. The decision not to search the grey literature for additional articles excluded insights from sources such as conference proceedings and reports. However, given the vastness of the literature on the topic, I felt it prudent to narrow my search to articles that may be more scientifically rigorous. Third, the restriction to articles published in English omits potentially valuable contributions from non-English sources. Finally, the review includes articles published up to December 31, 2022, omitting more recent studies that may have provided further insights.

Conclusion

The scoping review conducted in Study 1 highlights the need for standardized and distinct definitions of financial anxiety, financial stress, and financial worry. The considerable conceptual overlap identified in the existing literature compromises the validity and reliability of research findings in this domain and has significant implications for policy and practice. Inconsistent definitions may lead to varied approaches in addressing financial anxiety through interventions or policy initiatives. Clarifying the conceptualization of financial anxiety will improve the effectiveness of interventions and policies aimed at alleviating its impact. To advance theoretical understanding related to financial anxiety, future research must focus on developing a theory-driven measurement tool that accurately captures the nuances of this construct. This will enable researchers to assess the unique impacts of financial anxiety more precisely, contributing to a more coherent and cumulative body of knowledge. Ultimately, this approach will facilitate the creation of more effective, targeted interventions.

Chapter 4: Constructing Conceptual and Operational Definitions of Financial Anxiety

Study 3 Development of the Financial Anxiety Feelings and Engagement Scale (FAFES)

The findings of my scoping review emphasize the need for distinct and consistent definitions to improve the validity of studies related to financial anxiety, financial stress, and financial worry. The review, which included 119 articles, revealed significant inconsistencies and overlap in the conceptual and operational definitions of these constructs. Notably, while researchers generally agreed on the conceptualization of financial anxiety and financial worry, definitions of financial stress varied widely, encompassing objective, subjective, combined, and physiological perspectives. This variability undermines construct validity and compromises the ability to build cumulative theoretical knowledge (Wacker, 2004; Ward, 2012). It is thus evident that distinct and theoretically grounded conceptual and operational definitions are essential for advancing research in this area. Below, I outline the conceptual definitions developed based on the findings of my review.

Conceptual Definitions of Financial Anxiety, Financial Stress, and Financial Worry

Financial Worry

Researchers largely agree that financial worry is the repeated and negative thinking about the uncertainty of one's financial situation (de Bruijn & Antonides, 2020; Magwegwe et al., 2022). This is distinct from both financial anxiety and financial stress. Financial worry represents the act of thinking, whereas financial anxiety represents the feelings associated with these thoughts. However, most scales of financial worry identified in the review focus on the emotional responses to financial situations, which I contend aligns more closely with the construct of financial anxiety. As such, I urge researchers to use scales that accurately reflect this conceptual distinction when assessing financial worry in future work (e.g., de Bruijn & Antonides, 2020).

Financial Stress

Although researchers have presented conflicting and varied definitions of financial stress, encompassing objective, subjective, combined, and physiological perspectives, I propose that financial stress is best represented solely as objective financial demands and a person's ability to meet these demands. The subjective and physiological perspectives, on the other hand, are better suited to describing 'financial anxiety.' This distinction aligns with the general definition of stress provided by Koolhaas et al. (2011), who recommend that the "term 'stress' should be restricted to conditions where an environmental demand exceeds the natural regulatory capacity of an organism" (p. 1291). I further propose that financial stress may be a subconstruct of financial anxiety, which I refer to as 'demands and resources.'

Financial Anxiety

The current conceptual understanding of financial anxiety should be broadened to encompass financial stress (i.e., demands) and anxiety towards financial concepts in general. Presently, financial anxiety is understood as anxiety towards one's personal financial situation, which overlooks the broader financial context that can significantly impact a person's level of financial anxiety. For example, engaging with financial systems or understanding economic trends can provoke substantial anxiety, even in those without immediate concerns about their financial stability. Further, I propose the inclusion of engagement in my conceptualization of financial anxiety, such as an unwillingness to engage with unfamiliar financial concepts. Expanding this conceptual framework will enable researchers to better identify and address financial anxiety, leading to more effective interventions and support mechanisms.

Theoretical Framework of Financial Anxiety

I propose financial anxiety is a multifaceted construct comprised of three components: demands and resources, feelings, and engagement.

‘Demands and resources’ represent the objective reality of one’s financial situation (i.e., financial stress). In this view, stress is considered a load component and occurs when someone does not have sufficient resources to meet basic financial demands such as paying bills, buying food, or other subsistence costs. My definition aligns with previous conceptualizations of *objective* financial stress (see Chapter 3 Table 10, definitions 1 to 22). The subjective and physiological elements that some researchers label as financial stress (see Chapter 3 Table 10, definitions 23 to 38 and 46 to 48) are better aligned with the ‘Feelings’ component of my conceptualization of financial anxiety.

‘Feelings’ represent the subjective experience of finances, including both cognitive and physiological reactions. How anxious a person feels thinking about (1) their personal financial situation and (2) financial information in general. The first part of this definition (personal finances) aligns with previous conceptualizations of *subjective* financial stress (see Chapter 3 Table 10, definitions 23 to 38) and financial anxiety (see Chapter 3 Table 9, definitions 1a, 2, 5). My conceptualization extends previous definitions put forth by authors included in my review, as it not only encompasses the anxiety associated with one’s personal financial situation, but also anxiety related to financial information more broadly. This expansion acknowledges the potential for anxiety about finances to manifest beyond one’s personal financial situation.

‘Engagement’ represents actions that demonstrate a person’s engagement with (1) their personal financial situation and (2) financial information in general. This engagement component is largely missing from the current conceptualizations of financial anxiety, stress, or worry. This dimension is distinct from financial behaviours, such as paying off credit card debt on time,

saving portions of a paycheque, and having a diversified investment portfolio. When using the term engagement, I refer to actions that demonstrate anxiety towards finances, as opposed to poor financial practices in general, which might simply reflect low financial knowledge rather than financial anxiety. For example, avoidance, procrastination, and disengagement are all actions that I conceptualize as being indicators of financial anxiety. Apart from definition 6 in Table 9 (Potter et al., 2020), which mentions an avoidance of financial topics, all definitions of financial anxiety, stress, and worry focus on one's personal financial circumstances and do not extend to feelings or engagement related to financial information more broadly.

The Necessity of a New Scale

Existing measurement tools are insufficient as they omit behavioural indicators of financial anxiety. Certain behaviours, such as avoidance, are characteristic of anxiety coping mechanisms and could serve as informative indicators of financial anxiety. Indeed, avoidance is recognized as a key indicator and perpetuator of anxiety (American Psychiatric Association, 2000; Aupperle & Martin, 2010) and research in various areas consistently demonstrates that people generally avoid events or activities that make them anxious (Daker et al., 2023). For instance, people higher in math anxiety tend to avoid courses, majors, and careers that heavily involve math (Daker et al., 2023; Hart & Ganley, 2019; Hembree, 1990), much like people with health anxiety may avoid visits to their doctor (Dattilo et al., 2021; Koszegi, 2003). Psychotherapy approaches designed to alleviate anxiety, such as cognitive-behavioural and exposure-based therapies, often target the reduction of this avoidance behaviour (Barlow, 2002; Foa & Kozak, 1986).

In the literature on coping with anxiety, a crucial distinction exists between avoidance coping (i.e., disengagement) versus approach coping (i.e., engagement) strategies (Hofmann &

Hay, 2018). Engagement behaviours involve confronting the threat and related emotions, while disengagement behaviours involve avoiding the threat and related emotions (e.g., Carver & Connor-Smith, 2010; Skinner et al., 2003). Research by Daker et al. (2023) illustrates this distinction, finding that heightened anxiety in specific cognitive domains (creativity, math, and spatial reasoning) predicts less interest and engagement in careers or activities involving those domains. This finding suggests that domain-specific anxieties can significantly influence people's tendencies to engage with or avoid certain types of cognitive pursuits. Applying this conclusion to financial anxiety, it follows that people higher in financial anxiety may exhibit more disengagement behaviours and fewer engagement behaviours in the context of finances. The absence of items assessing these behavioural aspects—such as disengagement from managing personal finances or proactive engagement with learning financial concepts—limits the current scales' abilities to fully capture the indices of financial anxiety.

The Present Studies

In Study 3, I build on the theoretical foundation developed in Study 2 by creating and psychometrically evaluating a novel measure of financial anxiety. Using two separate samples, I first examine the item-level characteristics, factor structure, and internal consistency of my items (Study 3a). I then replicate the psychometric examination of the scale in a new sample (Study 3b). This new scale improves upon existing scales in two important ways. First, this measure broadens its scope to encompass anxiety towards financial information beyond personal financial circumstances. Second, it incorporates behavioural indicators of anxiety, a dimension lacking in previous measures. This study addresses both the substantive and structural phases of construct validation (Flake et al., 2017). In the substantive phase, I develop an operational definition by creating items and assessing their content relevance. In the structural phase, I examine the

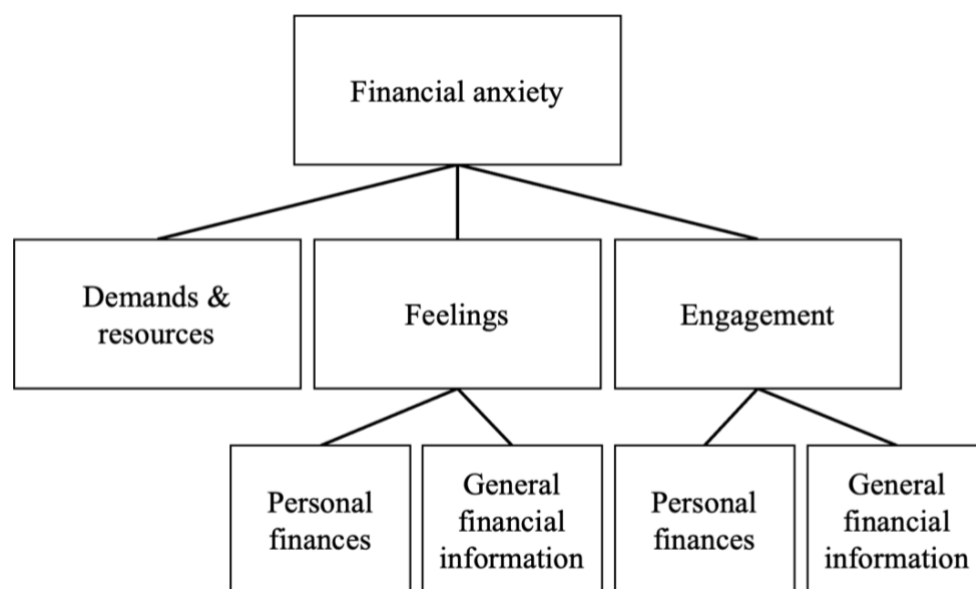
psychometric properties of my scale through item analysis, factor analysis, and reliability assessments.

Objectives and Hypotheses

The purpose of Study 3 is to develop an operational definition of financial anxiety that is consistent with my theoretically driven conceptual definition. Based on the results of the scoping review, I expect the scale will be multidimensional, comprised of three components: (1) demands and resources, (2) feelings, and (3) engagement. Both the components of feelings and engagement are further broken down into personal finances and financial information in general. See Figure 3 for a visual depiction of my proposed factor structure for the financial anxiety scale.

Figure 3

Proposed Factor Structure of the Novel Financial Anxiety Scale



Study 3a Primary Development Sample

Methods

To develop my scale, I followed the guidelines put forth by DeVellis and Thorpe (2022). The authors propose eight steps in creating a valid and reliable scale: (1) clearly defining the construct of interest; (2) generating an item pool; (3) determining the format for measurement; (4) having the initial item pool reviewed by experts; (5) considering inclusion of validation items; (6) administering items to a development sample; (7) evaluating the items; and (8) optimizing scale length. I achieved step one (defining the construct) in Study 2 through my scoping review. I chose to omit step four (expert review) and instead assessed item clarity and relevancy using six independent reviewers with expertise in either psychology or economics more broadly, which I will elaborate on below.

Item Development

Item pool. Based on the results of the scoping review, I created a pool of items intended to measure financial anxiety, drawing from existing scales (e.g., Archuleta et al., 2013a; Fünfgeld & Wang, 2009; Heo et al., 2020; Shapiro & Burchell, 2012; Siahpush, Spittal, et al., 2007) and adapting select items for inclusion in my pool. Please refer to Appendix S for all items along with citations indicating the sources from which they were adapted. DeVellis and Thorpe (2022) recommend generating three to four times the number of items expected in the final scale. Given that I expected my final scale to comprise roughly 5 items per subconstruct (i.e., 20 items total), I generated 78 items. I created items with intended redundancy, strengthening the scale with repetition to maximize internal consistency. To facilitate item clarity, I avoided the use of double-barreled items (i.e., items that convey two or more ideas), ambiguous pronouns, misplaced modifiers, and double negatives. I included reverse coded items, as they are particularly helpful in identifying incidents of insufficient effort responding (i.e., straightlining) or fraudulent respondents (i.e., bots) in data collected online (Herzog & Bachman, 1981;

Johnson, 2005; Storozuk et al., 2020; Yan, 2008). However, inclusion of reverse coded items in the final scale will depend on the performance of such items in the item evaluation stage, as opposite-valence items may diminish correlations between this item and other items in the scale, ultimately harming scale performance (Currey et al., 2002).

Readability. Adult literacy levels can vary widely and do not always correspond neatly to a specific grade level in school. Large-scale assessments like the Program for the International Assessment of Adult Competencies (PIAAC) can provide insight into the general literacy proficiency of adults in a region. Proficiency is measured across different levels in the PIAAC, with Level 3 comparable to the literacy level expected by the end of compulsory schooling, which in Ontario would be around the end of high school (Grade 12). According to the 2012 PIAAC results, Canadians aged 16 to 65 achieved a mean literacy proficiency score of 273 (OECD, 2013b). This score corresponds to a Level 2 (i.e., 226 to 275) and sits just below the cut-off for a Level 3 (i.e., 276 to 325). To ensure accessibility for most Canadians, I wrote the scale items to roughly match guidelines for a Level 2 on the PIAAC. Readability guidelines provided by Fry (1977) suggest the scale items require a ninth-grade reading level (see Appendix R for item reading level calculation).

Format of measurement. I chose a Likert scale with four anchors, whereby higher scores indicate more agreement or frequency, and lower scores indicate less agreement or frequency. Agreeance: (1) Strongly disagree, (2) disagree, (3) agree, (4) strongly agree; Frequency: (1) Never, (2) rarely, (3) sometimes, (4) almost always. I also included the response options “I don’t understand this statement” (to assess item clarity) and “Not applicable to me.”

Assessment of Item Clarity and Relevance

Reviewers. To maximize content validity, six independent reviewers rated my items for clarity and relevance. Five reviewers have expertise in psychology (doctoral level), and one has expertise in economics (undergraduate level). Given that my scale items focus on emotions related to finances, and not on the financial concepts themselves, the reviewers did not require a background in economics to effectively assess the items.

Instructions to reviewers. I provided reviewers with my proposed factor structure of financial anxiety, my conceptual definition, and the items. I asked reviewers to rate each item on a scale from 1 to 4 for relevance to my conceptual definition and for clarity, with 1 being not at all relevant or clear and 4 being very relevant or clear. I invited reviewers to provide additional comments on specific items as needed.

Reviewing procedure. I first distributed my initial 78 items to three independent reviewers. I modified or deleted any item with a rating of 1 or 2 on either clarity or relevance. I incorporated reviewers' comments, modifying existing items and generating new ones accordingly. I then distributed my revised set of 96 items to three new reviewers. I modified or deleted any items with ratings of 2 (no items received a rating of 1), and carefully considered reviewers' additional comments. I then administered my final pool of 75 items to the Primary Development sample (see Appendix S for these items).

Participants

I recruited 355 Canadian residents using Prolific. I selected this sample size based on recommendations put forth by Tabachnick and Fidell (2013) (i.e., to obtain a minimum of 300 respondents) and is consistent with the norms presented in a systematic review of sample sizes across 1750 quantitative instrument validation studies (White, 2022). Participants received £3 (approximately \$5.15 CAD) for their participation. Only participants with an approval rate of 90

to 100 and who indicated English fluency on Prolific were eligible to participate. See Appendix T for the ethics certificate for Study 2.

I excluded 14 people from the sample based on incorrect responses to the comprehension questions ($n = 3$), survey completion in under 5 minutes ($n = 2$), a lack of Canadian residency ($n = 3$), and evidence of inattention based on Longstring analysis ($n = 6$). Longstring is defined as the longest consecutive string of identical responses given by a respondent. This technique is used to identify inattention, evidenced by using the same response category consecutively throughout measures that require reverse scoring (e.g., the STAI; Yan, 2008). Please refer to Appendix U for detailed information on the exclusion procedure. The final sample consists of 341 participants ($n = 175$ women, $n = 160$ men, $n = 6$ non-binary) between 18 to 70 years old ($M = 33.94$, $SD = 10.53$). See Table 13 for all demographic information.

Table 13

Demographics of Participants in the Primary Development Sample

Demographics ($N = 341$)	n (%)
Age group	
18 to 29	136 (39.9%)
30 to 49	168 (49.3%)
50+	36 (10.6%)
Not reported	1 (0.0%)
Gender	
Women	160 (46.9%)
Men	175 (51.3%)
Non-binary	6 (1.8%)
Socioeconomic status*	
1	2 (0.6%)
2	16 (4.7%)
3	22 (6.5%)
4	50 (14.7%)
5	73 (21.4%)
6	69 (20.2%)
7	68 (19.9%)
8	31 (9.1%)
9	5 (1.5%)

10	0 (0.0%)
Not reported	5 (1.5%)
Income (CAD)	
Less than \$15,000	41 (12.0%)
\$15,000 to \$34,999	35 (10.3%)
\$35,000 to \$49,999	39 (11.4%)
\$50,000 to \$74,999	72 (21.1%)
\$75,000 to \$99,999	48 (14.1%)
\$100,000 or more	94 (27.6%)
I prefer not to answer	12 (3.5%)
Education	
I have not completed high school	3 (0.9%)
High school diploma	69 (20.2%)
College diploma	49 (14.4%)
Bachelor's degree	165 (48.4%)
Master's degree	44 (12.9%)
Doctoral degree	11 (3.2%)
Cultural background	
African	19
European	193
East Asian	53
South Asian	25
Southeast Asian	25
First Nations or Indigenous (please specify)	13
Cree	2
First Nations	1
Indigenous	1
Ojibwa	2
Métis	6
Hispanic or Latinx	7
Middle Eastern	13
Other (please specify)	
Canadian	4
North-African	2
Caribbean	2
I prefer not to answer	2
Race	
Asian	100
Black	21
European/White	210
Hispanic	3
Indigenous (please specify)	7
Cree	1
Métis	2
Ojibwa	2
Dene	1

I don't know	7
I prefer not to answer	10

Note. Percentages may not equal 100% due to rounding. Percentages were not reported for

cultural background and race as some participants identified with multiple options. *Participants were asked where they would put themselves on the socioeconomic ladder with options ranging from 1 to 10.

Materials

After providing consent to participate in the survey (see Appendix V for the consent form), each participant began by answering two comprehension questions designed to be easy for humans but difficult for bots to answer. Participants only gained admittance to the survey if they answered both items correctly. Participants then answered demographic items, followed by the initial pool of financial anxiety items, the measure of general anxiety, and the measure of social desirability. Lastly, participants responded to an open-ended question for the sole purpose of ensuring their responses appeared human (see Appendix W for details on bot detection methods). The average completion time was 15.57 minutes ($SD = 6.82$).¹¹

Social desirability. DeVellis and Thorpe (2022) encourage the inclusion of validation items during the development sample process to identify alternate motivations influencing participants' responses. One such motivation may be social desirability. I originally proposed measuring social desirability with the Marlow-Crowne Social Desirability Scale (MC-20) (Strahan & Gerbasi, 1972). However, recent criticism of the validity of social desirability scales, and of the Marlow-Crowne Social Desirability Scale in particular (Lanz et al., 2022), prompted me to investigate other methods to control for the influence of social desirability. I opted to

¹¹ To provide a more accurate representation of the average completion speed, I excluded participants ($n = 6$) who completed the survey more than three standard deviations above the average completion time from this computation.

instead measure social desirability using the English adaptation of the Kurzskala Soziale Erwünschtheit-Gamma (KSE-G; translated to Short Scale of Social Desirability-Gamma). Originally developed in German by Kemper et al. (2012), Nießen et al. (2019) translated and validated the KSE-G in English. This scale is appropriate for the present research given that it is recommended for use in social-scientific self-report surveys that measure behaviour, personality characteristics, or attitudes (Nießen et al., 2019). This scale also contains fewer items than the Marlow-Crowne Social Desirability Scale, helping to preserve scale brevity and reduce survey fatigue.

The KSE-G consists of six items subdivided into self-attribution of positive and negative qualities. That is, exaggerating positive qualities (e.g., “When talking to someone, I always listen carefully to what the other person says”) and minimizing negative ones (e.g., “It has happened that I have taken advantage of someone in the past”). Participants rated items on a five-point Likert scale ranging from (1) *Doesn't apply at all* to (5) *Applies completely*. Scale scores are calculated as the average of each scale's respective three items. For each scale, lower values indicate a stronger understatement of negative qualities and overstatement of positive qualities, respectively. This measure has previously demonstrated good internal consistency ($\alpha = .64$ to $.79$) (Nießen et al., 2019). Cronbach's alpha for the current sample was $.61$ for the understatement of negative qualities and $.71$ for the overstatement of positive qualities.

General anxiety. Another purpose of the inclusion of validation items pertains to the construct validity of the scale. DeVellis and Thorpe (2022) further recommend including measures of relevant constructs. The patterns between items and these relevant constructs can provide either evidence for validity claims or advanced warning that the items do not perform as anticipated. Given that I expect financial anxiety to be related to (but distinct from) general

anxiety, I included a measure of general anxiety (see STAI-T in Materials section Study 1) (Spielberger et al., 1982). Cronbach's alpha for the current sample was .94.

Results

Preliminary Analyses

Missing Data Analysis. Not all participants completed every measure. Occasionally, some participants did not respond to an item in a scale (<1%). I performed Little's MCAR test to assess the missingness of the data. Significant results suggest some data may be missing systematically, $\chi^2(2397) = 2854.96, p < .001$. I was unable to determine if missingness is predictable from the dependent variable using Separate Variance t-tests as there is no dependent variable in the dataset (Tabachnick & Fidell, 2013). I did, however, explore potential patterns between missingness and other variables. This exploratory analysis suggested the missingness of three variables displayed associations to SES or education, and these variables were subsequently removed. Additionally, some participants selected the option "I don't understand this statement" (<1% per item) or "Not applicable to me" (<10% per item)¹². Given that listwise deletion would severely impact power by reducing the total sample to only 224 participants, I coded these responses as missing and deleted cases pairwise in my analysis. I did not estimate values to preserve participants' intentional nonresponse.

Assumption Testing. I then assessed the suitability of factor analysis. The data met the assumption of linearity based on a visual inspection of scatterplots. Five items violated the assumption of normality by demonstrating skewness values above 1 or kurtosis values above 2 (Tabachnick & Fidell, 2013). Three items violated the assumption of multicollinearity as demonstrated by VIF values greater than 10. The data is considered factorable based on

¹² Note that only three items had >5% missing data. These three items were later removed based on item evaluation.

significant correlations of .3 or higher for each variable, a significant chi-square value on Bartlett's test of sphericity ($p < .001$), and a value of .939 on the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Bartlett, 1954; Tabachnick & Fidell, 2013). There were no univariate outliers as assessed by standardized scores exceeding ± 3.29 standard deviations. There were no multivariate outliers as indicated by Mahalanobis distance evaluated at $p < .001$ and X^2 (chi squared) with degrees of freedom equal to the number of variables.

Item Evaluation. I evaluated the suitability of the initial 75 items for the financial anxiety scale. I first examined item correlations to social desirability and general anxiety. I removed one item (i.e., "I am well-informed about my current financial situation") that displayed a weak positive correlation to the overstatement of positive personal qualities, $r = .30$, $p < .001$. Some items displayed moderate correlations (i.e., $r < .58$) to general anxiety, as anticipated for items designed to measure an anxiety-related construct. The moderate correlations suggest that while these items capture aspects of anxiety, the items represent a distinct construct from general anxiety as there is variance that cannot be solely attributed to general anxiety. Consequently, I did not exclude any items based on correlations with general anxiety.

I calculated the corrected item-scale correlations for each financial anxiety item to identify items that are strongly intercorrelated. This calculation involves correlating the item with all other scale items, excluding itself (DeVellis & Thorpe, 2022). I then inspected a correlation matrix to identify high intercorrelations among the financial anxiety items. Considering that items with higher correlation values are preferable to those with lower values, I flagged 12 items with corrected item-scale correlations below .5. I then assessed item means and flagged one item with a mean that deviated substantially from the center of the range ($M = 3.24$, center = 2). I assessed item variability and flagged six items with standard deviations below .7

and variance below .5 (DeVellis & Thorpe, 2022). I removed 18 items based on violations of the assumptions and the item evaluations (see Table X1 Appendix X for a summary of the exclusion criteria for each item).

Factor Analysis

The final sample size ($n = 341$) is considered adequate for a factor analysis with 57 items. Hair et al. (2014) recommend maximizing the cases-per-variable ratio to achieve sufficient power for factor analysis. Hatcher (1994) and Pallant (2016) suggest that five participants per variable is sufficiently large, while Tabachnick and Fidell (2013) recommend having a minimum of 300 respondents.

I conducted an exploratory factor analysis with 57 items designed to measure financial anxiety and stress. I used a promax rotation to aid interpretability by minimizing the number of variables that have high loadings on each factor (Gorsuch, 1983). I selected an oblique rotation, as opposed to orthogonal, as most factors correlated above .32 (see Table 14), suggesting there is adequate variance to warrant oblique rotation (Brown, 2009; DeVellis & Thorpe, 2022; Osborne, 2015; Tabachnick & Fidell, 2007). The factor analysis revealed five factors with eigenvalues greater than one and which explained 38.3%, 11.7%, 5.8%, 4.6%, and 2.1% of the variance, respectively (H. F. Kaiser, 1960). However, visual inspection of the scree plot indicated that only four factors should be retained (see Figure 4; Cattell, 1966). Indeed, after considering complex variables (i.e., variables with items with loadings of .30 or higher on more than one factor; Bryant & Yarnold, 1995), the fifth factor had only two items. Factors with under three variables loading on them are considered unstable and unreliable (Tabachnick & Fidell, 2013). Further, the four-factor solution met criterion for a simple structure, whereby most variables loaded near 1 or near 0 on a given factor (Bryant & Yarnold, 1995). The model also satisfied the interpretability

criterion, with factors largely aligned with my proposed theoretical framework. That is, there were strong loadings of feelings towards personal finances on Factor 1, actions related to finances in general on Factor 2, feelings towards finances in general on Factor 3, and actions related to personal finances on Factor 4. As such, I retained four factors. Factor loadings and communalities of the rotated solution are presented in Table 15. The cumulative percent of variance explained by the four-factor solution is considered satisfactory at 60.3% (Hair et al., 2014).

Table 14

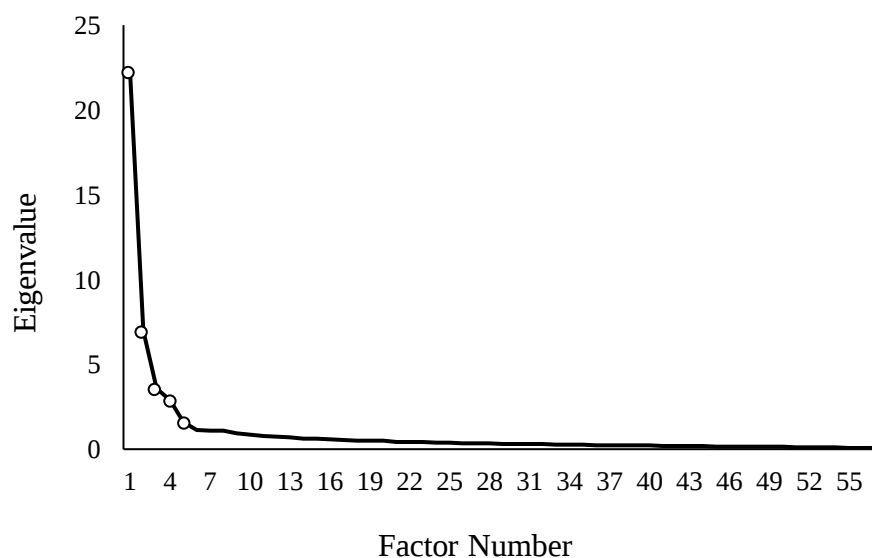
Factor Correlation Matrix

Factor	1	2	3	4
1	--	.260	.540	.516
2		--	.458	.493
3			--	.613
4				--

Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization.

