The relationship between financial education and downstream financial health

by

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B.S., Arizona State University, 1986
B.S., Arizona State University, 1986
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AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Personal Financial Planning
College of Health and Human Sciences

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Abstract

Many Americans are in a precarious financial situation: living paycheck to paycheck, unable to fund relatively trivial unexpected expenses, and unable to save substantially for retirement and other financial goals. Low financial literacy has been cited as one of the leading causes of suboptimal economic outcomes. Financial illiteracy, meaning that an individual lacks the knowledge to know what a good financial decision is and/or belief that they can execute a good financial decision, is also a source of economic inequities among genders, ethnicities, and other marginalized communities. The consequence is that a significant portion of the US population is financially fragile and in danger of being unable to meet basic needs due to unemployment, medical issues, or other financial difficulties which may arise.

This study considered financial education as a potential solution to this problem. Prior literature has indicated positive relationships between financial education and financial literacy, and between financial literacy and financial behaviors. However, there is little information on the relationship between financial education and economic endpoints. This study expanded on prior research by considering the chain of events from receiving financial education all the way through economic outcomes, using the Theory of Planned Behavior (TPB) as a scaffold. Using structural equation modeling (SEM), the study explored the complex set of factors which intervene between being exposed to financial education and economic outcomes which occur later. This study also integrated the concept of financial health as an analogue to physical health, measuring not just financial behaviors, but the economic results of those actions. The SEM analysis found a significant relationship between financial education and financial health, which was mediated by constructs in the TPB.

Propensity score matching was also used to create an artificially randomized data set, to isolate the effects of financial education on financial outcomes more strictly. The matching homogenized the demographic differences between those who received financial education and those who did not. Regression and ANOVA analyses confirmed that a significant relationship between financial education and financial health existed. The relationship was significant whether financial education was measured as a binary variable, by level of education, or by number of exposures to financial education. The strongest positive effects of financial education were seen in the domain of positive financial outcomes, specifically asset accumulation.

The evidence presented makes a strong case for financial education as an economically demonstrable solution to the problems brought on by low financial literacy. Certainly, financial education is not a standalone solution, but it can be a powerful part of a package of solutions to strengthen the financial circumstances of Americans.

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Table of Contents

List of Figures

List of Tables

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Dedication

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Chapter 1 - Introduction

A significant proportion of adults in the US are financially vulnerable (Federal Reserve, 2020), with more than 40% of households unable to cover an unexpected $400 expense. This creates significant economic risk for the country. Events such as the Great Recession in 2008 and COVID in 2020 demonstrate the consequences to individuals and the overall economy when households are on the edge of financial distress. Many Americans are considered financially fragile (Sherter, 2019). If a household is financially fragile, then exposure to any number of events, such as job loss or income interruption, or unexpected medical bills or repairs, can lead to an inability to meet basic needs or fulfill financial obligations.

COVID in 2020 provided a clear picture of the widespread financial fragility and the steps required of the government to manage a financial crisis when much of the population cannot withstand an unexpected shock (Rungcharoenkitkul, 2021). As businesses shut down simultaneously, many people lost jobs and faced immediate financial shortfalls. The nature of the crisis was such that the government had to create financial aid programs on the fly to prevent massive economic damage. Federal spending on COVID relief included $4.6 trillion for businesses (U. S. Government, 2023) and $1.8 trillion for individuals, including direct payments and extended unemployment benefits (Parlapiano et al., 2022).

In the United States, numeric skills (numeracy) and financial literacy are deficient (Lusardi, 2012). Mitchell and Lusardi (2015) showed that financial literacy accounts for more than a third of wealth inequality in the US. Low financial literacy is associated with suboptimal financial decisions and the problems which come with bad decision-making (Lusardi & Mitchell, 2014). Indeed, numerous other issues are also involved in the current state of American finances. Economic opportunities are not equally available, there are differences in general education, and

many problems associated with prior and contemporary social and economic policies have financial effects today (Darity et al., 2018).

This study considered the role of financial education as a way of addressing financial illiteracy and its resultant economic problems. More broadly, financial education was viewed as a vehicle which can improve financial outcomes for the individuals who receive it. Systemic economic issues rarely have easy solutions, and the study positioned financial education as one of many approaches to improving the economic lives of Americans.

Theoretical Framework