Figure 4

Scree Plot Generated from a Factor Analysis of Financial Anxiety Items



Note. This graph illustrates the number of factors (x-axis) and Eigenvalues (y-axis) of the financial anxiety items.

Table 15

Factor Analysis (with Promax Rotation) Loadings of 57 Financial Anxiety Items

Item	Communalities	Factor			
		1 Feelings Personal	2 Engage general	3 Feelings General	4 Engage personal
I relied on financial help from family or friends.	0.293	.474	.011	.013	.095
I went without things I really needed.	0.372	.572	-.018	-.032	.107
I put off getting health care (e.g., dental, glasses, prescription medication) for myself and/or my family.	0.436	.616	-.041	.064	.034
I could not go out to eat, go to a movie, or do something else I wanted.	0.594	.771	.026	-.026	.012
I gave up things I wanted (e.g., going to the movies) to pay for things I needed (e.g., food, housing).	0.613	.782	-.049	-.021	.047
I had money left over to spend how I wanted after covering my basic costs.	0.576	.821	.155	-.188	-.042
I had enough money to participate in hobbies or pastimes I enjoy.	0.607	.846	.113	-.135	-.069
I had enough money to eat out or order takeout from restaurants when I wanted to.	0.521	.785	.150	-.156	-.073
I feel like I am struggling to make ends meet.	0.786	.911	-.008	-.027	-.016
I feel overwhelmed by my current financial situation.	0.748	.796	.023	.105	.002
I find myself excessively worrying about my financial situation.	0.621	.687	-.154	.266	-.062
I feel anxious that I won't be able to pay for things I need (e.g., food, housing, bills)	0.638	.692	-.099	.183	.034
I feel anxious when faced with a financial decision.	0.529	.473	-.017	.327	.043

I tend to second guess my financial decisions.	0.410	.381	-.042	.344	.030
I feel satisfied with my current financial situation.	0.543	.776	.112	-.145	-.002
I feel in control of my financial situation.	0.522	.649	.149	-.022	.053
I feel at ease with the financial decisions I make.	0.426	.586	.195	.033	-.054
I feel at ease with my ability to meet my monthly expenses.	0.587	.814	.069	-.061	-.073
I get tense when I think about my financial situation.	0.641	.576	-.067	.332	.028
I get sweaty when I think about my financial situation.	0.503	.259	-.184	.581	.030
I have a hard time sleeping because of my financial situation.	0.577	.401	-.216	.437	.138
I have a hard time concentrating on my school or work because of my financial situation.	0.648	.515	-.271	.400	.114
I feel anxious when talking to financial experts about financial topics.	0.617	.204	.099	.532	.100
I get nervous when I think about learning new things about finances.	0.642	-.066	.158	.745	.009
I feel overwhelmed by how complicated financial topics can be.	0.668	.032	.337	.676	-.133
I feel intimidated by financial terms.	0.719	-.119	.311	.783	-.104
I feel uneasy about the language used by financial experts.	0.736	-.049	.284	.798	-.132
I get tense when I think about financial concepts.	0.748	.027	.121	.848	-.098
I get sweaty when I think about financial concepts.	0.692	-.064	-.139	.908	.019
I can feel my heart race when I think about financial concepts.	0.758	.024	-.166	.903	.030
I get stomach aches when I think about financial concepts.	0.667	-.016	-.192	.839	.094
I enjoy exploring and understanding new financial terms and concepts.	0.705	-.038	.843	.084	-.072
I feel comfortable discussing financial topics with experts	0.571	.071	.584	.297	-.070
I enjoy books, blogs, or podcasts that cover financial topics.	0.685	-.039	.857	.078	-.126

I feel confident in my ability to grasp complex financial information.	0.574	.047	.626	.300	-.123
I get excited about learning new financial concepts.	0.724	.008	.902	.021	-.143
I avoid thinking about my financial situation.	0.552	.019	.002	.086	.675
I do not make a big effort to understand my financial situation.	0.427	-.157	.046	.040	.674
I would let someone else manage all my personal finances if I could.	0.284	-.020	.210	.179	.267
I put off handling my finances for as long as possible.	0.740	.039	-.027	-.097	.909
I avoid situations that make me think deeply about my financial situation.	0.703	.022	-.032	.090	.784
I disengage from conversations about my financial situation.	0.637	.006	.077	-.022	.768
I postpone financial decisions.	0.636	.111	-.041	-.113	.821
I ignore my financial problems rather than facing them.	0.761	-.004	-.076	.052	.877
I procrastinate when making a financial decision.	0.676	.025	.011	-.027	.820
I promptly handle my finances without delay.	0.480	.249	.123	-.215	.595
I seek out situations that require me to think deeply about my financial situation.	0.442	.134	.629	-.252	.167
I find myself zoning out when people talk about finances.	0.583	-.056	.362	.217	.375
I lose interest when people talk about financial concepts.	0.667	-.059	.553	.139	.306
I stay away from situations that require me to learn about financial concepts.	0.653	-.145	.451	.248	.354
I pass up chances to learn more about financial concepts.	0.561	-.137	.442	.159	.366
I do not pay close attention to financial trends.	0.599	-.012	.656	.008	.199
I am uninterested in learning about financial trends and developments.	0.562	-.116	.599	.122	.195
I actively engage in conversations about financial concepts.	0.610	.139	.836	-.121	-.101
I initiate discussions on financial topics.	0.600	.143	.782	-.151	.024

I like to stay up to date on the latest financial news or trends.	0.591	.082	.803	-.167	.021
I actively seek out ways to improve my understanding of new financial concepts.	0.681	.061	.868	-.149	.003
% of variance explained by each factor		38.2%	11.6%	5.6%	4.5%

Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization. Rotation converged in 6 iterations. Eigenvalue>1. Engage = Engagement.

Scale Simplification. When scrutinizing items for deletion, I considered items that load closer to 1 as important in the interpretation of the factor, and items that load near 0 as unimportant (Bryant & Yarnold, 1995). After deleting 25 items that were complex variables and/or items with loadings considered weak relative to other items (<.65), 32 items remained. The 32-item scale yielded an alpha coefficient of .95, indicating that I could remove more items to enhance brevity without compromising reliability. I considered deleting items that met the following criteria: Items on the cusp of being complex variables (i.e., multiple factor loadings >.25), items with the lowest item-scale correlations (and thus, contribute least to the overall internal consistency of the scale), items with low communality (i.e., share less variance with other items), and items that do not contribute additional theoretical value to the scale. I removed 12 items based on these criteria (see Table X2 Appendix X for detailed exclusion criteria).

The final scale consists of 20 items, with 5 items per factor. The descriptive statistics of the items are presented in Table 16. Factor 1 includes items about how a person feels about their own financial situation, which I named ‘Feelings towards Personal Finances.’ Factor 2 includes items about how a person feels about financial information in general, specifically capturing physiological sensations, which I named ‘Physiological Feelings towards Financial Concepts.’ Factor 3 includes items about how a person disengages from their own finances, which I named ‘Disengagement with Personal Finances.’ Factor 4 includes items about how a person engages with financial information in general, which I named ‘Engagement with Financial Concepts.’

Table 16*Descriptive Statistics of Items Retained Based on the Exploratory Factor Analysis*

Factor	#	Item	Response Options n (%)						Descriptives	
			Strongly disagree	Disagree	Agree	Strongly agree	Not applicable	I don't understand	Mean	SD
Feelings personal	1	I feel like I am struggling to make ends meet.	47 (13.8)	98 (28.7)	104 (30.5)	87 (25.5)	5 (1.5)	0 (0.0)	2.69	1.01
	2	I feel overwhelmed by my current financial situation.	35 (10.3)	103 (30.2)	101 (29.6)	100 (29.3)	2 (0.6)	0 (0.0)	2.78	0.98
	3	I feel anxious that I won't be able to pay for things I need (e.g., food, housing, bills).	60 (17.6)	92 (27.0)	107 (31.4)	74 (21.7)	8 (2.3)	0 (0.0)	2.59	1.03
	4	I feel satisfied with my current financial situation.*	16 (4.7)	75 (22.0)	135 (39.6)	110 (32.3)	4 (1.2)	1 (0.3)	3.01	0.86
	5	I feel at ease with my ability to meet my monthly expenses.*	42 (12.3)	142 (41.6)	90 (26.4)	63 (18.5)	3 (0.9)	1 (0.3)	2.52	0.94
Feelings general	6	I get nervous when I think about learning new things about finances.	64 (18.8)	124 (36.4)	112 (32.8)	37 (10.9)	4 (1.2)	0 (0.0)	2.36	0.91
	7	I get tense when I think about financial concepts.	65 (19.1)	121 (35.5)	106 (31.1)	48 (14.1)	1 (0.3)	0 (0.0)	2.40	.95
	8	I get sweaty when I think about financial concepts.	117 (34.3)	141 (41.3)	60 (17.6)	20 (5.9)	3 (0.9)	0 (0.0)	1.95	0.87
	9	I can feel my heart race when I think about financial concepts.	119 (34.9)	127 (37.2)	71 (20.8)	21 (6.2)	2 (0.6)	1 (0.3)	1.98	0.90
	10	I get stomach aches when I think about financial concepts.	130 (38.1)	144 (42.2)	47 (13.8)	17 (5.0)	3 (0.9)	0 (0.0)	1.86	0.84
Engage personal	11	I put off handling my finances for as long as possible.	113 (33.1)	129 (37.8)	69 (20.2)	28 (8.2)	1 (0.3)	0 (0.0)	2.04	0.93

	12	I avoid situations that make me think deeply about my financial situation.	85 (24.9)	116 (34.0)	101 (29.6)	37 (10.9)	2 (0.6)	0 (0.0)	2.27	0.96
	13	I disengage from conversations about my financial situation.	96 (28.2)	139 (40.8)	73 (21.4)	28 (8.2)	5 (1.5)	0 (0.0)	2.10	0.91
	14	I ignore my financial problems rather than facing them.	121 (35.5)	137 (40.2)	55 (16.1)	27 (7.9)	1 (0.3)	0 (0.0)	1.96	0.92
	15	I procrastinate when making a financial decision.	86 (25.2)	110 (32.3)	106 (31.1)	36 (10.6)	3 (0.9)	0 (0.0)	2.27	0.96
Engage general	16	I do not pay close attention to financial trends.	53 (15.5)	120 (35.2)	116 (34.0)	50 (14.7)	1 (0.3)	1 (0.3)	2.48	0.93
	17	I actively engage in conversations about financial concepts.*	20 (5.9)	111 (32.6)	155 (45.5)	51 (15.0)	4 (1.2)	0 (0.0)	2.70	0.80
	18	I initiate discussions on financial topics.*	26 (7.6)	90 (26.4)	136 (39.9)	88 (25.8)	1 (0.3)	0 (0.0)	2.84	0.90
	19	I like to stay up to date on the latest financial news or trends.*	39 (11.4)	115 (33.7)	127 (37.2)	57 (16.7)	2 (0.6)	1 (0.3)	2.60	0.90
	20	I actively seek out ways to improve my understanding of new financial concepts.*	41 (12.0)	103 (30.2)	151 (44.3)	41 (12.0)	3 (0.9)	1 (0.3)	2.57	0.86

Note. $N = 341$. Items 11 and 20 $n = 340$. *Reverse-coded item. Engage = Engagement.

Reliability Coefficients

Alpha. The most widely used reliability coefficient, alpha, provides an indication of the proportion of variance in the scale scores that is attributable to the “true” score of the latent variable (Cronbach, 1951; DeVellis & Thorpe, 2022). This reliability estimate is derived from the covariance matrix of the scale items. While an alpha of .70 is generally deemed acceptable (Nunnally, 1978), a high alpha (i.e., $>.90$) is desirable for a newly developed measure to account for potential instability of the scale in a different population (DeVellis & Thorpe, 2022).

Cronbach’s alpha for the 20-item scale exceeded this standard, yielding a value of .93.

Cronbach’s alpha is considered excellent for all four subscales, with a value of .91 for ‘Feelings Personal,’ .92 for ‘Feelings General,’ .92 for ‘Engagement Personal,’ and .91 for ‘Engagement General.’

Omega. Alpha has been criticized, however, for underestimating the true reliability of a set of items as it hinges on the assumption that the items are tau-equivalent (Deng & Chan, 2017; Sijtsma, 2009). Some researchers have turned to an alternate method to estimate reliability, the coefficient omega (Dunn et al., 2014; Hayes & Coutts, 2020; McDonald, 1999; McNeish, 2018). Omega and alpha share similar logic (i.e., allocating variance as a representation of the true score or error), but differ in methodology for computing reliability estimates (DeVellis & Thorpe, 2022). For omega, this estimate is derived from a matrix of item loadings on the common factor the items share. The assumption of omega does not require that the covariance of items with their common factor be equal (as is assumed for alpha). There is evidence to suggest alpha and omega differ beyond that of sampling errors (e.g., Deng & Chan, 2017). I computed the coefficient omega using the OMEGA macro in SPSS (Hayes & Coutts, 2020) with a bootstrapping method with 2,000 iterations at a 95% confidence interval. Like interpretation of the alpha coefficient, an

omega of .70 is considered acceptable (McNeish, 2018). McDonald's omega for the 20-item scale exceeded this standard, yielding a value of .92, 95%CI [.91, .94]. McDonald's omega is considered excellent for all four subscales, with a value of .91, 95%CI [.89, .93] for 'Feelings Personal,' .92, 95%CI [.90, .94] for 'Feelings General,' .92, 95%CI [.90, .93] for 'Engagement Personal,' and .90, 95%CI [.88, .92] for 'Engagement General.'

Discussion

In Study 3a, I designed and psychometrically evaluated the initial set of items intended to form a new measure of financial anxiety. I proposed a theoretical model in which financial anxiety is represented by financial demands, feelings, and engagement related to personal finances and financial information in general. I examined the item-level characteristics, factor structure, and internal consistency of my items using data from the Primary Development sample. I initially reduced the items based on their suitability for factor analysis, item intercorrelations, and variance (i.e., range and means), and then removed items identified in the EFA as complex variables or those that lacked additional theoretical value. This process resulted in a 20-item scale. The results suggest that the scale is most appropriately structured with four meaningful subscales, each capturing distinct aspects of financial anxiety: Feelings towards Personal Finances, Physiological Feelings towards Financial Concepts, Disengagement with Personal Finances, Engagement with Financial Concepts. These subscales demonstrated high internal consistency, providing initial evidence for the validity and reliability of the FAFES. Notably, items designed to measure financial demands did not emerge as a subconstruct of financial anxiety. This result suggests that financial stress should be considered a distinct construct, separate from financial anxiety. These findings are discussed further in the General Discussion in conjunction with my findings from the Secondary Cross-Validation sample.

Study 3b Secondary Cross-Validation Sample

In Study 3b, I collected responses from a new sample of participants to validate my findings from Study 3a. Specifically, I conducted a confirmatory factor analysis (CFA) to determine the degree to which the EFA factor structure would fit data from a different sample. This validation process offers two significant advantages (DeVellis & Thorpe, 2022). First, an entirely new sample may represent a different population from Study 3a, thus assessing the generalizability of the scale. Second, participants in Study 3a completed the scale amongst the other items that were later omitted from the final version. These discarded items might have influenced their responses. As such, employing multiple samples in scale validation is crucial for enhancing the reliability and generalizability of the findings.

Methods

Participants

I recruited 451 Canadian residents using Prolific. Participants received £1.50 (approximately \$2.60 CAD) for their participation. Only participants with an approval rate of 90 to 100 and who indicated English fluency on Prolific were eligible to participate. The sample size of 451 was informed by several considerations outlined in the literature. Gagné and Hancock (2006a) propose that for a ratio of parameters to factors equal to 5 (20 parameters divided by 4 factors), and with factor loadings exceeding .4, a sample size of 200 people would suffice, but that 400 people is ideal. This aligns with guidance from Kline (2016), who suggests collecting 20 participants per parameter (which translates to 400 people for the present study) as well as Tabachnick and Fidell (2013), who advise a minimum of 300 people. I recruited over 400 participants to accommodate for potential data loss. The decision to collect 450 participants is further supported by findings from a systematic review of sample sizes across 1750 quantitative

instrument validation studies (White, 2022). According to White (2022), a sample size ranging between 375 to 500 people is commonly observed in scale validation studies conducted among general populations. Therefore, the current sample size is consistent with the prevailing norms identified in recent literature.

I excluded 18 people from the sample during data cleaning based on incorrect responses to the comprehension questions ($n = 3$), evidence of inattention based on Longstring analysis ($n = 8$), survey completion in under four minutes ($n = 4$), and a lack of Canadian residency ($n = 3$). Please refer to Appendix Y for detailed information on the exclusion procedure. The final sample consists of 433 participants ($n = 230$ women, $n = 189$ men, $n = 10$ non-binary, $n = 1$ genderfluid, $n = 2$ preferred not to answer) between 18 to 79 years old ($M = 34.8$, $SD = 11.8$). The 200 participants who completed the survey again at Time 2 consisted of ($n = 105$ women, $n = 91$ men, $n = 4$ non-binary) and were between 18 to 72 years old ($M = 36.5$, $SD = 11.7$). See Table 17 for demographic information of all participants.

Table 17

Demographics of Participants in the Secondary Cross-Validation Sample

Demographics ($N = 433$)	n (%)
Age group	
18 to 29	170 (39.3%)
30 to 49	201 (46.4%)
50+	62 (14.3%)
Gender	
Women	230 (53.1%)
Men	189 (43.6%)
Non-binary	12 (2.8%)
Not reported	2 (0.5%)
Socioeconomic status*	
1	2 (0.5%)
2	11 (2.5%)
3	44 (10.2%)
4	50 (11.5%)
5	78 (18.0%)

6	93 (21.5%)
7	118 (27.3%)
8	29 (6.7%)
9	6 (1.4%)
10	2 (0.5%)
Income (CAD)	
Less than \$15,000	46 (10.6%)
\$15,000 to \$34,999	58 (13.4%)
\$35,000 to \$49,999	38 (8.8%)
\$50,000 to \$74,999	78 (18.0%)
\$75,000 to \$99,999	78 (18.0%)
\$100,000 or more	119 (27.5%)
I prefer not to answer	16 (3.7%)
Education	
I have not completed high school	4 (0.9%)
High school diploma	86 (19.9%)
College diploma	69 (15.9%)
Bachelor's degree	197 (45.5%)
Master's degree	63 (14.5%)
Doctoral degree	12 (2.8%)
I prefer not to answer	2 (0.5%)
Cultural background	
African	22
European	254
East Asian	67
South Asian	33
Southeast Asian	25
First Nations or Indigenous (please specify)	10
Cree	1
First Nations	2
Indigenous	1
Métis	3
Mississaugas of the Credit	1
Hispanic or Latinx	10
Middle Eastern	11
Other (please specify)	
Canadian	8
West Asian	3
Caribbean	2
North-African	1
Moroccan	1
Mississaugas of the Credit	1
I don't know	7
I prefer not to answer	7
Race	
Asian	121

Black	20
European/White	281
Hispanic	11
Indigenous (please specify)	11
Cree	1
Métis	4
First Nations	1
Ojibwe	1
Assyrian	1
Berber	1
I don't know	4
I prefer not to answer	6

Note. Percentages may not equal 100% due to rounding. Percentages were not reported for

cultural background and race as some participants identified with multiple options. *Participants were asked where they would put themselves on the socioeconomic ladder with options ranging from 1 to 10.

Materials and Procedure

I used the same measures and procedure as described in Study 3a, with the exception that participants completed the shortened 20-item version of the financial anxiety scale (see Table 16). Additionally, I re-recruited a subset of 200 participants from the Secondary Cross-Validation sample three and a half weeks (i.e., 24 days) after the initial assessment to assess test-retest reliability of the scale (DeVellis & Thorpe, 2022). The average completion speed was 9.32 minutes (SD = 3.75)¹³ at Time 1 and 6.89 minutes (SD = 3.13)¹⁴ at Time 2. This faster completion speed can be attributed to the removal of the short answer question (i.e., a bot detection question). Given that I assessed the humanness of participants' text entry responses with the short answer question at Time 1, and I sent the survey invitations directly to these same participants, I removed this question at Time 2 to mitigate survey fatigue.

¹³ To provide a more accurate representation of the average completion speed, I excluded participants ($n = 9$) who completed the survey more than three standard deviations above the average completion time from this computation.

¹⁴ I excluded six participants from this calculation.

Results

Preliminary Analyses

Missing Data Analysis. Not all participants completed every measure. Occasionally, some participants did not respond to an item (<1%). I performed Little's MCAR test to assess the missingness of the data. Significant results suggest some data may be missing systematically, $\chi^2(633) = 829.10, p < .001$. I conducted Separate Variance t-tests to investigate potential associations between missingness and the financial anxiety variables (Tabachnick & Fidell, 2013). Given that this analysis did not reveal any statistically significant relations of concern, I deleted missing cases pairwise in my analysis ($n = 4$). Some participants selected the option "Not applicable to me" (<2% per item). I coded these values as 0 and I did not estimate values to preserve participants' intentional nonresponse.

Assumption Testing. I then examined the statistical assumptions associated with a CFA. The assumption of normality was met based on inspection of the distribution of scores in histograms and acceptable standard errors of skewness and kurtosis (Hair et al., 2022; Tabachnick & Fidell, 2013). The assumption of multicollinearity was met, evidenced by all VIF values being below 10. The data was considered factorable based on significant inter-item correlations of .30 or higher for each variable, a significant chi-square value on Bartlett's test of sphericity ($p < .001$), and a value of .92 on the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Bartlett, 1954; Tabachnick & Fidell, 2013). I did not detect any univariate outliers as assessed by standardized scores exceeding ± 3.29 standard deviations. I identified and removed 18 multivariate outliers as indicated by Mahalanobis distance evaluated at $p < .001$ and X^2 (chi squared) with degrees of freedom equal to the number of variables. The final sample size for the CFA was 415.

Confirmatory Factor Analysis

I conducted the CFA using the IBM SPSS AMOS structural equation modeling software. In accordance with guidelines provided by Hu and Bentler (1999), I assessed goodness of fit based on the following six statistics: comparative fit index (CFI; $> .95$), goodness-of-fit index (GFI; $> .95$), adjusted goodness-of-fit index (AGFI; $> .80$), standardized root-mean-square residual (SRMR; $< .09$), root-mean-square error of approximation (RMSEA; $< .05$), and a nonsignificant chi-square value (CMIN/DF; < 5 ; $p > .05$).

Using maximum likelihood estimation method, the four-factor model demonstrated an excellent level of model fit. The results of the CFI (.96), AGFI (.89), SRMR (.05), and the chi-square test, $\chi^2(157) = 374.49$, $p < .001$, indicated great model fit, and the results of the GFI (.92) and RMSEA (.06) indicated moderate fit. See Figure 5 for the model diagram.

Reliability

I assessed test-retest reliability by calculating the correlation between averages on the financial anxiety scale at Time 1 and Time 2 (Buelow, 2020). A test-retest correlation of .80 or higher is sufficient evidence of reliability (Cozby & Bates, 2012). The 20-item scale demonstrated excellent stability across time evidenced by a strong positive correlation between Time 1 and Time 2 scores ($r = .89$). Additionally, the reliability of the scale was further supported by stable reliability coefficients across time points and samples. Specifically, Cronbach's alpha for the scale yielded a value of .93 at Time 1 and .94 at Time 2, which is consistent with Study 3a (i.e., $\alpha = .93$). McDonald's omega for the 20-item scale yielded a value of .93, 95%CI [.91, .94] at Time 1 and .93, 95%CI [.91, .95] at Time 2, which is also consistent with Study 3a (i.e., .92, 95%CI [.91, .94]). See Table 18 for a summary of the reliability coefficients across samples and timepoints.

Further, all factors were significantly and moderately correlated with at least two other factors (see Table 19). These correlations provide support for combining these four factors into a single FAFES score. See Table 19 for the correlation matrix and the descriptive statistics for the average scores of the four FAFES subscales.

Table 18

Summary of Reliability Coefficients Across Samples and Timepoints

Coefficient	Sample	Total Scale	Factor			
			Feelings Personal	Feelings General	Engage Personal	Engage General
Alpha (α)	Primary	.93	.91	.92	.92	.91
	Secondary T1	.93	.92	.91	.91	.90
	Secondary T2	.94	.93	.91	.92	.91
Omega (Ω)	Primary	.92 [.91, .94]	.92 [.90, .93]	.92 [.91, .94]	.92 [.90, .93]	.90 [.88, .92]
	Secondary T1	.93 [.91, .94]	.92 [.91, .93]	.91 [.89, .92]	.91 [.90, .93]	.90 [.88, .91]
	Secondary T2	.93 [.91, .95]	.93 [.91, .95]	.91 [.87, .93]	.92 [.90, .94]	.91 [.89, .93]

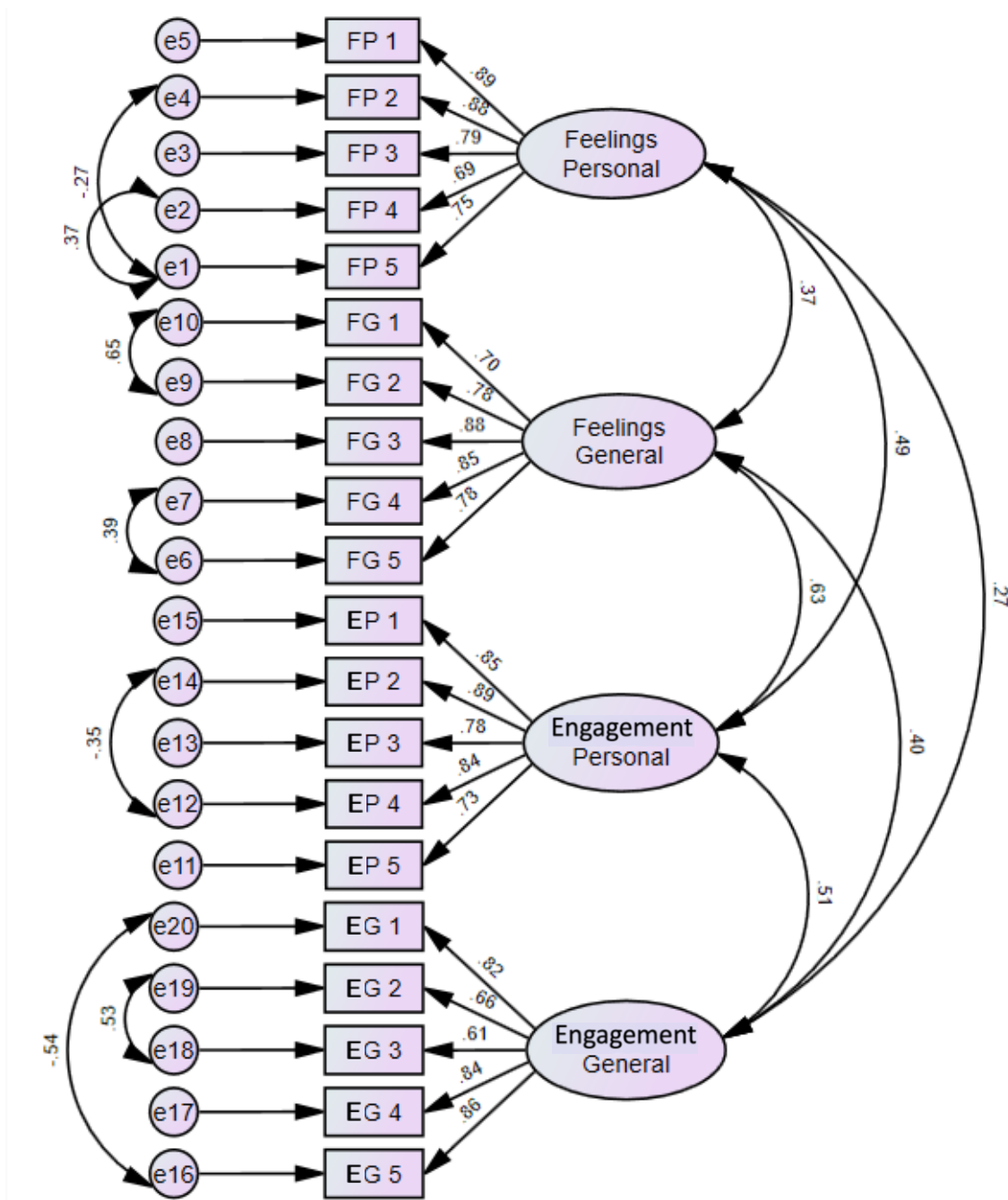
Note. Confidence interval for omega is 95%. T1 = Time 1, T2 = Time 2. Engage = Engagement.

Table 19

Correlation Matrix and Descriptive Statistics for the Average Score of the Four FAFES Subscales and Total Scale

Subscales	# of items	Mean (SD)		Correlation Matrix							
				1		2		3		4	
Time Point	–	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
Feelings Personal	5	2.7 (.81)	2.6 (.86)	–	–						
Feelings General	5	2.0 (.75)	2.0 (.76)	.36	.41	–	–				
Engage Personal	5	2.3 (.78)	2.3 (.81)	.45	.50	.62	.58	–	–		
Engage General	5	2.6 (.70)	2.6 (.72)	.28	.37	.44	.39	.53	.51	–	–
Total	20	2.4 (.58)	2.4 (.61)	–	–	–	–	–	–	–	–

Note. Scores range from 0 to 4. Correlation matrix: 1 = Feelings Personal, 2 = Feelings General, 3 = Engagement Personal, 4 = Engagement General. All correlations were significant at $p < .01$.

Figure 5*Four-Factor Financial Anxiety Scale Model*

Note. Diagram illustrating the confirmatory factor analysis model. Reported estimates are standardized. Circles represent latent variables, rectangles represent observed variables, and 'e' variables represent measurement errors associated with the observed variables. Single-headed

arrows represent the strength of correlation between variables, while double-headed arrows represent the strength of correlation between covariant variables.

Discussion

In Study 3b, I replicated the psychometric examination of the FAFES in a new sample. The CFA confirmed an excellent model fit for a four-factor structure. Each of the four factors demonstrated excellent internal consistency and were interrelated. The FAFES was stable over time, evidenced by a strong positive correlation between scores obtained 24 days apart. Taken together, these findings further support the validity and reliability of the FAFES. Detailed discussions of the results from Studies 3a and 3b are provided below.

General Discussion

The purpose of Study 3 was to develop a theoretically driven operational definition of financial anxiety. I achieved this by first creating a conceptual definition of financial anxiety informed by the results of the scoping review conducted in Study 2. Establishing a strong conceptual understanding of financial anxiety prior to developing the scale was imperative, as conceptual definitions have been described as “the causal force behind all measures” (Wacker, 2004, p. 634). This new measure addresses limitations in existing financial anxiety scales, which focus narrowly on personal finances and omit behavioural indicators of anxiety. Through two separate samples, I found initial evidence that the Financial Anxiety Feelings and Engagement Scale (FAFES) is an internally consistent measure comprising four interrelated subconstructs: Feelings towards Personal Finances, Physiological Feelings towards Financial Concepts, Disengagement with Personal Finances, and Engagement with Financial Concepts. The evidence from Study 3 suggests that the FAFES is a promising research tool, calling for further psychometric validation to ensure its widespread applicability.

Providing a Theoretical Framework for Financial Anxiety

The results of our structural analyses of the FAFES contribute to both understanding this measure's properties and the theoretical framework of financial anxiety as a construct. Prior to this study, there was no clear theoretical framework for financial anxiety, with terms like financial anxiety, financial stress, and financial worry often conflated (e.g., Archuleta et al., 2013a; Doehring, 2018; Grable et al., 2015; Grable et al., 2014; Medyanik, 2020; Tran et al., 2018). By providing distinct definitions for these constructs, this research enables researchers to come to a shared understanding of their meanings, facilitating the synthesis and comparison of results across studies. Such alignment is essential for identifying trends and making informed conclusions about how these constructs relate to outcomes such as financial well-being. Indeed, the lack of a clear framework has previously hindered progress in understanding the broader causes and consequences of these constructs (Hill et al., 2012; Wacker, 2004; Ward, 2012). Further, the theoretical framework developed in this research has significant implications beyond the field of psychology. Financial anxiety intersects with various disciplines, including economics and education, suggesting that the contributions of this research can enhance understanding across multiple fields. By providing a clear theoretical foundation, this study supports cross-disciplinary applications and encourages a more comprehensive approach to studying financial anxiety.

My hypothesis on the structure of the scale (H6) was partially supported. Based on the results of my scoping review, I predicted that the scale would be structured with three subconstructs: (1) demands, (2) feelings, and (3) engagement, with the feelings and engagement components further divided into personal finances and general financial information (see Figure 3). The resulting model largely aligned with this prediction, apart from the demands and

resources component (i.e., financial stress). The EFA conducted in Study 3a revealed that financial stress did not fit well with other subconstructs of financial anxiety. This misalignment became clear when evaluating individual items, as many items designed to measure financial stress had to be removed because they did not meet statistical criteria (e.g., related to item-scale correlations, item standard deviation, variance, etc.). The remaining financial stress items that were included in the EFA either showed weak loadings or did not align theoretically in conjunction with the overall scale.

Several factors could explain this outcome. First, the sample size may have been too small to adequately capture the variance in financial stress. A larger sample might reveal a wider range of financial stress experiences, providing a more accurate assessment of how this component fits with other subconstructs of financial anxiety. However, the sample size is likely not the issue, as both samples combined comprised nearly 800 participants, which is considered sufficient for these analyses (Gagné & Hancock, 2006; Kline, 2016; Tabachnick & Fidell, 2013; White, 2022). A more likely explanation is that financial stress may not be normally distributed within the sampled population. If most participants experience similar levels of financial stress, the lack of variation could lead to a poor fit in the model (Tabachnick & Fidell, 2013). A third possibility is that the items intended to measure financial stress were not well-constructed. If these items did not accurately reflect the construct of financial stress, they would fail to align with the theoretical framework (DeVellis & Thorpe, 2022). This could point to a need to revise the items to better capture financial stress. Finally, financial stress could represent a distinct construct from financial anxiety. If financial stress is fundamentally different from financial anxiety, it would make sense that it did not fit well with the other subconstructs (DeVellis & Thorpe, 2022). This distinction would require recognizing financial stress as a separate entity

that warrants its own theoretical and measurement considerations. These reflections suggest that further investigation is needed to understand the relation between financial stress and financial anxiety.

Expanding Financial Anxiety Measurement

The FAFES improves upon existing financial anxiety measures by including both general anxiety towards finances and behavioural indicators of financial anxiety. Specifically, this measure includes items that assess physiological feelings towards financial concepts in general, separate from one's personal financial situation, and behavioural indicators of disengagement from personal finances and engagement with financial concepts. The inclusion of engagement behaviours is particularly relevant for anxious dispositions (Daker et al., 2023; Hofmann & Hay, 2018). The 'feelings' component captures the emotional aspect of financial anxiety, reflecting the person's internal state and subjective experiences related to finances. In contrast, the 'engagement' component highlights behavioural patterns, such as how people engage or disengage with financial information. These behaviours are crucial for identifying people experiencing financial anxiety, as they reflect coping mechanisms or avoidance strategies related to anxiety (Aupperle & Martin, 2010; Hofmann & Hay, 2018).

Researchers can use the FAFES to examine more dimensions of financial anxiety than were previously available. None of the financial anxiety measures included in the scoping review (Study 2) examined anxiety beyond a person's personal financial situation (e.g., Archuleta et al., 2013a; Shapiro & Burchell, 2012). Yet, how someone feels about their personal finances is not the same as how they feel about financial information in general. For instance, some people may feel confident managing their own budget but experience anxiety when confronted with economic policies or financial market trends that could impact the broader economy. Existing

measures do not account for this distinction. By incorporating both emotional and behavioural dimensions, the FAFES offers a more comprehensive understanding of financial anxiety. This dual approach enhances our ability to identify and support people experiencing financial anxiety, ultimately contributing to more effective interventions and policies.

Implications for Research and Policy

There is a broader impact of better understanding and measuring financial anxiety given its link to financial literacy. Indeed, financial literacy levels have been low in Canada for decades (OECD, 2016, 2020), but traditional intervention strategies have been largely unsuccessful in raising financial literacy to acceptable standards (Fernandes et al., 2014; Willis, 2021). This failure has prompted researchers to investigate other factors that may influence financial literacy, such as emotional factors like financial anxiety and financial stress (e.g., Estelami & Estelami, 2023; Skagerlund et al., 2018). A shared understanding of these constructs is crucial not only for clarifying their relations with financial literacy but also because it directly impacts policymaking. Policymakers rely on academic literature to guide the design and implementation of initiatives aimed at increasing financial literacy and promoting financial resilience. Misinterpretations of these constructs can lead to misdirected interventions that fail to address the root issues effectively. The findings from the present work suggest that policies targeting financial stress would be adept to address structural barriers, such as access to affordable housing, healthcare, and education, to alleviate the objective demands of financial stress. Conversely, policies aimed at reducing financial anxiety may be better positioned for implementation in educational settings. Policymakers and educators might use the findings to develop interventions and educational programs to increase financial literacy by targeting the effects of financial anxiety.

Limitations

A major strength of this work lies in the use of two distinct samples to gather validity evidence of the FAFES. However, it is important to note that both samples were drawn exclusively from Canadian residents, comprised predominantly of White people with relatively higher socioeconomic status. Future research should prioritize cross-cultural investigations to gather validity evidence of the FAFES in populations with varied socioeconomic backgrounds (Henrich et al., 2010; Morgado et al., 2017; Pollet & Saxton, 2019; Rad et al., 2018). Another notable strength of this study was the collection of longitudinal data to evaluate the test-retest reliability of the scale. However, retesting occurred approximately three to four weeks after the initial assessment. While I have no grounds to suspect instability in scores over longer periods, this aspect was not explicitly tested. Therefore, future investigations should extend the interval between initial assessment and retest to establish the stability and predictive validity of the FAFES over more extended periods of time.

Conclusion

In Study 3, I developed the Financial Anxiety Feelings and Engagement Scale (FAFES), a comprehensive and theoretically grounded tool that addresses the limitations of existing financial anxiety measures by incorporating both emotional and behavioural dimensions and assessing anxiety beyond personal finances. While the findings suggest that the FAFES is a reliable measure, further validation across diverse populations is necessary. The impact of this work lies in its provision of a theoretical framework for financial anxiety that was previously absent in the literature. This study not only enhances the conceptual understanding of financial anxiety but also supports interdisciplinary research and policy development aimed at improving financial literacy and resilience.

Chapter 5: Replication of Study 1 Using the FAFES to Measure Financial Anxiety

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Study 4 Replicating Relations Between Financial Anxiety and Financial Literacy

Financial literacy is a vital life skill necessary for making informed financial decisions and achieving long-term financial well-being. Despite its importance, many Canadian adults are not considered financially literate (OECD, 2016, 2020). Traditional educational interventions, which often focus on enhancing financial knowledge, have largely failed to create lasting change in financial behaviours (Barrafrem et al., 2020; Carpena et al., 2019; Sharif et al., 2020; Willis, 2021). This challenge has led researchers to explore alternative explanations and solutions. One promising avenue is the investigation of individual differences, such as cognitive and emotional factors, which may influence a person's level of financial literacy (Estelami & Estelami, 2023; Fernandes et al., 2014; Skagerlund et al., 2018). Understanding these individual differences could provide valuable insights into why conventional interventions have failed and offer new strategies to enhance financial literacy. By tailoring educational approaches to address these individual factors, it may be possible to develop more effective interventions that can better meet people's diverse needs and ultimately improve financial well-being across the nation.

This work builds on the contributions of Skagerlund et al. (2018) who found evidence to suggest people higher in financial anxiety may be less financially literate compared to people lower in financial anxiety. However, in their study, they measured only financial knowledge, failing to assess the other components that comprise financial literacy (confidence, attitudes, and behaviour). This limitation is significant as drawing conclusions about overall financial literacy requires evaluating all of its components. Especially important is the assessment of financial behaviour, given that I consider behaviour the driving factor linking financial literacy to financial well-being. Indeed, financial literacy is not an end goal in itself; rather, it is a means of achieving financial well-being (FCAC, 2020). As such, in Study 1, I extended Skagerlund et al.'s (2018)

work by assessing the relations between financial anxiety and all four subconstructs of financial literacy. The results of Study 1 demonstrated that financial anxiety was negatively related to most components of financial literacy (apart from financial attitudes). These findings suggested financial anxiety could be an important factor in relation to financial literacy that may warrant the investigation of targeted educational strategies to improve financial literacy.

Before such interventions can be created, however, a more comprehensive understanding of financial anxiety was needed. This led me to conduct a scoping review of the literature on financial anxiety to determine how researchers define and measure financial anxiety and related terms (i.e., financial stress and financial worry). The review revealed significant overlap in the conceptualization and measurement of financial anxiety and financial stress, highlighting the need for distinct and consistent definitions. To address this need, I developed a novel scale of financial anxiety that is rooted in a theoretical understanding of the construct, which was lacking in previous measures. Using this new scale, I felt it prudent to conduct a replication of Study 1 to determine whether financial anxiety continues to represent an important construct in relation to financial literacy when using a theoretically driven measure of financial anxiety.

The Present Study

In Study 4, I replicate Study 1 using the financial anxiety measure (the FAFES) developed in Study 3. This study not only serves to replicate my first study but also contributes to the growing validity evidence for the FAFES. Importantly, in this study, I control for financial stress, which was not accounted for in Study 1. This decision was based on the results from Study 3, which indicated that financial anxiety and financial stress may be distinct constructs. Further, this study aligns with the external phase of construct validation by situating the

construct of financial anxiety in a broader context through convergent/discriminant validity and predictive analyses (Flake et al., 2017).

Objectives and Hypotheses

The objective of Study 4 is to determine whether the relations identified in Study 1 between financial anxiety and the subconstructs of financial literacy (financial knowledge, confidence, attitudes, and behaviour) remain consistent when using the FAFES to measure financial anxiety. Based on my findings from Study 1, I expect financial anxiety to be negatively related to financial knowledge (H7), financial confidence (H8), and financial behaviour (H10). Though I did not find a relation between financial anxiety and financial attitudes in Study 1, with the use of a more theoretically driven tool to capture financial anxiety, I expect these factors to be related (H9).

Methods

Participants

I recruited 351 Canadian residents using Prolific. I conducted an a priori power analysis using G*Power version 3.1.9.6 to determine the minimum sample size required to test my hypotheses (Faul et al., 2007). The results indicated that the required sample size to achieve 99% power for detecting a small effect (0.10), at a significance criterion of $\alpha = .01$, was $N = 279$ for linear multiple regressions with a fixed model detecting the R^2 increase. I collected a sample of 351 to account for possible data attrition and ensure an adequate sample size. Participants received £3.50 (approximately \$6.10 CAD) for their participation. Only participants with an approval rate of 90 to 100 and who indicated English fluency on Prolific were eligible to participate. See Appendix Z for the ethics certificate for Study 4.

I excluded 43 people from the sample based on incorrect responses to the comprehension questions ($n = 3$), evidence of inattention based on Longstring analysis ($n = 2$), missing more than 40% of data from one or more measures ($n = 3$), and a lack of Canadian residency ($n = 3$). I removed participants who did not identify as male or female ($n = 6$), or who did not disclose their education ($n = 4$) or income bracket ($n = 19$), and who did not complete the measures of general anxiety ($n = 7$) or financial stress ($n = 3$), as all analyses control for binary (man or woman) gender identification, education, income, general anxiety, and financial stress.

The final sample consists of 301 participants ($n = 153$ women, $n = 148$ men) between 18 to 78 years old ($M = 33.71$, $SD = 11.61$). Participants reported a range of educational experience: had not completed high school (1.3%), high school diploma (19.6%), college diploma (14.3%), Bachelor's degree (44.5%), Master's degree (16.9%), or Doctoral degree (3.3%). Just over half of participants reported an annual gross income above \$75,000 (52.1%).

Procedure

Each participant began the online survey by answering two comprehension items (e.g., “If you were to arrange the following movies into alphabetical order, which movie title would come last?”). Participants only gained admittance to the survey if they answered both items correctly (see Appendix D for details on bot detection methods). After granting their consent to participate in the survey, participants then answered demographic items, followed by measures of anxiety in a randomized order, then measures of financial knowledge, confidence, attitudes, and behaviour in a randomized order, followed by financial stress. Lastly, participants completed a math assessment. The average completion time was 24.22 minutes ($SD = 9.44$).¹⁵

¹⁵ To provide a more accurate representation of the average completion speed, I excluded participants ($n = 5$) who completed the survey more than three standard deviations above the average completion time from this computation.

Materials

I used the same measurement instruments as in Study 1 (see Methods section in Study 1), but also administered the Financial Anxiety Feelings and Engagement Scale (FAFES) developed in Study 3, and a financial stress scale.

Financial anxiety. I measured financial anxiety using the Financial Anxiety Feelings and Engagement Scale (FAFES). The FAFES consists of 20 items divided into four subscales: Feelings towards Personal Finances, Physiological Feelings towards Financial Concepts, Disengagement with Personal Finances, and Engagement with Financial Concepts. Participants answered items on a four-point Likert scale ranging from *Strongly Disagree* (1) to *Strongly Agree* (4), including the option “Not applicable to me.” The Feelings towards Personal Finances subscale includes items such as “I feel like I am struggling to make ends meet.” The Physiological Feelings towards Financial Concepts subscale measures physical reactions to financial concepts with items like “I can feel my heart race when I think about financial concepts.” The Disengagement with Personal Finances subscale includes statements such as “I put off handling my finances for as long as possible,” while the Engagement with Financial Concepts subscale features predominantly positively worded items such as “I actively seek out ways to improve my understanding of new financial concepts” (reverse-coded). This comprehensive measure captures both affective (i.e., feelings) and behavioural (i.e., engagement) dimensions of financial anxiety. Cronbach’s alpha for the current sample was .92.

Financial stress. I measured financial stress using a seven-item scale that inquired about financial difficulties participants experienced over the past six months due to lack of money (Siahpush, Spittal, et al., 2007). Participants indicated whether they had experienced situations such as inability to pay their mortgage or rent on time or seeking assistance from a welfare or

community organization. Each item was presented as a binary response (yes/no), with affirmative responses indicating the presence of financial stress. The total financial stress score was calculated by summing the number of affirmative responses, resulting in a score ranging from 0 to 7, with higher scores indicating greater financial stress. Cronbach's alpha for the current sample was .71.

Results

I conducted all analyses using IBM SPSS Statistics for Macintosh Version 28.0 (IMB, 2021). See Table 20 for the zero-order correlations and the descriptive information for all continuous variables in Study 4.

Table 20*Correlations and Descriptive Statistics for All Continuous Variables in Study 4*

Variable	1	2	3	4	5	6	7	8	9	10
1. Age	—	.186**	-.041	-.188**	-.198**	-.122*	.320**	.173**	0.083	.175**
2. Income		—	.190**	-.332**	-.259**	-.339**	.340**	.213**	.193**	.444**
3. Numeracy			—	-.233**	-.183**	-.263**	.410**	.258**	0.053	.290**
4. Financial Stress				—	.309**	.486**	-.305**	-.169**	-.159**	-.559**
5. General Anxiety					—	.521**	-.302**	-.299**	-.115*	-.386**
6. Financial Anxiety						—	-.539**	-.648**	-.374**	-.665**
7. Financial Knowledge							—	.600**	.135*	.452**
8. Financial Confidence								—	.247**	.447**
9. Financial Attitudes									—	.400**
10. Financial Behaviour										—
N per measure	301	301	301	301	301	297	299	301	301	297
Mean	33.71	4.36	7.38	1.04	46.08	46.97	13.06	3.90	9.58	49.88
SD	11.61	1.06	2.10	1.46	11.58	11.82	4.03	1.35	2.75	12.47
Minimum Score	18	1	2	0	21	14	1	1	3	22
Maximum Score	78	6	11	7	78	80	20	7	15	74
Possible Range	18+	1 – 6	0 – 11	0 – 7	20 – 80	20 – 80	0 – 20	0 – 7	3 – 15	15 – 75

Note. Income is measured from 1 (<\$15,000) to 6 (>\$100,000). * $p < .05$. ** $p < .01$.

Preliminary Analyses

Missing Data Analysis

Some participants did not respond to an item in a scale (<0.5%). I performed Little's MCAR test to assess the missingness of the data. Significant results suggest some data may be missing systematically, $\chi^2 (1741) = 1921.68, p < .001$. I conducted Separate Variance t-tests to investigate potential associations between missingness and the dependent variables (Tabachnick & Fidell, 2013). This analysis revealed statistically significant relations between education, income, and a few items from the financial behaviour scale. However, given that there was less than 0.5% missing data, it is unlikely that these missingness patterns will impact the analyses performed with the present dataset. As such, I deleted missing cases pairwise in my analysis. Additionally, some participants selected the option "Not applicable to me" (<2.5% per item for the FAFES and <12% per item for the FMBS). Rather than estimating values for these items, I omitted these responses from the average calculations for both the FAFES and the FMBS to respect the participants' intentional nonresponse. Given that not all participants completed every measure, I noted the sample size for each analysis.

Assumption Testing

I first determined that my data met the assumptions necessary to perform multiple regression analyses. For relations to financial knowledge, there was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.928. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no leverage values greater than 0.2 or values for

Cook's distance above 1. The assumption of normality was met, as assessed by a Q-Q Plot.

There were no outliers as assessed by studentized deleted residuals greater than ± 3.29 standard deviations (Tabachnick & Fidell, 2013). Based on these results, I proceeded with the first analysis.

Main Analyses

I conducted a series of multiple regression analyses to determine whether financial anxiety relates to the four components of financial literacy (i.e., financial knowledge, confidence, attitudes, and behaviour). For each regression, Model 1 included variables known to be related to financial literacy (i.e., age, gender, education, income, numeracy, and financial stress) and Model 2 included general anxiety (as a control) and financial anxiety.¹⁶ The dependent variables for the regressions were performance on the financial knowledge scale (1), and scores on the measures of financial attitudes (2), financial confidence (3), and financial behaviour (4).

Relations to Financial Knowledge

I conducted a multiple regression to determine whether financial anxiety relates to financial knowledge (see Table 21). Note that, in Study 1, I categorized financial knowledge items as either conceptual or mathematical and conducted separate regressions for each category. However, given that math anxiety is not the focus of Study 4, I excluded it from the current models and combined all financial knowledge items into a single total score. For the results of a direct replication of Study 1, please refer to Appendix AA (Tables AA5 to AA8).¹⁷

¹⁶ Note that these results replicate even when financial stress is not included in Model 1. Please see Appendix AA Tables AA1 to AA4 for these supplementary analyses.

¹⁷ Consistent with Study 1, math anxiety was not related to conceptual financial knowledge or financial confidence. Counter to Study 1, math anxiety was not related to mathematical financial knowledge or financial attitudes, but was related to financial behaviour.

In support of my hypothesis (H7), financial anxiety was negatively related to financial knowledge, whereby people higher in financial anxiety obtained lower scores on the FKS, $\beta = -.364, p < .001$. The full model (Model 2), which included age, gender, education, income, numeracy, and financial stress, as well as general and financial anxiety, significantly related to performance on the FKS, $F(8, 286) = 37.376, p < .001$, adjusted $R^2 = .497$. This indicates that, above and beyond the variance explained by variables known to be related to financial literacy in Model 1 (adjusted $R^2 = .426$), Model 2 accounted for an additional 7.4% of the variance in financial knowledge. See Table 21 for all regression coefficients, standard errors, and confidence intervals.

Relations to Financial Confidence

I conducted another multiple regression to determine whether financial anxiety relates to financial confidence (see Table 22). The data met all assumptions.¹⁸ In support of my hypothesis (H8), financial anxiety was negatively related to financial confidence, whereby people higher in financial anxiety were less confident in their financial knowledge, $\beta = -.695, p < .001$. The full model (Model 2) was significantly related to financial confidence, $F(8, 288) = 35.427, p < .001$, adjusted $R^2 = .482$. The addition of anxiety to the model accounted for an additional 28.8% of the variance in a person's financial confidence compared to Model 1 (adjusted $R^2 = .191$).

Relations to Financial Attitudes

I then conducted a multiple regression to determine whether financial anxiety relates to financial attitudes (see Table 23). I removed one participant flagged as an outlier (i.e., studentized deleted residuals greater than -3.29 standard deviations). The data met all other assumptions.¹⁹ In support of my hypothesis (H9), financial anxiety was negatively related to

¹⁸ Durbin-Watson statistic of 2.163.

¹⁹ Durbin-Watson statistic of 2.071.

financial attitudes, whereby people higher in financial anxiety were less likely to favour the long-term regarding their money, $\beta = -.504$, $p < .001$. The full model (Model 2) was significantly related to financial attitudes, $F(8, 287) = 9.164$, $p < .001$, adjusted $R^2 = .181$. The addition of anxiety to the model accounted for an additional 14.6% of the variance in financial attitudes compared to Model 1 (adjusted $R^2 = .038$).

Relations to Financial Behaviour

I conducted a final multiple regression to determine whether financial anxiety relates to financial behaviour (see Table 24). The data met all assumptions.²⁰ In support of my hypothesis (H10), financial anxiety was negatively related to financial behaviour, whereby people higher in financial anxiety were less likely to report engaging in ideal financial behaviours, $\beta = -.448$, $p < .001$. The full model (Model 2) was significantly related to financial behaviour, $F(8, 284) = 44.132$, $p < .001$, adjusted $R^2 = .542$. The addition of anxiety to the model accounted for an additional 13.0% of the variance in financial behaviour compared to Model 1 (adjusted $R^2 = .413$).

²⁰ Durbin-Watson statistic of 1.963.

Table 21*Multiple Regression Assessing Factors Related to Financial Knowledge*

Variable	Financial Knowledge											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.339	0.064		0.214	0.464	<.001	0.551	0.077		0.398	0.703	<.001
Age	0.005	0.001	0.272	0.003	0.006	<.001	0.005	0.001	0.272	0.003	0.006	<.001
Gender	-0.120	0.019	-0.299	-0.157	-0.084	<.001	-0.091	0.018	-0.226	-0.127	-0.055	<.001
Education	0.023	0.009	0.129	0.006	0.041	0.008	0.023	0.008	0.125	0.006	0.039	0.007
Income	0.020	0.006	0.161	0.008	0.032	0.001	0.013	0.006	0.104	0.002	0.025	0.025
Numeracy	0.271	0.051	0.258	0.170	0.372	<.001	0.251	0.048	0.238	0.156	0.345	<.001
Financial Stress	-0.137	0.049	-0.136	-0.233	-0.040	0.006	-0.012	0.050	-0.012	-0.111	0.087	0.816
General Anxiety							0.129	0.070	0.092	-0.008	0.267	0.065
Financial Anxiety							-0.506	0.078	-0.364	-0.659	-0.353	<.001
R^2	.426						.497					
ΔR^2	.426						.074					
F	37.33					<.001	37.38					<.001

Note. *N* = 295; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted *R*² change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table 22*Multiple Regression Assessing Factors Related to Financial Confidence*

Variable	Financial Confidence											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	3.169	0.506		2.172	4.166	<.001	6.393	0.526		5.357	7.428	<.001
Age	0.018	0.006	0.151	0.005	0.030	0.006	0.016	0.005	0.142	0.006	0.027	0.001
Gender	-0.794	0.147	-0.294	-1.085	-0.504	<.001	-0.398	0.123	-0.148	-0.640	-0.156	0.001
Education	0.086	0.070	0.071	-0.052	0.223	0.221	0.069	0.056	0.057	-0.042	0.180	0.222
Income	0.092	0.048	0.108	-0.003	0.187	0.058	-0.008	0.040	-0.009	-0.085	0.070	0.847
Numeracy	1.034	0.406	0.147	0.236	1.833	0.011	0.739	0.326	0.105	0.099	1.380	0.024
Financial Stress	-0.484	0.390	-0.071	-1.251	0.282	0.215	1.270	0.342	0.187	0.597	1.942	<.001
General Anxiety							0.834	0.471	0.089	-0.093	1.762	0.078
Financial Anxiety							-6.434	0.519	-0.695	-7.456	-5.413	<.001
R^2												
ΔR^2												
F												

Note. $N = 297$; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table 23*Multiple Regression Assessing Factors Related to Financial Attitudes*

Variable	Financial Attitudes											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.481	0.074		0.334	0.627	<.001	0.759	0.089		0.584	0.935	<.001
Age	0.000	0.001	0.028	-0.001	0.002	0.639	0.000	0.001	0.025	-0.001	0.002	0.649
Gender	0.029	0.022	0.081	-0.013	0.072	0.178	0.064	0.021	0.177	0.023	0.105	0.002
Education	0.004	0.010	0.024	-0.016	0.024	0.698	0.003	0.010	0.021	-0.015	0.022	0.721
Income	0.018	0.007	0.157	0.004	0.032	0.012	0.009	0.007	0.079	-0.004	0.022	0.178
Numeracy	0.027	0.060	0.029	-0.090	0.145	0.646	0.000	0.055	0.000	-0.109	0.108	0.995
Financial Stress	-0.080	0.057	-0.087	-0.192	0.033	0.165	0.083	0.058	0.091	-0.031	0.197	0.153
General Anxiety							0.140	0.080	0.111	-0.017	0.297	0.080
Financial Anxiety							-0.630	0.088	-0.504	-0.803	-0.456	<.001
R^2	.038						.181					
ΔR^2	.038						.146					
F	2.95					.008	9.16					<.001

Note. $N = 296$; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table 24*Multiple Regression Assessing Factors Related to Financial Behaviour*

Variable	Financial Behaviour											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.561	0.052		0.458	0.664	<.001	0.850	0.060		0.731	0.969	<.001
Age	0.001	0.001	0.044	-0.001	0.002	0.349	0.000	0.001	0.033	-0.001	0.002	0.430
Gender	-0.043	0.015	-0.131	-0.073	-0.013	0.006	-0.009	0.014	-0.028	-0.037	0.018	0.510
Education	0.013	0.007	0.090	-0.001	0.028	0.072	0.011	0.007	0.072	-0.002	0.024	0.104
Income	0.026	0.005	0.251	0.016	0.036	<.001	0.017	0.005	0.168	0.008	0.026	<.001
Numeracy	0.080	0.042	0.093	-0.004	0.163	0.060	0.055	0.037	0.064	-0.019	0.128	0.143
Financial Stress	-0.343	0.040	-0.420	-0.423	-0.264	<.001	-0.198	0.039	-0.243	-0.275	-0.122	<.001
General Anxiety							0.008	0.054	0.007	-0.099	0.114	0.887
Financial Anxiety							-0.500	0.059	-0.448	-0.616	-0.383	<.001
R^2	.413						.542					
ΔR^2	.413						.130					
F	35.19					<.001	41.26					<.001

Note. $N = 293$; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Discussion

The purpose of Study 4 was to gather more evidence to support (or disconfirm) the relations established between financial anxiety and financial literacy in Study 1. Replicating findings is crucial in the psychological sciences, as it serves as a critical test of objectivity (Lamal, 1990). To achieve this, I conducted a conceptual replication of Study 1, modifying the methods slightly by using my newly developed measure of financial anxiety (i.e., the FAFES) and by adding financial stress and removing math anxiety from the models. These modifications aimed to provide valuable insights into the boundaries of the relation between financial anxiety and financial literacy (Laws, 2016; Neuliep & Crandall, 1993).

Consistent with previous work by Skagerlund et al. (2018), my findings revealed that people with higher financial anxiety tend to score lower on assessments of financial knowledge. I extended this work by moving beyond relations to financial knowledge. I used a more nuanced approach to measure financial literacy, assessing its relation to financial confidence, attitudes, and behaviour. Additionally, I controlled for factors known to be related to financial literacy, including age, gender, education, income, and numeracy (de Bassa Scheresberg, 2013; Finke et al., 2017; Lusardi & Mitchell, 2012, 2014; Lusardi & Tufano, 2015). Importantly, this study also accounted for financial stress (conceptualized as an ability to meet financial demands; Siahpush, Yong, et al., 2009) which was not considered in Study 1. The results of Study 4 indicate that people higher in financial anxiety are less financially literate compared to those with less financial anxiety, evidenced by negative relations between financial anxiety and all four subconstructs of financial literacy. The evidence from this study supports the conclusions drawn in Study 1, reinforcing the notion that financial anxiety plays a more significant role in financial literacy than previously recognized. These results contribute to the growing body of evidence

indicating that financial anxiety could be a promising target for interventions aimed at improving financial literacy.

Contribution to Validity Evidence of the FAFES

This study not only provides support for the relation between financial anxiety and financial literacy established in Study 1, but also adds to the validity evidence of the FAFES, which has now demonstrated excellent internal validity across three separate samples (Studies 3a, 3b, and 4). With any newly developed measure, it is essential to gather additional evidence to support its validity (DeVellis & Thorpe, 2022). In this context, the replication of my findings with an additional sample provides valuable information about the stability of the scale. The consistent alpha coefficients and inter-item correlations observed across the three samples indicate that the FAFES is a stable and reliable measure. The consistency of these values increases confidence that the findings did not occur by chance (DeVellis, 2017). These replication efforts contribute to a stronger foundation for its use in research and practical applications, ensuring that the measure can reliably assess financial anxiety across different groups.

Conceptualization of Financial Anxiety versus Financial Stress

One major strength of this study is its contribution to the ongoing conversation about the conceptualization of financial stress versus financial anxiety. My scoping review (Study 2) revealed significant inconsistency in how researchers define financial stress. While half conceptualized it in line with my definition, focusing on demands and resources (e.g., Blanchette, 2020; Heckman et al., 2014; Jones et al., 2022; Kim et al., 2022; Koomson et al., 2022), the other half included subjective or physiological elements in their definitions (e.g., Heo

et al., 2021; Mansor et al., 2022; Northern et al., 2010; Xiao & Kim, 2022). This inconsistency called into question the optimal way to conceptualize these constructs.

The results of this study suggest that financial anxiety and financial stress are distinct. Financial anxiety was significantly related to financial knowledge, confidence, attitudes, and behaviour, even when accounting for experiences of financial stress. Further, the correlation between financial anxiety and stress was only moderate ($r = .486$), suggesting these constructs are related, but not the same. However, it must be noted that very few participants in the present sample reported experiences of financial stress. It is notable, however, that high levels of financial anxiety were still observed among the current sample, suggesting that financial anxiety can exist independently of financial stress. This distinction is significant, as it reinforces the notion that financial stress and financial anxiety, although related, are separate constructs.

Financial Stress and its Relation to Financial Behaviour

The results of this study indicated that people experiencing financial stress are less likely to engage in financially literate behaviours, such as budgeting, timely bill payments, and saving for retirement (OECD, 2016). This relation warrants careful interpretation, necessitating an examination of the value judgments inherent in defining “financially literate” behaviours. As discussed in the introduction of this dissertation, people experiencing financial stress may face challenges in prioritizing these behaviours, even if they possess the necessary financial knowledge. The context of poverty often forces people to prioritize immediate needs over long-term financial responsibilities as a strategic adaptation to coping with limited resources and chronic stress (Mullainathan, 2013; Shafir, 2017; Shah et al., 2015). Similarly, poverty can significantly impact decision-making processes, self-control, and attention (Mullainathan &

Shafir, 2013; Shafir, 2017; Shah et al., 2012). Acknowledging these dynamics is critical when considering the complex relation between financial behaviour and financial well-being.

Limitations

This study has limitations. First, very few participants in the present sample reported experiences of financial stress. As such, the results of this study must be interpreted with caution, particularly regarding the conclusion draws about relations between financial stress and financial literacy. In this respect, these data can be considered an initial approach to understanding how these factors relate in different subsets of the population. Second, although I collected data on age, gender, education, and income, I did not include information on race or ethnicity, which could have provided additional insights into the diversity of experiences with financial anxiety. Third, while replication is an important practice for establishing validity evidence (Lamal, 1990; Laws, 2016; Neuliep & Crandall, 1993), single study replications are insufficient to establish firm evidence (Maxwell et al., 2015). As highlighted by Maxwell et al. (2015), robust conclusions require the collective effort of multiple researchers. Therefore, I encourage future studies to further investigate the relations between financial anxiety and financial literacy in populations with varied socioeconomic backgrounds to build a more comprehensive understanding of these relations.

Conclusion

Study 4 serves as a replication of Study 1, providing further evidence of the negative relations between financial anxiety and financial literacy. These results provide support for initiatives aimed at improving financial literacy by addressing financial anxiety. Moreover, the study contributed to the growing validity evidence of the FAFES in an additional sample, establishing its reliability for future research and practical applications. Furthermore, this

research provided support for the distinction between financial anxiety and financial stress as separate constructs. Future research should explore these relations across varied socioeconomic backgrounds to develop targeted strategies for enhancing financial literacy and well-being. The broader implications of this work are addressed in more detail in the General Discussion.

Chapter 6: General Discussion

General Discussion

In this dissertation, I proposed that individual differences in financial anxiety could represent the purported third variable impacting the acquisition of financial literacy (Fernandes et al., 2014; Skagerlund et al., 2018). Despite Cognitive Behavioural Theory highlighting the connection between thoughts, emotions, and behaviours (Fenn & Byrne, 2013; González-Prendes & Resko, 2012), researchers often neglect the role of emotions like anxiety in shaping financial behaviours (Friman et al., 1998). Addressing these emotional barriers is crucial for educators and policymakers to effectively support people in developing the necessary knowledge, skills, and confidence to make sound financial decisions and improve their financial well-being. Indeed, traditional interventions designed to improve financial literacy have largely failed (Fernandes et al., 2014; Willis, 2021), as they often focus on increasing knowledge and overlook individual differences that may impact financial literacy acquisition (Estelami & Estelami, 2023; Fernandes et al., 2014; Skagerlund et al., 2018). Given that many Canadian adults are not considered financially literate (OECD, 2016, 2020), it is imperative to explore alternative factors that may impact people's levels of financial literacy.

The purpose of this dissertation was to better understand how anxiety about finances relates to financial literacy. To accomplish this, I conducted three studies that addressed my ten hypotheses (see Appendix A for a summary of the hypotheses). In Study 1, I built upon previous research that suggested people higher in math and financial anxiety are less likely to be financially knowledgeable compared to less anxious people (Skagerlund et al., 2018). I extended this previous work in three important ways. First, I included all four subconstructs of financial literacy in my analyses (i.e., financial knowledge, confidence, attitudes, and behaviours). Second, I distinguished financial knowledge items confounded with numeracy from items that

are not. Third, I controlled for trait anxiety to demonstrate that any observed differences are not better explained by general anxiety. Consistent with my hypotheses, I found that people higher in financial anxiety scored lower on measures of mathematical and conceptual financial knowledge (H1a), financial confidence (H2a), and ideal financial behaviours (H4a) compared to those with lower financial anxiety. However, counter to my hypothesis, there was no relation between financial anxiety and financial attitudes (H3a). These results suggested that financial anxiety may have a greater impact on the various aspects of financial literacy than previously recognized (Skagerlund et al., 2018). This finding guided the development of Study 2.

In Study 2, I conducted a scoping review of empirical research to examine how financial anxiety, financial stress, and financial worry are conceptualized and operationalized. The review confirmed my hypothesis that financial anxiety and financial stress are frequently conflated in the literature, both conceptually and operationally (H5). This inconsistency hinders a clear empirical understanding of financial anxiety. To address this limitation, in Study 3, I developed a novel scale to measure financial anxiety that aligned with the theoretical framework of financial anxiety informed by my scoping review. An EFA identified four interrelated subconstructs within the Financial Anxiety Feelings and Engagement Scale (FAFES): Feelings towards Personal Finances, Physiological Feelings towards Financial Concepts, Disengagement with Personal Finances, Engagement with Financial Concepts. Notably, financial stress did not fit within this model as I predicted (H6). In a separate sample, a CFA confirmed the scale structure identified by the EFA. The model demonstrated robust psychometric properties, with excellent fit and test-retest reliability.

In Study 4, I used the FAFES to replicate Study 1 with a theoretically driven measure of financial anxiety while also controlling for financial stress (i.e., ability to meet basic demands).

Consistent with my hypotheses, the results demonstrated that people higher in financial anxiety scored lower on measures of financial knowledge (H7), confidence (H8), attitudes (H9), and ideal behaviours (H10) compared to people lower in financial anxiety. These findings align with Study 1, apart from the relation to financial attitudes. While I found no relation between financial anxiety and financial attitudes in Study 1, I did detect a relation in Study 4, suggesting the FAFES may be more adept at identifying these nuanced relations compared to previous measures. These findings provide evidence of the robustness of the FAFES as a measure of financial anxiety.

Implications

Empirical Understanding of Financial Anxiety

This dissertation has significantly advanced the theoretical understanding of financial anxiety. A challenge with a concept like financial anxiety arises from its application across varied disciplines like psychology, economics, and education. Cross-disciplinary work often faces challenges with inconsistent terminology, where the same terms can refer to different constructs or different terms can refer to the same constructs (Hill et al., 2012; Knapp et al., 2015; Nordgreen et al., 2021). This inconsistency undermines efforts to build cumulative theory as it could result in statistically significant relations between constructs that would not exist if each construct had its own distinct definition (Wacker, 2004; Ward, 2012). My scoping review in Study 2 identified a content validity issue, whereby researchers often conflate financial anxiety and financial stress. This result highlighted the need for a consistent theoretical understanding of financial anxiety. To address this, I provided an empirically driven conceptual definition of financial anxiety, distinguishing it clearly from related constructs like financial stress and financial worry. This distinction is crucial for future research to ensure studies are more

comparable and consistent in their definitions and measurements (Hill et al., 2012; Wacker, 2004). By providing a theoretical framework of financial anxiety that was absent in the literature, this dissertation improves the accuracy and comparability of future studies on financial anxiety, facilitating more reliable research in the field.

The results of this dissertation challenge the use of financial anxiety and financial stress synonymously. Indeed, refining the construct of financial anxiety involves not only defining what it is but also clarifying what it is not (i.e., convergent and discriminant validity; Boateng et al., 2018; Carmines, 1979). Studies 2, 3 and 4 provide evidence that financial anxiety should be considered distinct from financial stress. Of the conceptual definitions identified in the scoping review (Study 2), only two definitions of financial anxiety (Jawahar et al., 2022; Jones & Heffner, 2022) reference an inability to afford necessities. Notably, these definitions were among the least cited, suggesting this is not a viewpoint largely held by other researchers. Further, in the development of a novel measure of financial anxiety (i.e., the FAFES; Study 3a), items designed to capture financial stress were ultimately dropped from the model due to poor fit and violations of statistical assumptions (DeVellis & Thorpe, 2022). In Study 4, I controlled for financial stress in the models replicating the relations between financial anxiety and financial literacy. Indeed, financial anxiety and financial stress were only moderately correlated ($r = .49$). Taken together, these findings suggest financial anxiety is distinct from financial stress.

Empirical Understanding of Financial Literacy

This work illustrates the importance of taking a nuanced approach to measuring financial literacy. Much of our current understanding of financial literacy is based on Lusardi and Mitchell's (2008) "Big Three" financial literacy assessment. Researchers likely favour this measure over others due to its brevity. However, use of this measure poses a serious issue when

drawing broader conclusions about financial literacy. In line with my definition of financial literacy, I consider the Big Three a measure of financial knowledge (not financial literacy) as the scale does not capture the other fundamental components that comprise financial literacy (i.e., financial confidence, attitudes, and behaviours). This means that much of our understanding of financial literacy is based on studies that use financial knowledge as the basis for measuring financial literacy (Kadoya & Rahim Khan, 2020).

When researchers consider financial literacy as only knowledge, we lose nuance in our understanding of the factors that are associated with it. This might lead researchers to draw erroneous conclusions or place emphasis on factors that are not truly impacting financial behaviour, a vital component in fostering financial well-being. For instance, researchers have concluded that numeracy has strong relations to financial literacy (e.g., Schuchardt et al., 2009; Skagerlund et al., 2018). Consistent with this conclusion, I also found that numeracy was associated with financial knowledge. Importantly, however, it was not associated with financial behaviour (Studies 1 and 4). This finding has crucial implications for the development of strategies aimed at improving financial well-being. Indeed, if numeracy is unrelated to behaviour, it is likely not the best area to place our efforts when looking to increase financial well-being, as has been suggested in previous work (Skagerlund et al., 2018).

My studies provide further empirical evidence that people higher in financial anxiety are less financially literate compared to those lower in financial anxiety (Studies 1 and 4). A major strength of this research is that, before drawing any conclusions about the relations between anxiety and financial literacy, I gathered additional evidence by replicating my first study (Study 4). Taken together, this dissertation contributes to the broader conversation on the factors that

relate to financial literacy and strengthens the argument for addressing financial anxiety within financial education programs.

Implications for Education

The contributions of this work not only advance academic knowledge but also have practical implications for improving financial literacy initiatives. Both the Consumer Financial Protection Bureau (CFPB, 2017) and the OECD (2013a, 2019b) emphasize the necessity of personalized financial education programs tailored to meet people's unique needs for financial success. The results of this dissertation suggest that people who experience greater degrees of financial anxiety may represent a financially vulnerable population (Studies 1 and 4). Specifically, in Study 1, I found that higher levels of financial anxiety were associated with lower scores in financial knowledge, financial confidence, and ideal financial behaviours. Study 4 replicated these findings using the FAFES (developed in Study 3), further substantiating the negative relation between financial anxiety and financial literacy. Current educational strategies tend to ignore the affective component associated with financial literacy, focusing solely on content knowledge (e.g., Cole et al., 2016; Lusardi, 2003). Attempting a "one-size fits all" educational approach will not be successful. Rather, we must take a more targeted approach to tackling financial literacy. Policy makers and educators looking to improve financial literacy may benefit from implementing intervention strategies aimed at lessening people's financial anxiety. By refining the concept and measurement of financial anxiety, this research offers a clearer direction to guide the development of more effective financial literacy interventions.

Future Directions

Gather Validity Evidence of FAFES in Populations with Varied Socioeconomic Backgrounds

Future research should gather validity evidence for the FAFES from other North American and European populations beyond Canadian samples. Especially pertinent would be the inclusion of people from varied cultural and socioeconomic backgrounds, particularly in groups that are shown to be stronger on scarcity markers (Pollet & Saxton, 2019; Rad et al., 2018). I developed and assessed the psychometric properties of the FAFES using a predominantly white, middle-class, Canadian sample with higher household incomes. Assessing the validity evidence of the FAFES in populations with varied socioeconomic backgrounds is important because financial anxiety may manifest differently for people that are not represented by the present samples. These efforts would ultimately enhance its utility in both research and practical applications (Henrich et al., 2010; Pollet & Saxton, 2019; Rad et al., 2018). Indeed, a scale that demonstrates validity in more diverse samples can be more confidently applied by researchers to a broader range of populations, helping policymakers, educators, and mental health professionals in addressing financial anxiety more effectively. As such, future studies should include participants from various backgrounds, income levels, and geographic regions to ensure the scale's generalizability and applicability, making it a more effective tool for assessing and addressing financial anxiety across different populations (Fenn et al., 2020; Morgado et al., 2017).

Develop and Test Targeted Financial Literacy Interventions

Future research should prioritize the development of targeted interventions aimed at improving financial literacy by mitigating the effects of financial anxiety. My research provides robust empirical evidence of the link between financial anxiety and literacy across two distinct studies (Studies 1 and 4), which is consistent with the relations established by Skagerlund et al. (2018). Building upon this foundation, the next crucial step is to investigate whether a reduction

in financial anxiety correlates with improvements in the various components of financial literacy (i.e., knowledge, confidence, attitudes, and behaviours). These approaches would aim not only to impart financial knowledge and skills but also to alleviate the psychological barriers that hinder effective financial decision-making. Research efforts could further explore potential moderating factors, such as individual differences in coping mechanisms or socio-economic backgrounds, to tailor interventions for maximum effectiveness across diverse populations. Within education, it is essential to create interventions that are evidence-based (Walker, 2004). My research lays the empirical foundation necessary for developing such interventions.

Conduct Longitudinal Research

To evaluate the effectiveness of these interventions, future research should conduct longitudinal studies to track changes in financial anxiety and financial literacy over time (Piesse et al., 2009). The correlational nature of this dissertation limits my ability to draw causal inferences regarding the relation between financial anxiety and the acquisition of financial literacy (Janse et al., 2021; Schield & College, 1995). However, the implementation of longitudinal studies offers a means to examine causal relations between variables. Unlike correlational studies, which identify associations, longitudinal designs would allow researchers to explore whether changes in financial anxiety precede changes in financial literacy, or vice versa (Janse et al., 2021; Pantoja-Galicia et al., 2009; Piesse et al., 2009). This insight into causal pathways is invaluable for informing the design and implementation of interventions, as well as offering insights into the long-term effects of these interventions (Piesse et al., 2009). By tracking participants beyond the immediate post-intervention period, researchers can assess the sustainability of intervention outcomes and identify factors that contribute to their maintenance or attenuation over time. This information is crucial for guiding the development of evidence-

based interventions and informing policy decisions aimed at promoting long-term financial well-being.

Concluding Remarks

From an individual, societal, and economic perspective, enhancing financial literacy is a significant issue of our time. This dissertation has contributed significantly to the field by refining the concept and measurement of financial anxiety, providing detailed insights into its relation to financial literacy, and offering practical guidance for improving financial education programs. This work takes an important step towards understanding who is at risk of being financially illiterate by identifying relations between financial anxiety and all four subconstructs of financial literacy. This work provides a clear theoretical framework of financial anxiety, distinguishing it from related constructs like financial stress and worry, which were previously conflated in the literature. Policy makers, educators, and researchers can use this framework to design and implement strategies aimed at increasing financial literacy by targeting financial anxiety.

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Appendix A

Summary of Hypotheses

Hypothesis 1 (H1): Financial anxiety will be negatively related to mathematical and conceptual financial knowledge (H1a). Math anxiety will be negatively related to mathematical financial knowledge, but not conceptual financial knowledge (H1b).

Hypotheses 2 (H2): Both financial anxiety (H2a) and math anxiety (H2b) will be negatively related to financial confidence.

Hypothesis 3 (H3): Financial anxiety will be negatively related to financial attitudes (H3a). However, given that financial attitudes (i.e., preference for the short- or long-term) do not necessitate a mathematical skillset, I do not expect there to be a relation between math anxiety and financial attitudes (H3b).

Hypothesis 4 (H4): Both financial anxiety (H4a) and math anxiety (H4b) will be negatively related to ideal financial behaviour.

Hypothesis 5 (H5): The terms financial anxiety, financial stress, and financial worry are largely confounded in the literature.

Hypotheses 6 (H6): The financial anxiety scale will comprise three subconstructs: (1) demands and resources, (2) feelings, and (3) engagement, with the feelings and engagement components further divided into personal finances and financial information in general.

Hypothesis 7 (H7): Financial anxiety will be negatively related to financial knowledge.

Hypothesis 8 (H8): Financial anxiety will be negatively related to financial confidence.

Hypothesis 9 (H9): Financial anxiety will be negatively related to financial attitudes.

Hypothesis 10 (H10): Financial anxiety will be negatively related to ideal financial behaviours.

Appendix B

Ethics Certificate for Study 1

09/07/2020

Université d'Ottawa

Bureau d'éthique et d'intégrité de la recherche

University of Ottawa

Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number

H-06-20-5845

Titre du projet / Project Title

Understanding the factors that
contribute to financial illiteracy in
Canada

Type de projet / Project Type

Recherche de professeur /
Professor's research project

Statut du projet / Project Status

Approuvé / Approved

Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)

09/07/2020

Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)

08/07/2021

Équipe de recherche / Research Team

Chercheur / Researcher Affiliation

Erin MALONEY

École de psychologie / School of Psychology

Andie STOROZUK

École de psychologie / School of Psychology

Role

Chercheur Principal / Principal Investigator

Assistant de recherche / Research Assistant

Kim THOMPSON

Responsable d'éthique en recherche / Protocol Officer

Pour/For **Daniel LAGAREC** Président(e) du/ Chair of the **Comité d'éthique de la recherche en sciences de la santé et sciences / Health Sciences and Sciences Research Ethics Board**

Appendix C

Study 1 Participant Exclusion Procedure

I excluded a total of 192 respondents from my sample. I followed the screening procedure sequentially. As such, though many participants violated multiple filters, each n value represents a single participant. For example, if a participant provided an ineligible postal code, I did not screen them in subsequent filters, and thus they are not represented in the n values of other filters. Thirteen participants failed to successfully complete the initial comprehension questions and did not gain access to the survey and four participants did not consent to participate in the survey. I removed participants who provided an ineligible postal code address ($n = 11$) or who indicated that they were not a resident of Canada ($n = 2$). I removed participants who completed the survey twice (as evidenced by providing the same email address; $n = 6$), who completed less than 35% of the survey ($n = 3$), and who failed two or more of the three attention checks in my survey ($n = 21$) (Curran, 2016). I flagged one participant as a univariate outlier on the math anxiety scale (i.e., z -score 3 standard deviations above the mean), but I opted to retain them in the sample as I did not feel it would be appropriate to remove a participant for scoring highly in the trait I am most interested in examining. I used longstring analysis to identify participants who used the same response category, consecutively, throughout measures that require reverse scoring (i.e., the State-Trait Anxiety Inventory; Yan, 2008). I removed participants with a string of consistent responses equal to or greater than three quarters the length of the total scale ($n = 5$). Though the Financial Knowledge Scale is not a reverse-coded scale, I removed people whose response behaviour reflected inattention (i.e., selecting “Option 1” consecutively) as opposed to uncertainty of the answer (i.e., selecting “I don’t know” consecutively; $n = 2$). I removed participants who provided the same occupation (i.e., “Web

designer” and “Dog trainer”) in succession with 12 other respondents ($n = 4$).²¹ I flagged participants who provided a suspicious email address to collect compensation (i.e., followed remarkable patterns relative to other respondents in close temporal proximity) (Storozuk et al., 2020) and who provided open-ended responses that I considered nonsensical (e.g., “Won also want to overweight, winning margin into after...”) (Chmielewski & Kucker, 2020) or that appeared to be copy-and-pasted information unrelated to the question²² (e.g., “Deposits of funds flexible, low yield, but the funds are safe, can also meet your capital needs”; Storozuk et al., 2020). Of these flagged participants, I further flagged those who provided the same postal code address. I removed participants who offended at least two of these bot-indicators (i.e., suspicious email, suspicious open-ended responses, same postal code; $n = 87$). I also removed participants based solely on their suspicious open-ended responses ($n = 4$). I set an arbitrary cut-off for completion speed and removed participants who completed the survey in under 6.5 minutes ($n = 12$), as I designed the survey to take approximately 30 minutes to complete. Of the participants I retained in the sample, the fastest completion speed was 8.5 minutes. I removed participants who did not identify as male or female ($n = 1$), who did not disclose their education ($n = 2$), and who did not disclose their income bracket ($n = 15$), as all analyses control for binary (i.e., male or female) gender identification, education, and income.

²¹ Note that these respondents also provided identical postal codes, ages, and responses to the CRT-2. I had already removed the other eight offenders for failing previous screening filters.

²² The question read as follows: “The province of Ontario has recently included financial literacy as a unique strand in the math curriculum. Advocates of this change say it is important for children to learn about finances at a young age. In 2 to 3 complete sentences, briefly describe your first experience learning how to manage your finances (e.g., at school, through a family member, etc.).”

Appendix D

Study 1 Bot Prevention and Detection Methods

Prior to receiving the consent form, participants were required to answer two simple questions (I refer to as “botchas”) to demonstrate that they are human respondents.

You need to successfully answer both questions to proceed to the study. If you are unable to do so, you will not qualify for the study and will receive no compensation.

1. If you were to arrange the following movies into alphabetical order, which movie title would come **last?**

Fantasia

Mulan

Hotel Transylvania

Finding Nemo

Little Miss Sunshine

Correct response: Mulan

2. Please read the statement below and then type it in the box in reverse order. Please include any capitalizations in the words that have capital letters. Do not include any punctuation (e.g., periods, quotation marks, etc.) and make sure there is no space after the last word in the sentence. For example, if the sentence said “fun are trucks Red” you would type “Red trucks are fun”.

watermelon the on slammed door The

Correct response: The door slammed on the watermelon

napkin her folded She

Correct response: She folded her napkin

I inserted the following three questions into the survey to serve as attentional checks:

- 1) The options presented include low anxiety and high anxiety. If you are paying attention, select some anxiety. (Added to the AMAS)
- 2) Reading the instructions carefully is critical. Please select from the following options, such as False or I don’t know. If you are paying attention, please select “True.” (Added to the Financial Knowledge Scale)
- 3) I am paying attention. Select “almost always.” (Added to the STAI)

I used the following question for bot detection purposes, as nonsensical responses to short-answer questions are an indication of fraudulent respondents (Storozuk et al., 2020).

The province of Ontario has recently included financial literacy as a unique strand in the math curriculum. Advocates of this change say it is important for children to learn about finances at a young age. In 2 to 3 sentences, describe your first experience learning how to manage your finances (e.g., at school, through a family member, etc.).

Appendix E

Consent and Debriefing Forms

Cognition and Emotion Laboratory

Researcher information:

Dr. Erin Maloney, University of Ottawa, Faculty of Social Sciences, School of Psychology

Andie Storozuk, University of Ottawa, Faculty of Social Sciences, School of Psychology

Project: *Understanding the factors that contribute to financial illiteracy in Canada*

Managing money is part of daily life, but financial products and services today are more complex than ever. All Canadians need a solid foundation of financial knowledge and skills in order to live within their means and feel in control of their financial lives. Before I can effectively improve financial literacy within this country, I need to better understand why people make poor financial choices.

Your responses will allow us to better understand the factors that may contribute to financial illiteracy and, ultimately, help us understand what I can do to improve financial literacy in Canada. Your participation will consist of completing a 30-minute questionnaire in which you will be asked questions regarding demographics, mathematics, anxiety, and financial knowledge. Your data will initially be stored online using the Qualtrics server. It will then be downloaded onto a password protected USB drive that will be kept in a locked home office as well as onto a password server that is only accessible by those listed on the ethics application. The data will then be deleted from the Qualtrics server immediately. This action is irreversible and permanently removes data from the online server.

Anonymity will be assured in the following manner: The only identifying information collected will be your e-mail address. Before analyzing any data, your results will be coded and you will be assigned a participant ID that will be used to label your data and your e-mail address will be stripped from this file. The link between your e-mail address and your participant ID will be kept in a file separate from the coded data and will be kept private.

If the researchers publish the results of this study, then they may include the data in an online repository for other researchers to use. The data may also be used for student projects under the supervision of Dr. Erin Maloney. Any identifying information (e.g., postal code, email address, IP address) will never be included with your data. In order to minimize the risk of security breaches and to help ensure your confidentiality, I recommend that you use standard safety measures such as signing out of your account, closing your browser, and locking your screen or device when you have completed the study.

Participation in this study is strictly voluntary. You are free to withdraw from the project at any time (before or during the session), or to refuse to answer any questions. If you choose to withdraw before or during the session, your data will not be used in the study. Once you have submitted the questionnaire, you will not be able to withdraw your data, as it is completely anonymous.

Compensation

You will receive a \$5 Amazon gift card for your participation in this study.²³ If at any time during the session you wish to discontinue your participation, you will still receive full compensation.

Please note that there will be attention checks throughout the survey. Participants that complete the questionnaire but respond incorrectly to any of these checks will not be compensated. I will also reject payment for nonsensical or copied-and-pasted responses. This is to ensure a high quality of data and help us detect fraudulent responses.

Please be advised that temporary email addresses cannot be used to claim compensation. Should you have any questions or extenuating circumstances, please contact us at [redacted].

Any questions about your rights as a research participant may be addressed to Protocol Officer for Ethics in Research, 550 Cumberland Street, Room 154, 613-562-5387, ethics@uOttawa.ca.

If you wish to participate in this research, please indicate your agreement by checking off the “I agree” box. Please provide your email address if you wish to be compensated. If you have any questions about the conduct of the research project, you may contact the researchers.

- ☐ I agree to participate in this research.
- ☐ I do **not** agree to participate in this research.

Email address: _____

We strongly encourage you to print or save a copy of this consent page for your records.

²³ Participants recruited through ISPR received 0.5 ISPR credits for their participation and participants recruited through Prolific received £3.50.

Cognition and Emotion Laboratory**Debriefing form****Researcher information:**

Dr. Erin Maloney, University of Ottawa, Faculty of Social Sciences, School of Psychology

Andie Storozuk, University of Ottawa, Faculty of Social Sciences, School of Psychology

Project: *Understanding the factors that contribute to financial illiteracy in Canada*

Managing money is part of daily life, but financial products and services today are more complex than ever. All Canadians need a solid foundation of financial knowledge and skills in order to live within their means and feel in control of their financial lives. Before I can effectively improve financial literacy within this country, I need to better understand why people make poor financial choices.

Your participation today will allow us to better understand the factors that may contribute to financial illiteracy and, ultimately, help us understand what I can do to improve financial literacy in Canada.

All the information I collected in today's study will be confidential, and there will be no way of identifying your individual responses in the data archive. We are not interested in any one individual's responses; I want to look at the general patterns that emerge when the data are aggregated together.

Your participation today is greatly appreciated! Any information about your rights as a research participant may be addressed to Protocol Officer for Ethics in Research, 550 Cumberland Street, Room 154, 613-562-5387, ethics@uOttawa.ca. If your participation in this study has caused you concerns, anxiety, or you have any questions, you are welcome to contact the principal investigator, Erin Maloney. Her information can be found at the top of this form.

Thank you for your participation!

Appendix F

Financial Knowledge Scale (Knoll & Houts, 2012)

Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than \$102, exactly \$102, less than \$102?

More than \$102

Exactly \$102

Less than \$102

I do not know.

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?

More than today.

Exactly the same as today.

Less than today.

I do not know.

Assume a friend inherits \$10,000 today and his sibling inherits \$10,000 but 3 years from now. Who is richer today because of the inheritance?

My friend.

His sibling.

They are equally rich.

I do not know.

If the interest rates rise, what should happen to bond prices?

They should rise.

They should fall.

They should stay the same.

I do not know.

Buying a company stock usually provides a safer return than a stock mutual fund.

True.

False.

I do not know.

Bonds are normally riskier than stocks.

True.

False.

I do not know.

Considering a long time period (for example 10 or 20 years), which asset described below normally gives the highest return: Savings accounts, Bonds or Stocks?

Savings accounts.

Bonds.

Stocks.

I do not know.

Normally, which asset described below displays the highest fluctuations over time: Savings accounts, Bonds, or Stocks?

Savings accounts.

Bonds.

Stocks.

I do not know.

When an investor spreads his money among different assets, does the risk of losing a lot of money increase, decrease or stay the same?

Increase.

Decrease.

Stay the same.

I do not know.

If you were to invest \$1,000 in a stock mutual fund, it would be possible to have less than \$1,000 when you withdraw your money.

True.

False.

I do not know.

A stock mutual fund combines the money of many investors to buy a variety of stocks.

True.

False.

I do not know.

If you buy a company's stock ...

You own a part of the company.

You have lent money to the company.

You are liable for the company's debts.

The company will return your original investment to you with interest.

I do not know.

“Whole life” insurance has a savings feature while “term” insurance does not.

True.

False.

I do not know.

The cash value of a life insurance policy is the amount available if you surrender your life insurance policy while you are still alive.

True.

False.

I do not know.

An annuity is a financial product that pays a lump sum when you die.

True.

False.

I do not know.

There are annual contribution limits on the amount you can save in a 401(k) plan or IRA that depend on your income. (Modified to read “There are annual contribution limits on the amount you can save in a Registered Retirement Saving Plan (RRSP) that depend on your income.”)

True.

False.

It depends on the type of IRA and/or 401(k) plan.

I do not know.

After 70.5 years of age, you have to withdraw at least some money from your 401(k) plan or IRA. (Modified to read “After 71 years of age, you have to withdraw at least some money from your RRSP.)

True.

False.

It depends on the type of IRA and/or 401(k) plan.

I do not know.

A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.

True.

False.

I do not know.

Housing prices in the United States can never go down. (Modified to read “Housing prices in Canada can never go down.”)

True.

False.

I do not know.

Suppose you oI \$3,000 on your credit card. You pay a minimum payment of \$30 each month. At an annual percentage rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges?

Less than 5 years.

Between 5 and 10 years.

Between 10 and 15 years.

Never, you will continue to be in debt.

I do not know.

*Highlighted terms modified for Canadian sample.

Appendix G

Financial Anxiety Scale (Fünfgeld & Wang, 2009)

When answering the following questions, imagine how you behaved prior to the Covid-19 pandemic in Canada (i.e., prior to March 2020). Fill in the blank with one of the response options provided. It's _____ true about me.

1 = Not at all; 2 = Rarely; 3 = Quite; 4 = Mostly; 5= Absolutely

1. I get unsure by the lingo of financial experts.
2. I am anxious about financial and money affairs.
3. I tend to postpone financial decisions as long as possible.
4. After making a decision, I am anxious whether I was right or wrong.

Appendix H

Abbreviated Math Anxiety Scale (Hopko, Mahadevan, Bare, & Hunt, 2003)

Please rate each item in terms of how anxious you would feel during the event specified. Use the following scale and record your answer in the space to the left of the item:

1 = Low Anxiety; 2 = Some Anxiety; 3 = Moderate Anxiety; 4 = Quite a bit of anxiety; 5 = High Anxiety

1. Having to use the tables in the back of a math book.
2. Thinking about an upcoming math test one day before.
3. Watching a teacher work an algebraic equation on the blackboard.
4. Taking an examination in a math course.
5. Being given a homework assignment of many difficult problems which is due the next class meeting.
6. Listening to a lecture in math class.
7. Listening to another student explain a math formula.
8. Being given a “pop” quiz in a math class.
9. Starting a new chapter in a math book.

Appendix I

Demographics Questionnaire

Are you at least 18 years of age or older?

Yes

No

What is your age? _____

What is your gender?

Male

Female

You do not have an option that applies to me. I identify as _____.

What is your first language? _____

Are you fluent in English?

Definitely yes

Probably yes

Might or might not

Probably not

Definitely not

Are you a resident of Canada?

Yes

No

I don't know

Please enter the first 3 digits of your postal code: _____

What is your highest level of education completed?

I have not completed high school

High school diploma

College diploma

Bachelor's degree

Master's degree

Doctoral degree

I prefer not to answer

In the past five years, have you taken a course or program of study to increase your knowledge and understanding of the economy or financial matters?

Yes

No

I don't know

I prefer not to answer

What is your occupation? _____

Which of the following categories best describes your family's annual gross income?

Less than \$15,000

\$15,000 to \$34,999

\$35,000 to \$49,999

\$50,000 to \$74,999

\$75,000 to \$99,999

\$100,000 or more

I prefer not to answer

Appendix J

Brief Math Assessment 3 (Steiner & Ashcraft, 2012)

1. $\begin{array}{r} 42 \\ - 21 \\ \hline \end{array}$	2. $\begin{array}{r} 56 \\ + 17 \\ \hline \end{array}$	3. $\begin{array}{r} 8 \\ \times 5 \\ \hline \end{array}$	4. $\frac{9}{3} = \underline{\hspace{2cm}}$
5. $3\frac{1}{2} + 2\frac{1}{2} = \underline{\hspace{2cm}}$	6. $\begin{array}{r} 4\frac{1}{4} \\ 3\frac{1}{8} \\ + 2\frac{1}{2} \\ \hline \end{array}$	7. $\begin{array}{r} 8\frac{1}{4} \\ - 5\frac{2}{3} \\ \hline \end{array}$	
8. Write as a common fraction in lowest terms: .025 = <u> </u>	9. $5j - w = 18$ $4j - w = 14$ $j = \underline{\hspace{1cm}} \quad w = \underline{\hspace{1cm}}$	10. Reduce: $\frac{P^2 + P}{P^2} \cdot \frac{2P - 2}{P^2 - 1}$ Answer: <u> </u>	

Correct answers:

21

73

40

3

6

9 $\frac{7}{8}$ or $\frac{79}{8}$ or 9.875

2 $\frac{7}{12}$ or $\frac{31}{12}$ or 2.59 or 2.60

$\frac{1}{40}$

$j=4, w=2$

$\frac{2}{p}$

Appendix K

State-Trait Anxiety Inventory (Trait Scale) (Spielberger & Gorsuch, 1983)

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate value to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

*Reverse-scored items.

1 = Almost never; 2 = Sometimes; 3 = Often; 4 = Almost always

1. I feel pleasant*
2. I feel nervous and restless
3. I feel satisfied with myself*
4. I wish I could be as happy as others seem to be
5. I feel like a failure
6. I feel rested*
7. I am "calm, cool, and collected"*
8. I feel that difficulties are piling up so that I cannot overcome them
9. I worry too much over something that doesn't really matter
10. I am happy*
11. I have disturbing thoughts
12. I lack self-confidence
13. I feel secure*
14. I make decisions easily*
15. I feel inadequate
16. I am content*
17. Some unimportant thought runs through my mind and bothers me
18. I take disappointments so keenly that I can't put them out of my mind
19. I am a steady person*
20. I get in a state of tension and turmoil as I think over my recent concerns and interests

Appendix L

Financial Attitudes Scale (OECD, 2016)

Questions are answered on a five-point Likert scale (1 = Completely Agree; 5 = Completely Disagree). The attitudes score is computed as the sum of the values for the three statements and then divided by three. The attitudes score, therefore, ranges from 1 to 5, with lower score indicative of a tendency to favour the short-term and higher scores indicative of a tendency to favour the long-term.

I tend to live for today and let tomorrow take care of itself

I find it more satisfying to spend money than to save it for the long term

Money is there to be spent

Appendix M

The Financial Management Behaviour Scale (FMBS) (Dew & Xiao, 2011)

The FMBS assesses four domains of financial management behaviour: (1) cash management^a (e.g., keeping a financial record and paying bills on time), (2) credit management^b, (3) savings and investments^c, and (4) insurance^d.

When answering the following questions, imagine how you behaved prior to the Covid-19 pandemic in Canada (i.e., prior to March 2020). In general, how often did you engage in the following activities?

1 = Never; 2 = Seldom; 3 = Sometimes; 4 = Often; 5 = Always; NA = Not applicable to me

Comparison shopped when purchasing a product or service ^a

Paid all your bills on time ^a

Kept a written or electronic record of your monthly expenses

Stayed within your budget or spending plan ^a

Paid off credit card balance in full each month ^b

Maxed out the limit on one or more credit cards ^b

Made only minimum payments on a loan ^b

Began or maintained an emergency savings fund^c

Saved money from every paycheck^c

Saved for a long-term goal such as a car, education, home, etc.^c

Contributed money to a retirement account ^c

Bought bonds, stocks, or mutual funds ^c

Maintained or purchased an adequate health insurance policy ^d

Maintained or purchased adequate property insurance like auto or homeowner insurance ^d

Maintained or purchased adequate life insurance ^d

Appendix N

Study 2 Final Search Strategy for Scoping Review

APA PsycInfo (Ovid)

- 1 (financ* adj2 (anxi* or worry* or stress*)).ti,ab.
- 2 limit 1 to yr="2010 -Current"
- 3 (money adj2 (anxi* or worry* or stress*)).ti,ab.
- 4 limit 3 to yr="2010 -Current"
- 5 (financ* attitude* and anxiety).ti,ab.
- 6 limit 5 to yr="2010 -Current"
- 7 (money attitude* and anxiety).ti,ab.
- 8 limit 7 to yr="2010 -Current"
- 9 2 or 4 or 6 or 8
- 10 limit 9 to peer reviewed journal

Ovid MEDLINE

- 1 (financ* adj2 (anxi* or worry* or stress*)).ti,ab.
- 2 limit 1 to yr="2010 -Current"
- 3 (money adj2 (anxi* or worry* or stress*)).ti,ab.
- 4 limit 3 to yr="2010 -Current"
- 5 (financ* attitude* and anxiety).ti,ab.
- 6 limit 5 to yr="2010 -Current"
- 7 (money attitude* and anxiety).ti,ab.
- 8 limit 7 to yr="2010 -Current"
- 9 2 or 4 or 6 or 8

CINAHL

- 1 (TI(financ* N2 (anxi* or worry* or stress*)) OR AB(financ* N2 (anxi* or worry* or stress*))) OR (TI(money* N2 (anxi* or worry* or stress*)) OR AB(money* N2 (anxi* or worry* or stress*))) OR (TI(financ* attitude* AND anxiety) OR AB(financ* attitude* AND anxiety)) OR (TI(money attitude* AND anxiety) OR AB(money attitude* AND anxiety))
- Limiters: Peer Reviewed; Published Date: 2010/01/01-2023/12/31

APA PsycTests

- 1 ((financ* or money*) NEAR/2 (anxi* or worry* or stress*)) AND Year: 2010 To 2023
- 2 ((financ* attitude* or money attitude*) AND (anxiety)) AND Year: 2010 To 2023

Note. I manually selected relevant articles from PsycTests to include in the review.

Appendix O

Study 2 Protocol for Inclusion and Exclusion Criteria

Inclusion Criteria

Written in English

Exclude article if written in a language other than English

From peer-reviewed journal

Excluded article if it is not from a peer-reviewed journal

Check this criterion by going to the uOttawa library journal search. Type in the journal title (e.g., Journal of human sexuality, journal of sex research, etc.) and hit “Search”. A purple icon (📖) saying “peer reviewed” should show up under the journal title. If this does not appear under the journal title it is not peer reviewed and should be excluded.

Able to access full text

If you cannot find the full text (after checking the uOttawa library, google scholar, and Research Gate) contact AS (send email with reference information: title, author(s), and date). Add note to Covidence reference: “can’t access full text – Your initials (MG, CP, NW, EL). AS will then search for article. If not found AS will contact you and let you know to exclude the article. A follow up note will be added to the Covidence reference: Full text not available - AS

Financial anxiety should be operationally defined (i.e., the article measures financial anxiety using survey items)

Look in the methods section:

The author(s) may use a full financial anxiety measure;

OR The author(s) may ask participants a few individual questions they formed themselves (e.g., “I feel anxious about finances”);

OR The author(s) may use subscales of a financial anxiety measure to measure the construct.

Exclusion Criteria

Sample includes participants under 18 years old;

Scale modified for a specific population (e.g., cancer survivors);

Scale focuses on a specific type of financial anxiety or stress (e.g., COVID-19-related financial stress, cancer-related financial stress);

Single item dichotomous scale (e.g., “Are you stressed about finances?”).

Appendix P

Study 2 Data Extraction Codes for Scoping Review

Element	Description
Publication	
S#	Number of studies reviewed.
C#	Covidence reference number.
Reference	Authors' name, year of publication, title of the article.
Demographics	
N	Sample size, NR = not reported.
Age	Average age of sample, NR = not reported.
Gender	Gender breakdown (%) of sample, NR = not reported.
Ethnicity	Ethnic majority of sample, NR = not reported.
Location	Location of study completion, NR = not reported.
Conceptual	
Def. Incl.	Whether article included a specific conceptual definition of financial anxiety or a related term (Yes or No).
Def.	The word-for-word definition from the article (citation included if from a different source).
Operational	
Measure	Title of measure used; NR if not reported.
Revised	Whether the scale/measure was revised (Yes or No; If Yes, how?).
T. Items	Total number of items included in the measure.
Items	Exact wording of items used.
Dimension	Dimensionality of measure. U = unidimensional, M = multidimensional.
Subscales	If multidimensional, the names of the subscales used.
S. Items	Number of items included in subscale; NR if not reported.
Scale	The scale each item was evaluated on; NR if not reported.
Scoring	
Score inst.	Instructions for how the score was calculated (e.g., total score, average); NR if not reported.
Score	Whether a criterion was applied to interpret a measure's score (Yes or No; Yes, if an ordinal ranking system was applied (e.g., levels (low to high), grade (positive to negative))).

Note. Data extraction method modelled after Ashley et al., (2023).

Appendix Q

Study 2 All Operational Definitions

Table Q1

Scales Used to Measure Financial Anxiety

#	Measure	Dim	Items	Scale	Scoring	Review articles that used this measure
1	Financial Anxiety Scale ^a (Archuleta et al., 2013)	Uni	(1) I feel anxious about my financial situation. (2) I have difficulty sleeping because of my financial situation. (3) I have difficulty concentrating on my school/or work because of my financial situation. (4) I am irritable because of my financial situation. (5) I have difficulty controlling worrying about my financial situation. (6) My muscles feel tense because of worries about my financial situation. (7) I feel fatigued because I worry about my financial situation.	7-point Likert scale (1 = never to 7 = always)	Sum all items. Score can range from 7 to 49. Higher values indicate higher levels of financial anxiety.	Archuleta et al. (2013) Archuleta et al. (2020) Basyouni et al. (2021) Carlson et al. (2015) Greene et al. (2016) Jawahar et al. (2022) Jones et al. (2021) Jones et al. (2022) Moss et al. (2018) Potter et al. (2020) Tran et al. (2018) Vieira et al. (2021)
2	Financial Anxiety Scale ^b (Shapiro & Burchell, 2012)	Uni	(1) I prefer not to think about the state of my personal finances. (2) Thinking about my personal finances can make me feel guilty. (3) I am worried about the debt I will have when I complete my university education.	4-point Likert scale (1 = very true to 4 = completely untrue)	Average of all items. Score can range from 1 to 4. Lower numbers indicate higher levels of financial anxiety.	Begun et al. (2017) Fenton-O'Creevy et al. (2021) Shapiro & Burchell (2012) Tambling et al. (2021) Vosylis et al. (2020)

			(4) Thinking about my personal finances can make me feel anxious. (5) I get myself into situations where I do not know where I'm going to get the money to "bail" myself out. (6) Discussing my finances can make my heart race or make me feel stressed. (7) I do not make a big enough effort to understand my finances. (8) I do not think I am doing as well as I could academically because I worry about money. (9) I find opening my bank statements unpleasant. (10) I would rather someone else who I trusted kept my finances organized.			
3	Financial Attitudes and Behaviour Scale (Fünfgeld & Wang, 2009)	Multi	Anxiety items: (1) I get unsure by the lingo of financial experts. (2) I am anxious about financial and money affairs. (3) I tend to postpone financial decisions. (4) After making a decision, I am anxious whether I was right or wrong.	5-point Likert scale (1 = not at all to 4 = absolutely)	NR	Tinghog et al. (2021)
4	NR ^c (Grable, Heo, & Rabbani, 2014)	Uni	(1) Participants were asked to indicate their current level of financial anxiety.	10-point Likert scale (1 = lowest score to 10 = highest score)	NR	Grable et al. (2014)
5	NR ^d (Heo, Lee, & Rabbani, 2021)	Multi	Anxiety items: (1) I worry about running out of money in retirement.	8-point Likert scale (0 = Strongly	Financial anxiety: sum of FA1, FA2, and FA3. Higher	Heo et al. (2021)

			(2) Thinking about my personal finances can make me feel anxious. (3) Discussing my finances can make my heart race or make me feel stressed.	disagree to 7 = strongly agree)	scores denote higher levels of anxiety.	
6	Money Management Stress (Netemeyer et al., 2018)	Uni	(1) Because of my money situation, I feel I will never have the things I want in life. (2) I am behind with my finances. (3) My finances control my life. (4) Whenever I feel in control of my finances, something happens that sets me back. (5) I am unable to enjoy life because I obsess too much about money.	5-point Likert scale (1 = Does not describe me at all to 5 = Describes me completely)	NR	Hashmi et al. (2021)

Note. NR = Not reported. Dim = Dimensionality. Uni = Unidimensional. Multi = Multidimensional.

Table Q2

Scales Used to Measure Financial Stress

#	Measure	Dim	O	S	P	Items	Scale	Scoring	Review articles that used this measure
1	The Personal Financial Well-Being Scale (also known as the InCharge Financial Distress/Fina	Uni	O	S		(1) What do you feel is the level of your financial stress today? (1 = overwhelming stress to 10 = no stress at all) (2) On the stair steps below, mark (with a circle) how satisfied you are with your present financial situation. The “1” at the bottom of the	10-point Likert scale	Take the average of the 8 items. Scores can range from 1 to 10. Lower scores indicate higher levels of financial stress.	Blanchette (2020) Blanchette et al. (2021) Buabang et al. (2022) King et al. (2019) Kramer et al. (2019) McGovern (2017) Mende & van Doorn

ncial Well-Being Scale)
(Prawitz et al., 2006)

steps represents complete dissatisfaction. The “10” at the top of the stair steps represents complete satisfaction. The more dissatisfied you are, the lower the number you should circle. The more satisfied you are, the higher the number you should circle.

(3) How do you feel about your current financial situation? (1 = feel overwhelmed to 10 = feel comfortable)

(4) How often do you worry about being able to meet normal monthly living expenses? (1 = worry all the time to 10 = never worry)

(5) How confident are you that you could find money to pay for a financial emergency that costs about \$1,000? (1 = no confidence to 10 = high confidence)

(6) How often does this happen to you? You want to go out to eat, go to a movie or do something else and don't go because you can't afford to? (1 = all the time to 10 = never)

(7) How frequently do you find yourself just getting by financially and living paycheck to paycheck? (1 = all the time to 10 = never)

(8) How stressed do you feel about

(2015)
White & Perrone-McGovern (2017)
Richardson et al. (2022)

				your personal finances in general? (1 = overwhelming stress to 10 = no stress at all)			
2	NR ^e (Siahpush, Spittal, & Singh, 2007)	Uni	O	In the past six months, did any of the following happen to you because of lack of money? (1) Could not pay electricity, gas, or telephone bills on time; (2) could not pay the mortgage or rent on time; (3) Pawned or sold something; (4) Went without meals; (5) Was unable to heat home; (6) Asked for financial help from friends or family; (7) Asked for help from a welfare or community organization (8) Could you raise AUD\$2000 in a week if there was an emergency? (9) Household spends more money than it gets (over the past 12 months)	Dichotomous scale (yes/no)	Financial stress is measured by number of “yes” answers for items with higher scores representing higher stress.	Byaruhanga et al. (2019) Guillaumier et al. (2014) Guillaumier et al. (2017) Koomson et al. (2022) Kutin et al. (2017)
3	Derived from the Ohio Student Financial Wellness Survey ^f (Lim et al., 2014; The Ohio State	Uni	S	(1) I feel stressed about my personal finances in general. (2) I worry about being able to pay monthly expenses. (3) I worry about having enough money to pay for school. (4) How much stress does the total amount of money you owe cause you? (5) How much stress does credit	Response options for items 1 to 3: 4-point Likert scale (1 = strongly disagree to 4 strongly agree). Responses	Sum all items. Scores can range from 6 to 30. Higher scores indicate higher financial stress.	Collier et al. (2020) Du et al. (2021) Lim et al. (2014) White et al. (2021)

	University, 2011)				card debt cause you? (6) How much stress does student loan debt cause you?	items 4 to 6: 6-point Likert scale (1 = does not apply/no debt to 6 extreme amount).		
4	Adapted from the Boston Longitudinal Study (Agrigoroaei, Lee-Attardo, & Lachman, 2017)	Uni	O		(1) How would you rate your current financial situation? (reverse-coded) (2) In general, would you say you (and your family living with you) have more money than you need, just enough for your needs, or not enough to meet your needs? (3) How difficult is it for you (and your family) to pay your monthly bills? (reverse-coded)	Item 1: 11- point Likert scale (0 = worst to 10 = best) Item 2: 3- point Likert scale (1 = more money than you need to 3 = not enough money) Item 3: 4- point Likert scale (1 = very difficult to 4 = not at all difficult)	Higher scores indicate higher levels of financial stress.	Agrigoroaei et al. (2017) Kuo et al. (2021) Kuo et al. (2022)
5	NR ^g (Eurostat, 2011)	Multi	O	S	Financial Need: (1) It is difficult to afford much more than the basics with our current income. (2) I feel that our current income allows me to maintain a desirable standard of living (reverse-scored).	Financial need and financial insecurity: 7- point Likert scale (1 = strongly	NR	DeMeulenaere et al. (2022) Ponnet (2014) Ponnet et al. (2016)

(3) With our current income, it is difficult to make ends meet.

Financial Insecurity:

(4) I am worried that I will not be able to pay my bills in the near future.

(5) I think that I will have to scale down my living standards in the following months.

(6) I often worry about my future financial situation.

(7) I am frightened that I or my partner will lose our jobs.

(8) I think that I (or my household) will experience financial difficulties in the following months.

disagree to 7
= strongly
agree)

Financial
burden: 4-
point Likert
scale (1 = not
a
burden/strugg
le to 4 = a
heavy
burden/strugg
le)

Financial Burden:
Rated the extent to which five
sources of costs imposed a financial
burden on their household.

(9) medical

(10) car/fuel

(11) child-care or other child-
related costs

(12) house-related costs

(13) mortgages/loans

6	APR Financial Stress Scale (Heo, Cho, & Lee, 2020)	Multi	S	P	Affective Reaction: (1) I feel depressed because of my financial situation. (2) I feel sad because of my financial situation.	5-point Likert scale (1 = Strongly Disagree to 5	NR	Choi et al. (2020) Heo et al. (2020)
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- (3) I am fearful because of my financial situation. = Strongly Agree)
- (4) I feel anxious because of my financial situation.
- (5) I worry a lot because of my financial situation.
- (6) I am easily irritated because of my financial situation.
- (7) I feel emotionally drained because of my financial situation.
- (8) I feel frustrated because of my financial situation.

Relational/ Interpersonal
Behaviour:

- (1) My financial situation interferes with my daily job performance.
- (2) I frequently pass on social events at work due to my financial situation.
- (3) I often get into trouble at work because of my financial situation.
- (4) My financial situation frequently interferes with my relationship with co-workers/colleagues.
- (5) I often argue with my spouse/significant other because of financial matters.
- (6) I find it difficult to talk about money with my spouse/significant other.
- (7) I frequently avoid attending
-

family events because of my financial situation.
 (8) My financial situation frequently interferes with my family relationship

Physiological Responses:

(1) I have stomach aches frequently because of my financial situation.
 (2) My heartbeat increases because of my financial situation.
 (3) I feel cold because of my financial situation.
 (4) I have more sweat because of my financial situation.
 (5) I have more frequent muscle pain because of my financial situation.
 (6) I have fatigue frequently because of my financial situation.
 (7) I am sensitive to noise because of my financial situation.
 (8) I find flaws/cracks/chips of general objects more frequently than before because of my financial situation.

7	Derived from the Weekly Stress Inventory ^h (Moran et al., 2019; Mosley et al., 1996)	Uni	O	Participants were asked whether they had experienced any of 5 financial problems over the previous week: (1) not enough money for basics (2) ran out of pocket money (3) had unexpected bills	7-point Likert scale. 1 = not stressful, 7 = extremely stressful. If the event did not occur,	Average the five items. Possible levels: (1) did not experience any of the hardship	Moran et al. (2019) Sonnenblick et al. (2022)
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					(4) had problems paying bills (5) not enough money for fun	participants indicated accordingly.	(2) no stress (experienced one or more hardship, but reported all experiences as not stressful) (3) mild stress (average score was less than 4) (4) moderate to high stress (average score was 4+)	
8	From the 2018 National Financial Capability Study (FINRA IEF, 2019)	Uni	S	P	(1) I worry about running out of money in retirement. (2) Thinking about my personal finances can make me feel anxious. (3) Discussing my finances can make my heart race or make me feel stressed.	7-point Likert scale	Summed Z scores of the three items to create composite index of financial stress.	Xiao & Kim (2022) Fan & Henager (2022)
9	NR (Siahpush et al, 2009, Wilson et al, 2010)	Uni	O		(1) In the last month, because of shortage of money, were you unable to pay any important bills on time, such as electricity, telephone or rent bills?	Dichotomous scale (yes/no)	NR	Siahpush et al. (2012) Martire et al. (2011)
10	Financial Stressors derived from the Ohio Student Financial Wellness	Uni	O		(1) I have enough money to participate in most of the same activities as my peers do. (2) I regularly spend more than I have by using credit or borrowing. (3) I pay my bills on time every month.	Items 1, 2, and 3: 4-point Likert scale (1 = strongly disagree to 4 = strongly	Items 1, 2, and 3: Condensed into two categories - those who agreed and those who disagreed.	Heckman et al. (2014) Kim et al. (2022)

	Survey ⁱ (OSFWS) (Heckman, Lim, & Montalto, 2014)				(4) Do you currently have debt from any source, including student loans, credit cards, car loans, personal loans from financial institutions or from family/friends, or any other type of credit or loans?" (5) How much student loan debt do you expect to accumulate by the time you graduate?	agree) Item 4: Dichotomous (yes/no/don't know) Item 5: 11- point Likert scale (1 = none to 11 = over \$100,000)	Item 4: Condensed the categories into four groups - (a) no student loans, (b) below average, (c) average, and (d) above average.	
11	Financial Anxiety Scale (Archuleta et al., 2013)	Uni	S	P	(1) I feel anxious about my financial situation. (2) I have difficulty sleeping because of my financial situation. (3) I have difficulty concentrating on my school/or work because of my financial situation. (4) I am irritable because of my financial situation. (5) I have difficulty controlling worrying about my financial situation. (6) My muscles feel tense because of worries about my financial situation. (7) I feel fatigued because I worry about my financial situation.	7-point Likert scale (1 = never to 7 = always)	Sum all items. Score can range from 7 to 49. High numbers indicate higher levels of financial anxiety.	Grable, Heo, & Rabbani (2014)
12	NR (Marshall & Tucker- Seeley, 2018; Birditt et al.,	Multi	O	S	Bill-paying difficulty: (1) How difficult is it for you to meet monthly payments on your bills? Ongoing financial strain:	Bill-paying difficulty: 5- point Likert scale (1 = not at all	Bill-paying difficulty: dichotomized to 0 if response was 1 or 2,	Loibl et al. (2022)

2016;
Marshall et
al., 2018)

(2) Please read the list below and indicate whether or not any of these are current and ongoing problems that have lasted twelve months or longer. If the problem is happening to you, indicate how upsetting it has been.

difficult, to 5 = completely difficult)
Ongoing financial strain: 4-point Likert scale (1 = no strain occurred, 2 = some strain but not supsetting, to 4 strain very upsetting)

dichotomized to 1 if response was 3, 4, or 5.

Ongoing financial strain: dichotomized, coded as 0 if response was 1, and coded as 1 if otherwise.

13	NR (Brim et al, 2011)	Uni	O	S	(1) How would you rate your current financial situation? (2) Looking ahead ten years into the future, what do you expect your financial situation will be like at that time? (3) How much control do you have over your current financial situation? (4) How much thought and effort do you put into your current financial situation? (5) In general, which of the statements below describes the current financial situation of you and your family?	Items 1-2: 10-point Likert scale (0 = worst to 10 = best) Items 3-4: 10-point Likert scale (0 = none to 10 = very much) Item 5: 3-point Likert scale (1 = does have enough money, 2 = does not have	Standardize all items before summing. High scores indicated higher levels of financial stress.	Montpetit et al. (2015)
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						enough money, or 3 = he or she has more than enough money)		
14	NR (Campbell et al., 2014)	Uni	O		(1) Money sufficient for daily living?	4-point Likert scale (Completely; Moderately; A Little; Not at All)	NR	Huang et al. (2020)
15	College Financial Stress Scale (Cattaneo et al., 2019)	Uni	O	S	(1) How would you describe your financial situation growing up? (Response options range from “I do not worry about paying for things I want and need” to “I simply can’t pay my bills”) (2) Growing up, we had to give up purchasing things we wanted (e.g., vacation, going out to dinner) so that we could pay for things we need. (3) Growing up, we had to postpone purchasing a needed household item because of its cost. (4) Taking into account all of the support you have available to you (e.g., your parents’ help paying bills), how would you describe your current financial situation? (Response options range from “I do not worry about paying for things I	5-point Likert scale (1 = strongly disagree to 5 = strongly agree)	Items 4, 5, 6, 8 reverse scored. Higher scores indicated more stress	Cattaneo et al. (2019)

want and need” to “I simply can’t pay my bills”)
 (5) Currently, considering all of the financial resources I have available, I have more money coming in than I have going out
 (6) Each month, I know I will be able to pay off whatever charges I have accumulated on my credit card
 (7) I am worried about my level of debt after I graduate from college.
 (8) Whatever happens, I am confident I will be financially secure next year
 (9) I have to give up purchasing things I want (e.g., vacation, going out to dinner) so that I can pay for things I need.
 (10) How important are financial aid and/or student loans to your ability pay for school tuition?
 (Response options range from “not at all” to “very.”)

16	Federal Consumer Financial Protection Bureau’s Financial Well-Being Scale short	Uni	O	S	(1) I am just getting by financially. (2) I am concerned that the money I have or will save won't last. (3) Because of my money situation, I feel like I will never have the things I want in life. (4) My finances control my life. (5) I have money left over at the end of the month.	5-point Likert scale	Sum all items. If sum ≤ 49 , “high financial stress.” If score ≥ 58 , “low financial stress.”	Liu et al. (2021)
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form (CFPB-
FWBS)
(CFPB,
2020)

17	College Stress Inventory Chinese Version (C- CSI) (Chuang, Chae, Wu, & Pernice- Kowalczyk, 2017)	Multi	O	Financial stress items: (1) I have difficulty paying for tuition. (2) I have money difficulties due to owing money. (3) I have difficulty paying for rent. (4) I have difficulty paying for food. (5) I have difficulty paying for recreation and entertainment. (6) I have difficulty due to my family experiencing money problems.	Likert 1 to 4 (1 = strongly disagree to 4 = strongly agree)	NR	Chuang et al. (2017)
18	From the Family Transition Project (Conger & Elder, 1994)	Multi	O	Family's ability to meet its basic needs: (1) Our income never seems to catch up with our expenses. (2) Since getting married, how much difficulty have you had with paying your bills? (reverse coded) (3) Generally, at the end of each month do you end up with...	Item 1: (1 = Strongly disagree to 5 = Strongly agree) Item 2: (1 = Great deal of difficulty to 5 = No difficulty at all) Item 3: (1 = More than enough money left over to 4 =	Standardize all items before summing. Higher scores indicate greater financial stress.	Crapo et al. (2021)

							Not enough to make ends meet)		
19	Parent Report of Economic Pressure (Conger et al, 1992)	Uni	O			Each parent responded to seven items that asked if they agreed or disagreed on a that their family had the money they needed for: (1) a home (2) clothing (3) household items (4) a car (5) food (6) medical care (7) recreational activities Example of item wording: We have enough money to afford the kind of food we should have.	5-point Likert scale (1 = strongly disagree to 5 = strongly agree)	Scales were summed and averaged	Sutter et al. (2019)
20	NR (Consistent with Montalto et al (2016); Prawitz et al (2006), and Thoits (2010)	Uni		S		(1) I feel stressed about my personal finances in general. (2) I worry about being able to pay my current monthly expenses. (3) I worry about having enough money to pay for school.	4-point Likert scale (1 = strongly disagree to 4 = strongly agree)	Index created from the mean of the three questions.	White (2020)
21	NR ^j (Delafrouz & Paim, 2013)	Uni	O	S	P	(1) I cannot sleep because of worrying about the payment of bills. (2) My current financial situation makes me anxious and depressed. (3) I am not able to support myself financially in eating a better food.	3-point Likert scale (1 = never to 3 = always)	NR	Sabri & Aw (2020)

				(4) I have high blood pressure due to stress about money. (5) I am concerned about medical costs in time of sickness.			
22	Affective Financial Stress ^k (based on Prawitz, 2006; Petitta et al, 2020)	Uni	S	(1) I worry about having the funds to cover normal monthly expenses. (2) I feel like I am living paycheck-to-paycheck. (3) I am stressed by my financial situation. (4) An unexpected event such as a car repair could cause a financial emergency for me.	5-point Likert scale (1 = Never to 5 =Always)	NR	Petitta et al. (2020)
23	From the Psychiatric Epidemiology Research Interview (PERI) Life Events Scale ^l (Dohrenwend et al., 1978)	Multi	O	(1) Have a major worsening of financial condition. (2) Been pressured to pay bills by stores, creditors, or bill collectors. (3) Been unable to pay for medication or other medical necessities. (4) Fallen behind in paying the rent or mortgage. (5) Been unable to purchase needed food. (6) Had a car, furniture, or some items bought on an installment plan repossessed.	NR	NR	Sturgeon et al. (2016)
24	NR ^m	Uni	O	(1) Rate how well the household is managing financially.	5-point Likert scale (1 = living comfortably; 2 = doing alright; 3 =	Dichotomized. If score was 3, 4, or 5, there was subjective financial stress.	Schenck-Fontaine et al. (2019)

					just about getting by; 4 = finding it quite difficult; 5 = finding it very difficult)		
25	NR (Grable, Archuleta, & Nazarinia, 2011)	Uni	O	The questions were asked to have the participants compare their financial situation at the present time as opposed to 5 years ago. E.g. whether the financial assets/financial situation/total income/standard of living/personal debts have decreased or increased over the past 5 years: (1) My overall financial situation has... (2) My total income has... (3) My financial assets have... (4) My ability to meet my usual monthly living expenses has... (5) My standard of living (the things that I purchase such as housing, food, transportation, and recreation) has... (6) The amount that I am able to save and invest has...	5-point Likert scale (1 = decreased significantly to 5 = increased significantly)	NR	Mahdzan et al. (2019)
26	From the 2010 Ohio Student Financial Wellness	Uni	O	(1) I have enough money to participate in most of the same activities as my peers do. (reverse-coded) (2) I regularly spend more than I			Heckman et al. (2014)

Survey
(OSFWS)

have by using credit or borrowing.
(3) I pay my bills on time every month. (reverse-coded)
(4) Do you currently have debt from any source, including student loans, credit cards, car loans, personal loans from financial institutions or from family/friends, or any other type of credit or loans?
(5) How much student loan debt do you expect to accumulate by the time you graduate?

27	NR (Heo, Lee, & Rabbani, 2021)	Multi	S	P	Financial Anxiety (FA): (1) I worry about running out of money in retirement. (2) Thinking about my personal finances can make me feel anxious. (3) Discussing my finances can make my heart race or make me feel stressed. Financial Situation (FS): (4) Because of my money situation, I feel like I will never have the things I want in life. (5) I am just getting by financially. (6) I am concerned that the money I have or will save will not last. Financial Confidence (FC): (7) If you were to set a financial goal for yourself today, how	FA: 8-point Likert scale (0 = Strongly disagree to 7 = strongly agree) FS: 5-point Likert scale (1 = does not describe me at all to 5 = describes me completely) FC: 4-point Likert scale (1 = not at all confident to 4 = very confident)	Financial anxiety (FA) was the sum of item 1, 2, and 3. Higher values indicated higher anxiety. Financial situation (FS) was the sum of items 4, 5, and 6. Higher values indicated increase in adverse financial situations. Financial confidence (FC) was denoted by item 7. Higher values indicated	Heo et al. (2021)
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					confident are you in your ability to achieve it?		lower level of confidence.	
28	Family Economic Strain Scale (FESS) (Hilton & Devall, 1997)	Uni	O	S	(1) How hard is it now to live on your present income? (2) Compared with other families in the United States, would you say your income is... (3) How often do you experience money problems? (4) How often do financial problems interfere with your work and daily routine? (5) How often do you worry about financial matters? (6) How often do financial problems interfere with your relationships with other people? (7) How often do you worry about disappointing your children because of your inability to give them things they want? (8) How often do you worry about having enough money to celebrate holidays and other special occasions? (9) How often do you put off family activities because of the expense? (10) How often do you feel frustrated because you can't afford education or training for yourself? (11) How often do you have to put off getting medical care for yourself or your children because of the	5-point Likert scale (1 = never to 5 = always)	Scores range from 13 to 65, with higher scores being better. ⁿ	White et al. (2019)

				expense? (12) How often do you have to put off getting dental care for yourself or your children because of the expense? (13) How often do you put off buying clothing you or your children really need because of the expense?			
29	NR (Kessler, Turner, & House, 1988)	Uni	O	(Sample item from Kessler et al., 1988) How difficult is it for you to live on your total household income right now? The financial strain questions dealt with constraints on buying food, clothing, and medical care.	5-point Likert scale (1 = not at all difficult to 5 = very difficult)	NR	Anderson (2018)
30	NR; Derived from the Social Change in Canada Survey (Krause & Baker, 1992), a financial strain scale (Vinokur, Price, & Caplan, 1996), and a measure of family	Uni	O	(1) Difficulty paying bills (2) Living on total household income (3) Going without things really needed (4) Stress related to finances over the past 12 months	5-point Likert scale	Sum all items. Higher scores indicating more stress	Foran et al. (2011)

economic
pressure
(Conger et
al., 1993)

31	Financial Stress (from the National Survey of Child and Adolescent Well-being, II)	Uni	O		(1) When it comes to money and making ends meet, how do you think things are going for you? Would you say you are able to save a little money each month, just getting by, or struggling to make it?	3-point Likert scale 1 = saving a little, 2 = just getting by, 3 = struggling to make it.	1 = low, 2 = moderate, and 3 = high financial stress.	Liu & Merritt (2018)
32	Items from National Survey of Student Engagement	Uni	O	S	Question 1: During the current school year, about how often have you done the following? (1) Worried about having enough money for regular expenses (2) Worried about paying for college (3) Carried a balance on a credit card (4) Chosen not to participate in an activity due to lack of money (5) Chosen not to purchase required academic materials due to their cost (6) Investigated transferring to a less expensive college (7) Investigated withdrawing from college due to costs (8) Investigated working more hours to pay for costs (9) Investigated borrowing more to pay for costs	Question 1: 4-point Likert scale (Very Often, Often, Sometimes, Never) Question 2: 6-point Likert scale (1 = Not at all to 6 = Very Much)	Standardize then average all items. The overall index was then standardized to have a mean of 0 and standard deviation (SD) of 1	Fosnacht & Calderone (2017)

Question 2: Please indicate the extent to which you agree with the following statements:

(10) Financial concerns interfered with my academic performance

(11) Working for pay interfered with my academic performance

(12) I worry about making enough money after college to repay my student loans

33	Subjective Financial Well-Being (from the UK's Families and Children Survey)	Multi	O	Financial stress items: (1) Taking everything together, how are you managing financially these days? Debt problems: (2) 'Thinking back over the past 12 months, how often would you say you have had trouble with debts that you found hard to repay?'	Likert scale. Exact scale NR	Item 1: classify "don't manage very well", "have some financial difficulties", and "are in deep financial trouble" as suffering from financial stress. Item 2: classify "almost all the time" and "quite often" as having persistent debt problem.	Bridges & Disney (2010)
34	NR	Uni	O	(1) Do you feel that your current financial situation is sufficient to pay for living expenses?	Dichotomous scale (yes/no)	NR	Nieh et al. (2022)
35	NR	Uni	O	(1) In general, how do your finances usually work out at the end of the month? Do you find you usually end up with...	3-point scale	"Some money left" = no stress.	Shah et al. (2012)

						“Just enough to make ends meet” = low stress. “Not enough to make ends meet” = high stress.	
36	NR	Uni	S	Financial stress was assessed by asking participants: (1) To report how stressed they felt about their level of debt; (2) if they had seriously considered abandoning their doctoral studies because of financial difficulties; (3) To estimate how many hours per week they spent thinking about or managing their financial concerns.	Item 1: 4-point Likert scale (1 = not stressed to 4 = very stressed) Item 2: Dichotomous (Yes/No)	NR	Szkody et al. (2022)
37	NR	Uni	O	How often in the past 12 months were you worried or stressed about having enough money to (1-3): (1) “...get the health care you or your family needed” (2) “... pay your rent or mortgage” (3) “...buy healthy food” (4) How difficult is it for you to live on your total household income right now?	5-point Likert scale. Item 1-3: almost always, usually, sometimes, rarely, and never. Item 4: very difficult, difficult, not difficult, easy, and very easy.	Dichotomized. Item 1-3: almost always and usually = frequently experiencing strain; sometimes to never = infrequently experiencing strain. Item 4: very difficult and difficult = difficult; not difficult to very	Widome et al. (2015)

						easy = not difficult.	
38	Financial Stress Index	Uni	S	(1) Confidence in ability to repay loan. (2) Anxiety about loan repayment. (3) Argument with spouse about finances. (4) Time spent thinking about repayment.	NR	Dichotomized. 1 if they did not feel confident about their ability to repay the loan; 1 if they felt worried, tense, or anxious about paying the next loan installment; 1 if they argued with their spouse in the last 24 hours; and 1 if they spent at least five minutes thinking about repayment during the past day.	Field et al. (2012)
39	NR	Multi	O	(1) How well are you and your husband/partner managing financially? (2) Compared to a year ago, how would you say you and your husband/partner are doing financially now?	Item 1: “living comfortably” to “difficult” (“very difficult” and “just about getting by” were merged with “difficult”). Item 2: 3-	NR	Uphoff et al. (2019)

					point Likert scale (“better off,” “about the same” or “worse off”)		
40	NR	Uni	O	Respondents were asked in six separate questions if they were worried about (1) paying their bills, (2) paying for serious medical costs, (3) expected medical costs, (4) retirement, (5) children’s college tuition, and (6) maintaining a standard of living.	3-point Likert scale (very worried, moderately worried, or not too worried)	“very worried” and “moderately worried” = 1. “not too worried” = 0.	Weissman et al. (2020)
41	NR	Uni	O	(1) Have you had problems paying your household bills in the past year?	NR	Dichotomized into people with and without problems paying their household bills. Those who had problems paying their household bills were classified as having financial stress.	Agyei et al. (2014)
42	NR	Uni	O	(1) Classification in three groups of financial stress was based on data about having troubles paying bills.	4-point Likert scale (1 = every month, 2 = every second month, 3 = it occurs rarely, 4 = never)	1 and 2 = financially stressed. 3 and 4 = not financially stressed.	Annerstedt et al. (2012)

43	NR	Uni	O	(1) How would you describe your current financial conditions, in terms of paying for essential goods and services such as bills, rents, mortgages?	5-point Likert scale (1 = very comfortable financially to 5 = very financially stressed)	NR	Botha et al. (2022)
44	NR	Uni	O	(1) Question about the respondent's financial situation	4-point scale (Really can't make ends meet; Just about manage to get by; Have enough to get along, and even have a little extra; Money is not a problem, can buy pretty much anything we want)	If participants endorsed "cannot make ends meet" or "just about manage to get by" they were classified as having financial stress.	Choi et al. (2021)
45	NR	Uni	O	In the past 12 months: (1) Were you evicted? (2) Did you not pay the rent/mortgage? (3) Could not afford to see their doctor? (4) Could not afford to see their dentist?	Dichotomous scale (yes/no)	Individuals positively endorsing any of the items were given a 1 for financial stress while others were given a 0.	Doom et al. (2017)

						(5) Did not pay the full amount of gas, electricity or oil bill because of lack of funds? (6) Had service turned off by the gas or electric company? (7) Lacked service for your phone?			
46	NR	Uni	O			(1) In the last 30 days, because of a shortage of money, were you unable to pay any important bills on time, such as electricity, telephone or rent bills?	Dichotomous scale (yes/no)	NR	Gravely et al. (2022)
47	NR	Uni		S		(1) Asked respondents to indicate how often they worried about their financial situation.	5-point Likert scale (1 = Never to 5 = very frequently)	NR	Lazarevic et al. (2016)
48	NR	Uni	O	S	P	(1) I couldn't sleep because I was worried about paying the bill. (2) I am getting depressed and restless with my current financial situation. (3) I can't afford (financially) to see a doctor when I'm sick. (4) I can't afford (financially) to get healthier food. (5) I have high blood pressure due to financial difficulties. (6) I'm worried about medical expenses. (7) I became depressed as a result of thinking about finances.	4-point Likert scale (1 = never to 4 = most frequent/always)	NR	Mansor et al. (2022)

49	NR	Uni	O	Respondents were asked how stressful they find each of the following four things: (1) paying their rent or mortgage, (2) maintaining their dwelling, (3) managing money, and (4) saving for retirement. (5) How true is it that you pay too much rent or mortgage? (6) How true is it that you have too much debt?	3-point Likert scale	Sum all items to create an index of financial stress.	Manturuk et al. (2012)
50	NR	Uni	O	(1) In the last month, because of a shortage of money, were you unable to pay any important bills on time, such as electricity, telephone or rent bills?	Dichotomous scale (yes/no)	NR	Martire et al. (2011)
51	NR	Uni	O	(1) Had trouble paying for any basic needs?	Dichotomous scale (yes/no)	NR	Miller-Rosales et al. (2022)
52	NR	Uni	O	(1) Often have to forego something because of budget (2) Mostly short of money	5-point Likert scale (1 = not at all correct to 5 = completely correct)	Average the two items. Higher values indicate greater deprivation or stress.	Morgan et al. (2021)
53	NR	Multi	O	(1) If residential mother or father has received Aid to Families with Dependent children, public assistance or welfare before 1996 (2) Have residential mothers and fathers had been paid for work (3) Has at least one of the residential mother or father completed high school	Dichotomous scale (yes/no)	If financial stress variable present, coded as 1, if not, coded as 0.	Stanton et al. (2022)

54	NR	Uni	O	(1) Asked parents to gauge how much money they were left with at the end of each month for the past 12 months. (2) Asked parents how much difficulty they have had in paying bills over the past year.	Item 1: 4-point Likert scale (1 = not enough to make ends meet, 2 = just enough to make ends meet, 3 = some money left over, 4 = more than enough money left over) Item 2: 5-point Likert scale (1 = a great deal of difficulty, 2 = quite a bit of difficulty, 3 = some difficulty, 4 = a little difficulty, 5 = no difficulty at all)	Reverse score items. Higher scores reflected greater amounts of perceived financial stress.	Valentino et al. (2014)
55	NR	Multi	O S	Objective financial stress: Extent to which participants reported experiencing four different financially related life events during the past 12 months	Objective: Dichotomous (yes/no) Subjective: 5-	Objective: A sum scale of the four financial life events was calculated.	Seely et al. (2019)

- (1) major financial expense
 (2) reduction in income
 (3) being fired or laid off
 (4) legal issues
- point Likert
 scale (1 = not
 at all to 5 =
 very)

For each event, participants were asked to recall the month and year the event occurred. This dating was used as a check that the event occurred in the 12 months prior to the interview.

Subjective financial stress:
 Participants rated how serious they perceived their current financial stress (i.e., “How serious do you perceive your stress to be with your financial situation?”).

56	Financial Stress Scale—College Version (FSSCV) (Northern, O’Brien, & Goetz, 2010)	Uni	O	S	Consider the past six months. Please first rate how often you’ve thought about the following financial events: (1) Being behind on payments (2) Having a low credit score (3) Being contacted by creditors (4) Having to declare bankruptcy (5) Not having any emergency money (e.g. savings accounts, investments) (6) Living paycheck to paycheck (7) Getting something repossessed (8) Being in a job where work isn’t steady/predictable	4-point Likert (1 = Never to 4 = All of the time)	NR	Northern et al. (2010)
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- (9) Barely making enough money to cover expenses
 (10) Not making enough money to be able to cover unexpected expenses
 (11) Worrying about having enough money to retire
 (12) Knowing you make less money than most of your peers
 (13) Having large debt
 (14) Having loans with high interest rates
 (15) Being turned down for a loan
 (16) Christmas/holiday expenses
 (17) Childcare expenses
 (18) Losing a job
 (19) Investments decrease in value
 (20) Having to borrow money from family/friends
 (21) Service is turned off due to being behind in payments
 (22) Paying taxes

57	Perceived Financial Strain ^o (Porrino et al, 2017; Selenko & Batinic, 2011)	Uni	O	S	(1) My current financial situation is a serious strain. (2) I often think about my current financial situation. (3) I have difficulties meeting my financial obligations.	5-point Likert scale (Agree strongly to Disagree strongly)	A mean across all items was used as an overall impression of perceived financial strain.	Ayyala et al. (2019)
58	Based on Robb et al. (2019) and	Uni	O	S	Financial worry: (1)“I worry about running out of money in retirement”	Financial worry: Items 1-3: 7-	NR	Magwegwe et al. (2022)

Woodyard et
al. (2016)^p

- (2) "Thinking about my personal finances make me feel anxious"
- (3) "Discussing my finances can make my heart race or make me feel stressed."

Financial Stressors:

- (1) "Have you been contacted by a debt collection agency in the past 12 months?"
- (2) "Do you currently have any unpaid bills from a healthcare or medical service provider (e.g., a hospital, a doctor's office, or a testing lab) that are past due?"
- (3) In the past 12 months, have you/your household experienced a large drop in income which you did not expect?"
- (4) "Do you currently have any student loans?"
- (5) "In a typical month, how difficult is it for you to cover your expenses and pay all your bills?" (reverse coded)
- (6) "I have too much debt right now."
- (7) "I am just getting by financially."
- (8) "How confident are you that you could come up with \$2,000 if an unexpected need arose within the next month?"

point Likert
scale (1 =
strongly
disagree to 7
= strongly
agree)

Financial
stressors:
Items 1-4
(Dichotomou
s yes/no),
Item 5: 3-
point Likert
scale (1 =
very difficult
to 3 = not at
all difficult)
Item 6: 7-
point Likert
scale (1 =
strongly
disagree to 7
= strongly
agree)
Item 7: 5-
point Likert
scale (1 =
does not
describe me
at all to 5 =
describes me
completely)
Item 8: 4-

					point Likert scale (1 = I am certain I could come up with the full \$2,000; 2= I could probably come up with \$2,000; 3 = I could probably not come up with \$2,000”; and 4 = I am certain I could not come up with \$2,000)		
59	College Stress Scale (Rodriguez et al, 2000)	Multi	O	Financial stress items: (1) Paying for bills and living expenses (2) Paying for food (3) Paying for recreation and entertainment (4) Paying tuition and student fees (5) Family experiencing money problems	5-point Likert (1 = not at all to 5 = extremely stressful)	Average the items. Higher scores indicated higher levels of stress.	Arbona et al. (2017)
60	Financial Stress Index ^q (Serido et al, 2014)	Multi	O	Financial strain, assessed participants' inability to meet current financial obligations, as an index of three questions: In the past 12 months, was there a	Dichotomous scale (yes/no)	All were measured through summed dichotomous responses (0=no;	Serido et al. (2014)

time when [you were/your household was]:

(1) Without telephone service for any reason?

(2) Did not pay the full amount of the rent or mortgage because you did not have enough money?

(3) Did not pay the full amount of gas, electricity, or oil bill because you did not have enough money?

Lack of financial access, construed as an indicator of economic disadvantage assessed participants' access to mainstream financial systems (banked vs. unbanked status), as an index of three questions:

(4) Do you have a checking account?

(5) Do you have a credit card?

(6) Do you have a savings account?

Public assistance, assessing financial hardship, was measured by a single item:

(7) Have you ever received any public assistance or welfare payments other than food stamps?

1=yes) to a series of questions

(2) The index was reversed so that higher values indicated less access to financial services.

61	NR (Serido et al, 2014)	Uni	O	S	The extent to which participants: (1) are constantly worried about money (2) have difficulties paying for	5-point Likert scale (1 = strongly disagree to 5	Average all items. Higher scores indicating higher	Cao et al. (2021)
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				things (3) feel satisfied with their current financial status (reverse coded)	= strongly agree)	levels of financial stress.	
62	NR (Siahpush, Spittal, & Singh, 2007; Siahpush et al, 2009)	Uni	O	(1) In the last six months, because of lack of money, was there a time when you were unable to buy food or pay any important bills on time, such as electricity, telephone, credit card, rent or your mortgage?	Dichotomous scale (yes/no)	An affirmative answer indicated the presence of financial stress	Siahpush et al. (2017)
63	Based on Siapush et al. (2009)	Uni	O	(1) Does your household currently have enough money saved to cover expenses for three months without any earned income? (2) What is your household's strategy for handling a financial emergency?	Item 1: Dichotomous scale (yes/no) Item 2: 6- point scale (I don't have a strategy; Borrow from payday lender; Borrow from friends or family; Borrow from another source; Use credit card; Use savings)	NR	Basu et al. (2015)
64	College Stress Inventory (adapted for use with	Multi	O	Financial stress items: In the last month, how often have you experienced: (1) Difficulty paying student fees next quarter (2) Financial difficulties due to	6-point Likert scale (1 = Never to 6 = Very often)	Items were averaged and higher scores indicated greater levels of stress.	Jones et al. (2022)

	Hispanic students) (Solberg et al, 1993)					owing money (3) Difficulty paying rent (4) Difficulty paying for food (5) Difficulty paying for recreation and entertainment (6) Difficulty due to your family experiencing money problems			
65	Aadapted from the Family Transitions Project (Spilman & Burzette, 2006)	Uni	O	S	P	(1) I have trouble sleeping because of my financial problems. (2) I am concerned because I cannot afford adequate health insurance. (3) I often worry about my financial situation. (4) My financial situation is much worse this year than it was a year ago. (5) I do not know how I will be able to support myself in the next year.	5-point Likert scale (1 = strongly disagree to 5 = strongly agree)	Higher scores reflect greater financial concerns.	Kelley et al. (2018)
66	NR (Starrin, Aslund, & Nilsson, 2009)	Uni	O			(1) During the past 12 months, has it been difficult for you to pay your monthly costs, such as rent, mortgage, etc.? (2) If you suddenly ended up in an unforeseen situation where you had to raise SEK 20 000 (~€2100), would you be able to?	Item 1: 5-point Likert scale (No; yes, one month; yes, 2 months; yes, 3–5 months; or yes, 6–12 months) Item 2: Dichotomous scale (yes/no)	Sum the points for questions 1 and 2, and then categorize the result as: 0 = No financial stress, 1 = Medium financial stress, 2 = High financial stress.	Aslund et al. (2014)

67	Financial Stress ^r (in the Quality of Life Survey) (Ottawa Defence Research and Development, 2010)	Uni	O	Do you feel you are ... (1) Living comfortably on present household income, (2) Coping on present income, (3) Finding it difficult to cope on present household income, or (4) Finding it very difficult to cope on present household income.	4-point scale	NR	Wang & Pullman (2019)
68	Financial Hardship ^s (Taylor et al, 2021)	Multi	S	(1) How worried are you right now about not having enough to pay your normal monthly bills? (2) How worried are you right now about not being able to pay your rent, mortgage, or other housing costs? (3) How worried are you right now about not being able to make the minimum payments on your credit cards? (4) How worried are you right now about not having enough money for retirement? (5) How worried are you right now about not being able to maintain the standard of living you enjoy?	4-point Likert scale (1 = very worried to 4 = not worried at all)	General financial stress was defined as reporting feeling “moderately worried” or “very worried” about monthly bills, housing costs, minimum payments on credit cards, retirement contributions, or maintaining standard of living.	Taylor et al. (2021)
69	Modified version of the Australian Bureau of Statistics (ABS)	Uni	O	(1) Sought help from welfare/community organization/friends/family (2) Could not pay bills (3) Could not pay for car registration or insurance	Dichotomous scale (yes/no)	For each item, “yes” = 1, “no” = 0. Dichotomize the sum. 1+ = “experienced financial stress”	DiGiacomo et al. (2020)

Household
Expenditure
Survey
(HES)
(Australian
Bureau of
Statistics,
2009)

(4) Pawned or sold something
(5) Went without meals

Note. NR = Not reported. Uni = Unidimensional. Multi = Multidimensional. O = Objective. S = Subjective. P = Physiological.

Table Q3

Scales Used to Measure Financial Worry

#	Measure	Dim	Items	Scale	Scoring	Review articles that used this measure
1	Derived from the National Health Interview Survey (NHIS) ^t (National Center for Health Statistics, 2019)	Uni	How worried are you right now about (1-8): (1) not having enough money for retirement? (2) medical costs of a serious illness or accident? (3) not being able to maintain the standard of living you enjoy? (4) not being able to pay medical costs for normal healthcare? (5) having enough money to pay for your children's college? (6) not having enough to pay your normal monthly bills? (7) not being able to pay your rent, mortgage, or other housing costs?	Items 1-8: 4-point Likert scale (very worried, moderately worried, not too worried, or not worried at all) Item 9: 3-point Likert scale (very worried, somewhat worried, or not at all worried)	NR	Arega et al. (2022) DeRigne et al. (2019)

			(8) not being able to make the minimum payments on your credit cards? (9) If you get sick or have an accident, how worried are you that you will be able to pay your medical bills?			
2	Financial Worry Scale (de Bruijn & Antonides, 2020)	Multi	Financial worry-related emotions: (1) When I think about my financial situation, I feel carefree* (2) I feel insecure when I think about my financial future (3) When I think about my finances, I feel relaxed* (4) I feel anxious when I think about my Financial worry-related cognitions: (1) I never wonder whether I can pay my bills* (2) I constantly think about the uncertainty of my financial future (3) I often wonder whether I have enough money to make ends meet (4) I think a lot about how to solve financial problems	5-point Likert scale (1 = completely disagree to 5 = completely agree)	Items with an asterisk are reverse coded.	deBruijn & Antonides (2020)
3	NR (Meuris & Leana, 2018)	Uni	(1) How often have you been worried about your financial situation? (2) How often have you felt satisfied with your financial situation (R)? (3) How often have you felt overwhelmed by your financial obligations? (4) How often do you feel that you do not have enough money?	5-point Likert scale (1 = never to 5 = always)	NR	Meuris & Leana (2018)

4	Things I Worry About Scale ^u (Millar & Gallagher, 1996)	Multi	Money matters: (1) Having enough money (2) Never having any money (3) Looking after my money (4) Paying my debts (5) Having enough money to keep myself when I am older (6) Having to work to earn enough money (7) Having to ask friends/parents for money (8) Not making anything out of my life	4-point Likert (1 = Never Worry to 4 = Always Worry)	Average the items. Higher scores indicated higher levels of worry in that domain.	Barlett & Barlett (2019)
5	Items from National Center for Health Statistics (NHIS) Survey (National Center for Health Statistics, 2014)	Uni	How worried are you about... (1) medical costs of healthcare (2) paying rent/mortgage/housing costs (3) maintaining standard of living (4) paying monthly bills	4-point Likert scale (1 = not worried at all to 4 = very worried)	“not worried at all” = not experiencing financial worries. “not too worried,” “moderately worried,” or “very worried” = experiencing financial worries.	Tsuchiya et al. (2020)
6	NR	Uni	We operationalized worry about having sufficient financial resources using 4 individual-level measures that assessed worry about money related to: (1) retirement (2) standard of living (3) monthly bills	4-point Likert scale (“very worried,” “moderately worried,” “not too worried,” and “not worried at all”)	For each item, “very worried” = 2, “moderately worried” = 1, “not too worried/not worried at all” = 0.	Zheng et al. (2020)

			(4) rent, mortgage, or other housing costs		Sum all items (range 0 to 8). Financial worry intensity level: 0 to 1 = minor/none 2 to 4 = moderate 5+ = severe.	
7	Based on Robb et al. (2019) and Woodyard et al. (2016) p	Multi	Financial worry items: (1) "I worry about running out of money in retirement," (2) "Thinking about my personal finances make me feel anxious," and (3) "Discussing my finances can make my heart race or make me feel stressed."	Financial worry: Items 1-3: 7-point Likert scale (1 = strongly disagree to 7 = strongly agree)	NR	Magwegwe et al. (2022)

Note. NR = Not reported. Dim = Dimensionality. Uni = Unidimensional. Multi = Multidimensional.

Table Q4

Scales Used to Measure Other Related Constructs

Measure	Construct	Dimensi- onality	Items	Scale	Scoring	Review articles that used this measure
Money Anxiety Subscale ^v (from the Attitudes Towards Money Scale) (Lim et al., 1997)	Money anxiety	Uni	(1) I worry about my finances much of the time. (2) Compared to most other people I know, I believe that I think about money much more than they do.	9-point Likert scale (1 = Strongly disagree to 9 = Strongly agree)	Average the items.	Amani & Shabahang (2017) Kersten et al. (2019)

			(3) I often feel inferior to others who have more money than me. (4) I often feel anxious and defensive when asked about by personal finances.			
Anxiety Subscale (from the Money Attitudes Scale; Yamauchi & Templer, 1982)	Money anxiety	Multi	(1) It's hard for me to pass up a bargain. (2) I am bothered when I have to pass up a sale. (3) I spend money to make myself feel better. (4) I show signs of nervousness when I don't have enough money. (5) I show worrisome behavior when it comes to money. (6) I worry that I will not be financially secure.	7-point Likert scale (always to never)	NR	Kersten et al. (2019) ^w
Money Anxiety Subscale (from the Attitudes Towards Money Scale) (Yamauchi & Templer, 1982)	Money worries	Uni	(1) I worry about my finances much of the time. (2) Compared to most other people I know, I believe that I think about money much more than they do. (3) I often feel inferior to others who have more money than me. (4) I often feel anxious and defensive when asked about by personal finances.	9-point Likert scale (1 = Strongly disagree to 9 = Strongly agree)	Average the items.	Kersten et al. (2019) Amani & Shabahang (2017)
Money Mental Health Scale (Richardson et al., 2022)	Money worries	Uni	(1) I feel my mental health affects how much I can manage my finances. (2) I feel my financial difficulties impact my mental health.	5-point Likert scale (0 = Not at all to 4 = Most or all the time)	Higher scores represent a greater impact of financial difficulties on	Richardson et al. (2022)

(3) I worry a lot about my debt/money situation.	mental health.
(4) I avoid my finances because it makes me feel anxious, e.g., not opening bills, not ringing bank.	
(5) I impulsively spent more than I can afford.	
(6) I feel like I have no control over my financial situation.	
(7) I find it hard to accept my financial situation.	
(8) I feel hopeless about my financial situation.	
(9) I criticize and blame myself for my financial situation.	

Note. NR = Not reported. Uni = Unidimensional. Multi = Multidimensional

^a Archuleta et al. (2020) omitted items 2 and 3, and Carlson et al. (2015) omitted items 4, 6, and 7. Vieira et al. (2021) added an item: “My financial situation causes me insecurity.” Grable et al. (2014) added an item, asking participants to indicate their current level of financial anxiety.

^b The FAS has 10 items, not 12. Shapiro et al. (2012) presents factor loadings for 12 items but removed two items.

^c Grable et al. (2014) used a single item to measure financial anxiety, but also used Archuleta et al.’s (2013) FAS to measure “financial stress.”

^d Heo et al. (2021) conceptualize financial anxiety as a subconstruct of financial stress.

^e Byaruhanga et al. (2019) and Koomson et al. (2022) used items 1 to 7. Guillaumier et al. (2014) and Guillaumier et al. (2017) included item 8. Kutin et al. (2017) used items 1, 3-8, and included item 9.

^f Du et al. (2021) refer to this scale as the “University Student Financial Stress Assessment (USFA) Tool,” but this name is not reported by the Ohio State University (2011) or Lim et al. (2014).

^g Ponnet (2014; 2016) conceptualize financial stress as comprising three subconstructs: financial burden, need, and insecurity. The financial burden items were adapted from the EU Statistics on Income and Living Conditions instrument (Eurostat 2008). No citation was provided for the financial need or insecurity items. DeMeulenaere et al. (2022) only used financial need and insecurity items.

^h Moran et al. (2019) used five items from the 87-item Weekly Stress Inventory.

ⁱ Kim et al. (2022) omitted two items that were not relevant to their sample.

^j Items based on Delafrooz and Paim (2013).

^k Petitta et al. (2020) indicated “items [were] developed by the second author of the present paper,” but no formal citation was provided.

^l Sturgeon et al. (2016) used six of the 11 financial items reported in Dohrenwend et al. (1978).

^m Schenck-Fontaine et al. (2019) did not provide an exact source for the item but stated “This question is comparable to questions used in other studies that have measured financial stress in the United Kingdom, the European Union, and the United States (Gauthier and Furstenberg, 2010; Leininger and Kalil 2014; Shawetal. 2014).”

ⁿ It is unclear what “better” means in this context.

^o Ayyala et al. (2019) used the same three items as Porrino et al. (2017), originating from the six items presented in Selenko & Batinic (2011).

^p Magwegwe et al. (2022) did not provide a citation for the financial worry items.

^q Serido et al. (2014) constructed their indices “consistent with the approach followed by other researchers (e.g., Prawitz et al. 2013).”

^r Aslund et al. (2014) used two of the six items reported in Starrin et al. (2009).

^s General financial stress is a subcomponent of financial hardship.

^t DeRigne et al. (2019) added item 9.

^u Barlett et al. (2019) report using six items from the 8-item Things I Worry About scale. It is unclear which six items were used.

^v Kersten et al. (2019) omitted item 4.

^w Kersten et al. (2019) used three of the six items , omitting items 1, 2, and 3.

Appendix R

Reading Level Calculation for the Initial Item Pool

I calculated the reading level for my pool of financial anxiety items (administered to the Primary Development Sample in Study 3a) in accordance with guidelines presented by Fry (1977). I randomly selected three samples of 100-word passages within my set of items. I counted the number of sentences and syllables in each passage and reported these values in Table R1.

Table R1

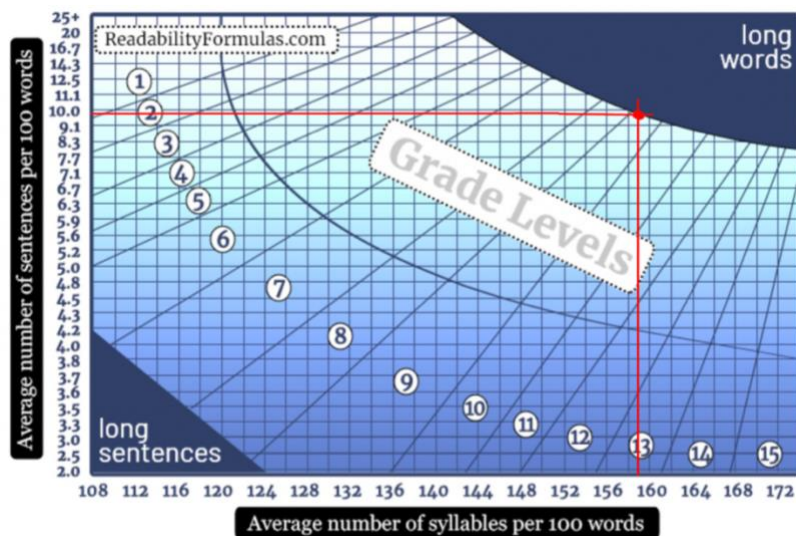
Characteristics of Sentences in the Initial Item Pool

	Number of sentences	Number of syllables
First 100 words	9	139
Second 100 words	9	152
Third 100 words	11	187
Total	29	478
Average	9.7	159.3

I entered this data into a graph with average sentence length on the y-axis and average number of syllables on the x-axis. The area where the two lines intersect signifies the approximate reading grade level of the content. Based on this calculation, my items are estimated to score at a Grade 9 reading level.

Figure R1

Fry Readability Graph for Estimating Reading Grade Level



Note. This graph presents the estimated reading level for my initial pool of items.

Appendix S

Study 3a Financial Anxiety Items Administered to the Primary Development Sample

Note that ^R signals reverse-coded items.

Demands and Resources

If you are in a partnership where you share finances, please answer the following questions taking into consideration your combined finances. In the past six months, how often did the following happen to you **due to a shortage of money?**

- 1 = Never
- 2 = Rarely
- 3 = Sometimes
- 4 = Almost always
- 5 = Not applicable to me
- 6 = I don't understand this statement

1. I could not pay my rent or mortgage on time (Siahpush et al., 2007).
2. I could not pay my electricity, gas, or phone bill on time (Siahpush et al., 2007).
3. I missed a meal (Adapted from Siahpush et al., 2007).
4. I relied on social assistance and/or welfare payments (Adapted from Serido et al., 2014 and Siahpush et al., 2007).
5. I relied on financial help from family or friends (Adapted from Siahpush et al., 2007).
6. I borrowed money from a payday advance business or "loan shark."
7. I went without things I really needed.
8. I put off getting health care (e.g., dental, glasses, prescription medication) for myself and/or my family (Adapted from Hilton & Devall, 1997).
9. I could not go out to eat, go to a movie, or do something else I wanted (Adapted from Prawitz et al., 2006).
10. I gave up things I wanted (e.g., going to the movies) to pay for things I needed (e.g., food, housing) (Adapted from Cattaneo et al., 2019).

In the past six months...

11. I had a reliable income that covered my basic costs (e.g., food, housing, bills).^R
12. I had money left over to spend how I wanted after covering my basic costs^R (Adapted from CFPB Financial Well-Being Scale, 2020).
13. I had enough money to spend on entertainment (e.g., movies, concerts, sporting events).^R
14. I had enough money to participate in hobbies or pastimes I enjoy.^R
15. I had enough money to eat out or order takeout from restaurants when I wanted to.^R

Feelings

Rate how much you agree with each statement based on how you *generally feel*.

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Agree
- 4 = Strongly agree
- 5 = Not applicable to me
- 6 = I don't understand this statement

These statements are about your feelings towards your **personal financial situation**.

1. I feel like I am struggling to make ends meet.
2. I feel overwhelmed by my current financial situation.
3. I find myself excessively worrying about my financial situation (Adapted from Archuleta et al., 2013).
4. I feel anxious that I won't be able to pay for things I need (e.g., food, housing, bills).
5. I feel anxious that I won't have enough money in the future.
6. I feel anxious when faced with a financial decision.
7. I tend to second guess my financial decisions.
8. I feel satisfied with my current financial situation.^R
9. I feel in control of my financial situation.^R
10. I feel at ease with the financial decisions I make.^R
11. I feel at ease with my ability to meet my monthly expenses.^R
12. I get tense when I think about my financial situation (Adapted from Archuleta et al., 2013).
13. I get sweaty when I think about my financial situation (Adapted from Heo et al., 2020).
14. I can feel my heart race when I think about my financial situation (Adapted from Shapiro & Burchell, 2012).
15. I get stomach aches when I think about my financial situation (Adapted from Heo et al., 2020).
16. I have a hard time sleeping because of my financial situation (Adapted from Archuleta et al., 2013).
17. I have a hard time concentrating on my school or work because of my financial situation (Adapted from Archuleta et al., 2013).

These statements are about your feelings towards financial information **in general**.

1. I feel anxious when talking to financial experts about financial topics.
2. I get nervous when I think about learning new things about finances.
3. I feel overwhelmed by how complicated financial topics can be.
4. I feel intimidated by financial terms.
5. I feel uneasy about the language used by financial experts (Adapted from Fünfgeld & Wang, 2009).
6. I get tense when I think about financial concepts (Adapted from Archuleta et al., 2013).

7. I get sweaty when I think about financial concepts (Adapted from Heo et al., 2020).
8. I can feel my heart race when I think about financial concepts (Adapted from Shapiro & Burchell, 2012).
9. I get stomach aches when I think about financial concepts (Adapted from Heo et al., 2020).
10. I enjoy exploring and understanding new financial terms and concepts.^R
11. I feel comfortable discussing financial topics with experts.^R
12. I enjoy books, blogs, or podcasts that cover financial topics.^R
13. I feel confident in my ability to grasp complex financial information.^R
14. I get excited about learning new financial concepts.^R

Engagement

These statements are about your actions towards your **personal financial situation**.

1. I avoid thinking about my financial situation.
2. I do not make a big effort to understand my financial situation. (Adapted from Shapiro & Burchell, 2012)
3. I rarely open my bank statements (Adapted from Richardson et al., 2022).
4. I would let someone else manage all my personal finances if I could (Adapted from Shapiro & Burchell, 2012)
5. I put off handling my finances for as long as possible.
6. I avoid situations that make me think deeply about my financial situation.
7. I have no interest in better understanding my financial situation.
8. I disengage from conversations about my financial situation.
9. I postpone financial decisions (Adapted from Fünfgeld & Wang, 2009).
10. I ignore my financial problems rather than facing them.
11. I procrastinate when making a financial decision.
12. I would ask financial experts for advice if I needed to.^R
13. I promptly handle my finances without delay.^R
14. I seek out situations that require me to think deeply about my financial situation.^R
15. I actively keep track of my personal finances.^R
16. I am well-informed about my current financial situation.^R

These statements are about your actions towards financial information **in general**.

1. I find myself zoning out when people talk about finances.
2. I lose interest when people talk about financial concepts.
3. I stay away from situations that require me to learn about financial concepts.
4. I pass up chances to learn more about financial concepts.
5. I do not pay close attention to financial trends.
6. I am uninterested in learning about financial trends and developments.
7. I actively engage in conversations about financial concepts.^R
8. I am open to learning about financial concepts I am unfamiliar with.^R
9. I would take a course on financial planning if given the opportunity.^R
10. I initiate discussions on financial topics.^R

11. I like to stay up to date on the latest financial news or trends.^R
12. I actively seek out ways to improve my understanding of new financial concepts.^R
13. I am curious about exploring financial information through books, blogs, or podcasts.^R

Appendix T

Ethics Certificate for Study 2

20/10/2023

Université d'Ottawa

Bureau d'éthique et d'intégrité de la recherche

University of Ottawa

Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number

H-09-23-9545

Titre du projet / Project Title

Development of a Financial
Anxiety Scale

Type de projet / Project Type

Thèse de doctorat / Doctoral
thesis

Statut du projet / Project Status

Approuvé / Approved

Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)

20/10/2023

Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)

19/10/2024

Équipe de recherche / Research Team

Chercheur / Researcher Affiliation

Andie STOROZUK

École de psychologie / School of Psychology

Erin MALONEY

École de psychologie / School of Psychology

Role

Chercheur Principal / Principal Investigator

Superviseur / Supervisor

Germain ZONGO

Responsable d'éthique en recherche / Protocol Officer

Pour/For **Daniel LAGAREC** Président(e) du/ Chair of the **Comité d'éthique de la recherche en sciences de la santé et sciences / Health Sciences and Sciences Research Ethics Board**

Appendix U

Study 3a Exclusion Procedure Primary Development Sample

I excluded 14 people from the Primary Development Sample based on the comprehension questions ($n = 3$), evidence of inattention ($n = 6$), completion speed ($n = 2$), and a lack of Canadian residency ($n = 3$). In accordance with Prolific's compensation regulations, participants had two opportunities to correctly answer the comprehension questions. Ten people initially failed the first question, and nine responded correctly on the second attempt. Five people initially failed the second question, and three responded correctly on the second attempt. This means that three participants failed to successfully complete the comprehension questions and did not gain access to the survey. I will note that Prolific's regulations allow participants who fail these types of comprehension checks to "return" their survey rather than receive a payment rejection. The action of returning the survey rescinds their data from our server. The three participants who failed the comprehension questions also failed to return their survey on the Prolific platform, enabling me to view their failed responses to these items. However, 14 other participants returned their surveys. This could be because they failed the comprehension items or because they no longer wished to participate. Indeed, participants can choose to return their survey at any time, for any reason. It is therefore possible the comprehension items screened out a total of 17 respondents, but it is not possible to know be certain beyond the three participants whose responses I can access.

I used longstring analysis to identify participants who used the same response category, consecutively, throughout measures that require reverse scoring (i.e., the STAI and my financial anxiety items; Yan, 2008). I removed participants with a string of responses that demonstrated inattention. I quantified this by subtracting the number of reverse-coded items from the total

number of items in the scale and adding two to account for possible error (e.g., confusion when flipping between positively and negatively valanced items) or the possibility that someone intended to endorse conflicting statements. For example, the STAI has a total of 20 items, nine of which are reverse-coded. A consecutive string of 13 items with the same response category is considered acceptable, whereas a score of 14 or more would suggest inattention. Based on these criteria, I excluded six participants who demonstrated inattention. I set an arbitrary cut-off for completion speed at 5 minutes. I excluded participants who completed the survey in under 5 minutes ($n = 2$), as I designed the survey to take approximately 20 minutes to complete. I also removed participants who indicated that they were not a resident of Canada ($n = 3$).

Appendix V

Study 3a Consent Form Primary Development Sample

Project: *What does it mean to be financially anxious?*

Managing money is part of daily life, but financial products and services are more complex than ever. All Canadians need a solid foundation of financial knowledge and skills to live within their means and feel in control of their financial lives. To help us effectively improve financial literacy in Canada, we need to better understand people's emotions towards finances.

Your Participation

Your participation will consist of completing a 30-minute survey in which you will be asked questions regarding demographics, anxiety, and financial stress. We will ask some questions about your family background to better understand who is represented in the creation of our new measure of financial anxiety. Participation in this study is voluntary. You are free to withdraw from the project at any time (before or during the session), or to refuse to answer any questions. If you choose to withdraw before or during the session, your data will not be used in the study. Once you have submitted the questionnaire, you will not be able to withdraw your data, as it is completely anonymous.

Benefits

Your participation today will provide valuable insight into what it means to be financially anxious and how this differs from (or is similar to) related constructs, such as financial stress. Your responses will be used to develop measures and strategies to improve financial literacy and emotional well-being towards finances. You may also gain increased self-awareness regarding your feelings and experiences related to finances and anxiety, which may be valuable for personal development.

Data Storage

Your data will initially be stored online using the Qualtrics server. It will then be downloaded onto a password protected USB drive that will be kept in a locked home office as well as onto a password server that is only accessible by those listed on the ethics application. The data will then be deleted from the Qualtrics server immediately. This action is irreversible and permanently removes data from the online server. Data will be stored on the servers and USB drive indefinitely from time of collection. The starting time of the retention period will begin immediately following the completion of data collection.

Confidentiality and Privacy

The information you share will remain strictly confidential. If the researchers publish the results of this study, then they may include the data in an online repository for other researchers to use. The data may also be used for student projects under the supervision of Dr. Erin Maloney. Any identifying information (e.g., postal code, IP address) will never be included with your data. To minimize the risk of security breaches and to help ensure your confidentiality, we recommend that you use standard safety measures, such as signing out of your account, closing your browser, and locking your device when you are no longer using it/when you have completed the study.

Compensation

You will receive \$12/hour for your participation in this study. If at any time during the session you wish to discontinue your participation, you will still receive full compensation.

Please note that there will be attention checks throughout the survey. Participants that complete the questionnaire but respond incorrectly to any of these checks will not be compensated. We will also reject payment for nonsensical or copied-and-pasted responses. This is to ensure a high quality of data and help us detect fraudulent responses.

Resources

We strongly encourage you to print or save a copy of this consent page for your records.

Any questions about the present study can be directed to the primary investigator, Andie Storozuk, or the supervising professor, Dr. Erin Maloney.

- **Andie Storozuk**, University of Ottawa, Faculty of Social Sciences, School of Psychology
- **Dr. Erin Maloney**, University of Ottawa, Faculty of Social Sciences, School of Psychology

Any questions about your rights as a research participant may be addressed to Protocol Officer for Ethics in Research, 550 Cumberland Street, Room 154, 613-562-5387, ethics@uOttawa.ca.

While completing the questionnaires, you may notice some emotional discomfort, or become aware of difficulties you are experiencing with general anxiety and/or financial anxiety. If you would like to seek psychological or emotional support, below are some resources that you may find helpful:

- **Wellness Together Canada:** To connect with a mental health professional one-on-one: call 1-888-668-6810 or text WELLNESS to 686868 for youth. call 1-866-585-0445 or text WELLNESS to 741741 for adults.
- **Crisis Services Canada:** A 24/7 national network of distress, crisis and suicide prevention line services. This service is available across Canada via toll-free phone, or text in English. Their toll-free phone service is also available in French. Call 1-833-456-4566 or text 45645.
- **eMentalHealth.ca:** A Canada-wide mental health support service database for crisis intervention, mental health education, and services including counselling and therapy, among other health services. Visit their website at: <https://www.ementalhealth.ca/index.php?m=record&ID=15914>
- **The Lifeline App:** An app that offers access and guidance for individuals in crisis. Online chat, text, and email crisis help is also available. Visit their website to read more about the app: <https://thelifelinecanada.ca/old/lifeline-app/>

If you wish to participate in this research, please indicate your agreement by checking off the “I agree” box. If you have any questions about the conduct of the research project, you may contact the researchers.

☐ I agree to participate in this research.

☐ I do **not** agree to participate in this research.

Appendix W

Study 3 Bot Prevention and Detection Methods

After providing consent to participate in the survey, participants were required to answer two comprehension questions to demonstrate that they are human respondents.

First, you need to successfully answer **two** comprehension questions. You will be given two attempts to answer these questions correctly. If you are unable to do so, you will be asked to return your submission.

Question 1: If you were to arrange the following movies into alphabetical order, which movie title would come **last**?

- Frozen
- Tangled
- Ratatouille
- Bolt
- Moana

Correct response: Tangled

Question 2: Please read the statement below and choose the option that presents the **same text in reverse order**. For example, if the sentence said "Red trucks are fun" the correct response would be "fun are trucks Red".

She built a big house

- houses big builds She
- Built big a house She
- house big a built She
- house a built She

Correct response: house big a built She

I inserted the following three questions into the survey to serve as attentional checks:

1. Reading the instructions carefully is important. Below we present several options, such as "False" or "I don't know." If you are paying attention, please select "True." (Added to demographics)
2. I am paying attention to this survey. Select "Agree." (Added to financial anxiety items)
3. I am paying attention. Select "Often." (Added to STAI)

I used the following question for bot detection purposes, as nonsensical responses to short-answer questions are an indication of fraudulent respondents (Storozuk et al., 2020).

- The province of Ontario has recently included financial literacy as a unique strand in the math curriculum. Advocates of this change say it is important for children to learn about finances at a young age. In 2 to 3 sentences, describe your first experience learning how to manage your finances (e.g., at school, through a family member, etc.).

Appendix X

Study 3a Item Exclusion Based on the Primary Development Sample

Table X1

Exclusion Criteria of Primary Development Items Based on Item Evaluation

Item label	Item	Exclusion criteria
Demands 1	I could not pay my rent or mortgage on time.	Item-scale correlation <.5 Item standard deviation <.7 and variance <.5 Skewness >1 Kurtosis >2
Demands 2	I could not pay my electricity, gas, or phone bill on time.	Item-scale correlation <.5 Skewness >1 Kurtosis >2
Demands 3	I missed a meal.	Item-scale correlation <.5 Skewness >1
Demands 4	I relied on social assistance and/or welfare payments.	Item-scale correlation <.5 Skewness >1 Kurtosis >2
Demands 6	I borrowed money from a payday advance business or “loan shark.”	Item-scale correlation <.5 Skewness >1 Missingness related to SES and education Kurtosis >2
Demands 11	I had a reliable source of income that covered my basic costs (e.g., food, housing, bills).	Item-scale correlation <.5 Skewness >1 Kurtosis >2
Demands 13	I had enough money to spend on movies and entertainment.	Multicollinearity
Feelings personal 5	I feel anxious that I won’t have enough money in the future.	Mean deviates from center ($M = 3.24$)
Feelings personal 14	I can feel my heart race when I think about my financial situation.	Multicollinearity
Feelings personal 15	I get stomach aches when I think about my financial situation.	Multicollinearity
Engage personal 3	I rarely open my bank statements.	Item-scale correlation <.5
Engage personal 7	I have no interest in better understanding my financial situation.	Item standard deviation <.7 and variance <.5
Engage personal 12	I would ask financial experts for advice if I needed to.	Item-scale correlation <.5 Item standard deviation <.7 and variance <.5
Engage personal 15	I actively keep track of my personal finances.	Item-scale correlation <.5 Missingness related to SES

Engage personal 16	I am well-informed about my current financial situation.	Correlated to KSE-G ($r = .3$) Item-scale correlation $<.5$ Item standard deviation $<.7$ and variance $<.5$
Engage general 8	I am open to learning about financial concepts I am unfamiliar with.	Item standard deviation $<.7$ and variance $<.5$
Engage general 9	I would take a course on financial planning if given the opportunity.	Negatively correlated with some items even after reverse scoring. Item-scale correlation $<.5$
Engage general 13	I am curious about exploring financial information through books, blogs, or podcasts.	Item-scale correlation $<.5$

Note. Engage = Engagement

Table X2*Exclusion Criteria of Primary Development Items Based on Initial Factor Analysis*

Item label	Item	Exclusion criteria
Demands 5	I relied on financial help from family or friends.	Weak loading
Demands 7	I went without things I really needed.	Weak loading
Demands 8	I put off getting health care (e.g., dental, glasses, prescription medication) for myself and/or my family.	Weak loading
Demands 9	I could not go out to eat, go to a movie, or do something else I wanted.	Scale logistics
Demands 10	I gave up things I wanted (e.g., going to the movies) to pay for things I needed (e.g., food, housing).	Scale logistics
Demands 12	I had money left over to spend how I wanted after covering my basic costs.	Scale logistics
Demands 14	I had enough money to participate in hobbies or pastimes I enjoy.	Scale logistics
Demands 15	I had enough money to eat out or order takeout from restaurants when I wanted to.	Theoretical value
Feelings personal 3	I find myself excessively worrying about my financial situation.	Complex variable
Feelings personal 6	I feel anxious when faced with a financial decision.	Complex variable

Feelings personal 7	I tend to second guess my financial decisions.	Complex variable
Feelings personal 9	I feel in control of my financial situation.	Weak loading
Feelings personal 10	I feel at ease with the financial decisions I make.	Weak loading
Feelings personal 12	I get tense when I think about my financial situation.	Complex variable
Feelings personal 13	I get sweaty when I think about my financial situation.	Weak loading and verging on a complex variable
Feelings personal 16	I have a hard time sleeping because of my financial situation.	Complex variable
Feelings personal 17	I have a hard time concentrating on my school or work because of my financial situation.	Complex variable
Feelings general 1	I feel anxious when talking to financial experts about financial topics.	Weak loading
Feelings general 3	I feel overwhelmed by how complicated financial topics can be.	Complex variable
Feelings general 4	I feel intimidated by financial terms.	Complex variable
Feelings general 5	I feel uneasy about the language used by financial experts.	Verging on complex variable
Feelings general 10	I enjoy exploring and understanding new financial terms and concepts.	Theoretical value
Feelings general 11	I feel comfortable discussing financial topics with experts.	Weak loading and verging on a complex variable
Feelings general 12	I enjoy books, blogs, or podcasts that cover financial topics.	Low item-scale correlation (.516)
Feelings general 13	I feel confident in my ability to grasp complex financial information.	Complex variable
Feelings general 14	I get excited about learning new financial concepts.	Low item-scale correlation (.527)
Engage personal 1	I avoid thinking about my financial situation.	Theoretical value
Engage personal 2	I do not make a big effort to understand my financial situation.	Low item-scale correlation (.518)
Engage personal 4	I would let someone else manage all my personal finances if I could.	Weak loading
Engage personal 9	I postpone financial decisions.	Theoretical value
Engage personal 13	I promptly handle my finances without delay.	Weak loading and verging on a complex variable
Engage personal 14	I seek out situations that require me to think deeply about my financial situation.	Weak loading and verging on complex variable

Engage general 1	I find myself zoning out when people talk about finances.	Complex variable
Engage general 2	I lose interest when people talk about financial concepts.	Complex variable
Engage general 3	I stay away from situations that require me to learn about financial concepts.	Complex variable
Engage general 4	I pass up chances to learn more about financial concepts.	Complex variable
Engage general 6	I am uninterested in learning about financial trends and developments.	Weak loading

Note. Weak loadings are $<.65$. Complex variables have loadings $>.3$ on multiple factors. Items verging on complex variables have loadings $>.25$ on multiple factors. Engage = Engagement.

Appendix Y

Study 3b Exclusion Procedure Secondary Cross-Validation Sample

I excluded 18 people from the Secondary Cross-Validation Sample based on the comprehension questions ($n = 3$), evidence of inattention ($n = 8$), completion speed ($n = 4$), and a lack of Canadian residency ($n = 3$). In accordance with Prolific's compensation regulations, participants had two opportunities to correctly answer the comprehension questions. Seventeen people initially failed the first question, and sixteen responded correctly on the second attempt. Eleven people initially failed the second question, and nine responded correctly on the second attempt. This means that three participants failed to successfully complete the comprehension questions and did not gain access to the survey. I will note that Prolific's regulations allow participants who fail these types of comprehension checks to "return" their survey rather than receive a payment rejection. The action of returning the survey rescinds their data from our server. The three participants who failed the comprehension questions also failed to return their survey on the Prolific platform, enabling me to view their failed responses to these items. However, 11 other participants returned their surveys. This could be because they failed the comprehension items or because they no longer wished to participate. Indeed, participants can choose to return their survey at any time, for any reason. It is therefore possible the comprehension items screened out a total of 14 respondents, but it is not possible to know be certain beyond the three participants whose responses I can access.

I used longstring analysis to identify participants who used the same response category, consecutively, throughout measures that require reverse scoring (i.e., the STAI and my financial anxiety items; Yan, 2008). I removed participants with a string of responses that demonstrated inattention. For the STAI, I quantified this by subtracting the number of reverse-coded items

from the total number of items in the scale and adding two to account for possible error (e.g., confusion when flipping between positively and negatively valanced items) or the possibility that someone intended to endorse conflicting statements. For example, the STAI has a total of 20 items, nine of which are reverse-coded. A consecutive string of 13 items with the same response category is considered acceptable, whereas a score of 14 or more would suggest inattention. For the financial anxiety items, I assessed the five “Feelings Personal” items, two of which are reverse-coded. Again, to account for possible error, I deemed a response of four as acceptable, but flagged respondents that straight-lined across all five items. Based on these criteria, I excluded eight participants who demonstrated inattention. I set an arbitrary cut-off for completion speed at four minutes. I excluded participants who completed the survey in under four minutes ($n = 4$), as I designed the survey to take approximately 10 minutes to complete. I also removed participants who indicated that they were not a resident of Canada ($n = 3$).

Appendix Z

Ethics Certificate for Study 4

12/06/2023

Université d'Ottawa

Bureau d'éthique et d'intégrité de la recherche

University of Ottawa

Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number

H-06-20-5845

Titre du projet / Project Title

Understanding the factors that contribute to financial illiteracy in Canada

Type de projet / Project Type

Recherche de professeur / Professor's research project

Statut du projet / Project Status

Renouvelé / Renewed

Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)

09/07/2020

Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)

08/07/2024

Équipe de recherche / Research Team

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COLORADO

Student-researcher

Coordonateur / COORDINATOR
Coordonnateur de l'éthique / Ethics Coordinator
Pour/For Daniel LAGAREC Président(e) du/ Chair of the Comité d'éthique de la recherche en sciences de la santé et sciences / Health Sciences and Sciences Research Ethics Board

Appendix AA

Study 4 Supplementary Analyses

In Study 4, I conducted a series of regressions to determine whether financial anxiety relates to the four components of financial literacy. For analyses that do not include financial stress in Model 1, please refer to Tables AA1 through AA4. For analyses that do not include financial stress in Model 1 but include math anxiety in Model 2, and thus parallel the analyses conducted in Study 1, see tables AA5 through AA8.

Table AA1

Multiple Regression Assessing Factors Related to Financial Knowledge

Variable	Financial Knowledge											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.269	0.058		0.156	0.383	<.001	0.556	0.077		0.405	0.708	<.001
Age	0.005	0.001	0.289	0.003	0.007	<.001	0.005	0.001	0.275	0.003	0.006	<.001
Gender	-0.121	0.019	-0.301	-0.158	-0.085	<.001	-0.093	0.018	-0.230	-0.128	-0.057	<.001
Education	0.026	0.009	0.147	0.009	0.044	0.003	0.022	0.008	0.119	0.005	0.038	0.009
Income	0.024	0.006	0.186	0.012	0.035	<.001	0.013	0.006	0.101	0.001	0.024	0.028
Numeracy	0.294	0.051	0.279	0.194	0.394	<.001	0.252	0.048	0.240	0.159	0.346	<.001
General Anxiety							0.112	0.070	0.080	-0.026	0.249	0.110
Financial Anxiety							-0.496	0.073	-0.357	-0.638	-0.353	<.001
R^2	.411						.493					
ΔR^2	.411						.084					
F	42.53					<.001	42.27					<.001

Note. $N = 298$; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit; ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6 (Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table AA2*Multiple Regression Assessing Factors Related to Financial Confidence*

Variable	Financial Confidence											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	2.936	0.453		2.044	3.827	<.001	6.604	0.532		5.558	7.651	<.001
Age	0.018	0.006	0.157	0.006	0.031	0.004	0.015	0.005	0.126	0.005	0.025	0.005
Gender	-0.808	0.147	-0.298	-1.097	-0.519	<.001	-0.472	0.124	-0.174	-0.715	-0.229	<.001
Education	0.107	0.069	0.088	-0.029	0.243	0.121	0.045	0.057	0.037	-0.066	0.157	0.427
Income	0.109	0.047	0.128	0.016	0.202	0.022	-0.022	0.040	-0.026	-0.101	0.057	0.582
Numeracy	1.059	0.398	0.150	0.276	1.843	0.008	0.541	0.327	0.077	-0.103	1.185	0.099
General Anxiety							0.928	0.479	0.098	-0.014	1.870	0.054
Financial Anxiety							-5.803	0.491	-0.625	-6.768	-4.837	<.001
R^2	.192						.465					
ΔR^2	.192						.272					
F	15.21					<.001	38.07					<.001

Note. $N = 300$; Model = “Enter” Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6 (Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table AA3

Multiple Regression Assessing Factors Related to Financial Attitudes

Variable	Financial Attitudes											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.421	0.067		0.289	0.552	<.001	0.743	0.090		0.566	0.920	<.001
Age	0.001	0.001	0.046	-0.001	0.003	0.439	0.000	0.001	0.029	-0.001	0.002	0.607
Gender	0.034	0.022	0.094	-0.008	0.077	0.115	0.064	0.021	0.176	0.023	0.106	0.002
Education	0.005	0.010	0.032	-0.015	0.025	0.608	0.000	0.010	0.000	-0.019	0.019	0.997
Income	0.019	0.007	0.167	0.006	0.033	0.006	0.007	0.007	0.064	-0.006	0.021	0.280
Numeracy	0.054	0.059	0.057	-0.061	0.170	0.356	0.007	0.055	0.008	-0.102	0.116	0.895
General Anxiety							0.127	0.081	0.099	-0.033	0.286	0.119
Financial Anxiety							-0.554	0.083	-0.441	-0.717	-0.391	<.001
R^2	.035						.162					
ΔR^2	.035						.130					
F	3.17					.008	9.26					<.001

Note. $N = 300$; Model = "Enter" Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table AA4*Multiple Regression Assessing Factors Related to Financial Behaviour*

Variable	Financial Behaviour											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.362	0.052		0.259	0.464	<.001	0.820	0.062		0.698	0.943	<.001
Age	0.001	0.001	0.087	0.000	0.003	0.094	0.001	0.001	0.050	0.000	0.002	0.244
Gender	-0.040	0.017	-0.122	-0.073	-0.007	0.019	0.000	0.014	0.001	-0.028	0.029	0.981
Education	0.024	0.008	0.164	0.008	0.040	0.003	0.015	0.007	0.102	0.002	0.029	0.026
Income	0.035	0.005	0.337	0.024	0.045	<.001	0.020	0.005	0.190	0.010	0.029	<.001
Numeracy	0.145	0.046	0.170	0.055	0.236	0.002	0.086	0.038	0.100	0.010	0.161	0.027
General Anxiety							-0.008	0.056	-0.007	-0.118	0.102	0.889
Financial Anxiety							-0.603	0.057	-0.540	-0.715	-0.490	<.001
R^2	.272						.503					
ΔR^2	.272						.230					
F	23.07					<.001	43.65					<.001

Note. $N = 296$; Model = "Enter" Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table AA5*Multiple Regressions Assessing Factors Related to Mathematical and Conceptual Financial Knowledge*

Variable	Mathematical Financial Knowledge											
	Model 1						Model 2					
	B	SE _B	β	95% CI for β		p	B	SE _B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.307	0.080		0.149	0.464	<.001	0.579	0.115		0.352	0.805	<.001
Age	0.006	0.001	0.253	0.003	0.008	<.001	0.005	0.001	0.243	0.003	0.007	<.001
Gender	-0.120	0.026	-0.238	-0.171	-0.070	<.001	-0.098	0.026	-0.193	-0.149	-0.047	<.001
Education	0.042	0.012	0.182	0.018	0.065	0.001	0.036	0.012	0.159	0.013	0.060	0.003
Income	0.009	0.008	0.058	-0.007	0.026	0.267	0.002	0.008	0.010	-0.015	0.018	0.846
Numeracy	0.376	0.070	0.283	0.238	0.515	<.001	0.314	0.071	0.236	0.174	0.454	<.001
General Anxiety							0.162	0.102	0.092	-0.039	0.363	0.114
Math Anxiety							-0.115	0.080	-0.079	-0.272	0.042	0.149
Financial Anxiety							-0.410	0.104	-0.237	-0.615	-0.205	<.001
R^2	.301						.340					
ΔR^2	.301						.045					
F	26.21					<.001	19.87					<.001
	Conceptual Financial Knowledge											
	B	SE _B	β	95% CI for β		p	B	SE _B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.253	0.064		0.126	0.379	<.001	0.570	0.089		0.395	0.744	<.001
Age	0.005	0.001	0.264	0.003	0.007	<.001	0.005	0.001	0.250	0.003	0.006	<.001
Gender	-0.118	0.021	-0.279	-0.159	-0.077	<.001	-0.088	0.020	-0.208	-0.128	-0.049	<.001
Education	0.024	0.010	0.124	0.004	0.043	0.016	0.018	0.009	0.095	0.000	0.036	0.050
Income	0.028	0.007	0.207	0.015	0.041	<.001	0.016	0.006	0.120	0.003	0.029	0.014
Numeracy	0.274	0.056	0.247	0.164	0.385	<.001	0.225	0.054	0.203	0.118	0.332	<.001
General Anxiety							0.138	0.079	0.093	-0.019	0.294	0.084
Math Anxiety							-0.018	0.061	-0.014	-0.138	0.103	0.774
Financial Anxiety							-0.540	0.082	-0.370	-0.701	-0.380	<.001
R^2	.356						.442					
ΔR^2	.356						.090					
F	33.34					<.001	29.98					<.001

Note. Mathematical $N = 294$; Conceptual $N = 294$; B = unstandardized regression coefficient; SE_B = standard error of the coefficient; β = standardized

coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit; ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman.

Education is measured from 1 (I have not completed high school) to 6 (Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table AA6*Multiple Regression Assessing Factors Related to Financial Confidence*

Variable	Financial Confidence											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	2.922	0.459		2.017	3.826	<.001	6.730	0.554		5.640	7.820	<.001
Age	0.018	0.006	0.158	0.006	0.031	0.004	0.015	0.005	0.126	0.004	0.025	0.006
Gender	-0.797	0.148	-0.295	-1.089	-0.505	<.001	-0.471	0.125	-0.174	-0.716	-0.225	<.001
Education	0.100	0.070	0.082	-0.037	0.237	0.153	0.035	0.058	0.028	-0.079	0.148	0.549
Income	0.102	0.047	0.120	0.009	0.196	0.032	-0.027	0.040	-0.031	-0.106	0.053	0.510
Numeracy	1.128	0.402	0.159	0.337	1.919	0.005	0.528	0.340	0.075	-0.141	1.197	0.121
General Anxiety							0.977	0.493	0.104	0.007	1.946	0.048
Math Anxiety							-0.264	0.383	-0.034	-1.018	0.490	0.491
Financial Anxiety							-5.736	0.501	-0.619	-6.722	-4.749	<.001
R^2	.190						.463					
ΔR^2	.190						.273					
F	14.78					<.001	32.63					<.001

Note. $N = 295$; Model = "Enter" Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table AA7*Multiple Regression Assessing Factors Related to Financial Attitudes*

Variable	Financial Attitudes											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.425	0.068		0.291	0.559	<.001	0.724	0.094		0.540	0.908	<.001
Age	0.001	0.001	0.047	-0.001	0.003	0.431	0.001	0.001	0.033	-0.001	0.002	0.560
Gender	0.036	0.022	0.098	-0.007	0.079	0.103	0.064	0.021	0.174	0.023	0.105	0.003
Education	0.004	0.010	0.027	-0.016	0.025	0.665	0.001	0.010	0.004	-0.019	0.020	0.949
Income	0.020	0.007	0.171	0.006	0.034	0.005	0.007	0.007	0.061	-0.006	0.020	0.307
Numeracy	0.045	0.059	0.047	-0.072	0.162	0.450	0.011	0.057	0.012	-0.102	0.124	0.845
General Anxiety							0.113	0.083	0.089	-0.051	0.277	0.174
Math Anxiety							0.079	0.065	0.075	-0.048	0.207	0.222
Financial Anxiety							-0.577	0.085	-0.459	-0.744	-0.410	<.001
R^2	.035						.166					
ΔR^2	.035						.137					
F	3.12					.009	8.23					<.001

Note. $N = 295$; Model = "Enter" Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).

Table AA8*Multiple Regression Assessing Factors Related to Financial Behaviour*

Variable	Financial Behaviour											
	Model 1						Model 2					
	B	SE_B	β	95% CI for β		p	B	SE_B	β	95% CI for β		p
				LL	UL					LL	UL	
Constant	0.352	0.052		0.249	0.456	<.001	0.762	0.064		0.637	0.887	<.001
Age	0.001	0.001	0.084	0.000	0.003	0.108	0.001	0.001	0.053	0.000	0.002	0.219
Gender	-0.037	0.017	-0.112	-0.070	-0.003	0.032	0.000	0.014	-0.001	-0.028	0.028	0.980
Education	0.025	0.008	0.168	0.009	0.041	0.002	0.019	0.007	0.126	0.006	0.032	0.006
Income	0.036	0.005	0.346	0.025	0.046	<.001	0.019	0.005	0.185	0.010	0.028	<.001
Numeracy	0.145	0.046	0.169	0.054	0.236	0.002	0.111	0.039	0.130	0.034	0.188	0.005
General Anxiety							-0.042	0.056	-0.037	-0.153	0.069	0.457
Math Anxiety							0.143	0.044	0.151	0.056	0.229	0.001
Financial Anxiety							-0.629	0.057	-0.566	-0.742	-0.517	<.001
R^2	.277					.523						
ΔR^2	.277					.247						
F	23.18					<.001						<.001

Note. $N = 291$; Model = "Enter" Method in SPSS Statistics; B = unstandardized regression coefficient; SE_B = standard error of the

coefficient; β = standardized coefficients; CI = confidence interval for standardized coefficients; LL = lower limit; UL = upper limit;

ΔR^2 = adjusted R^2 change; gender 1 = man, 2 = woman. Education is measured from 1 (I have not completed high school) to 6

(Doctoral degree). Income is measured from 1 (<\$15,000) to 6 (>\$100,000).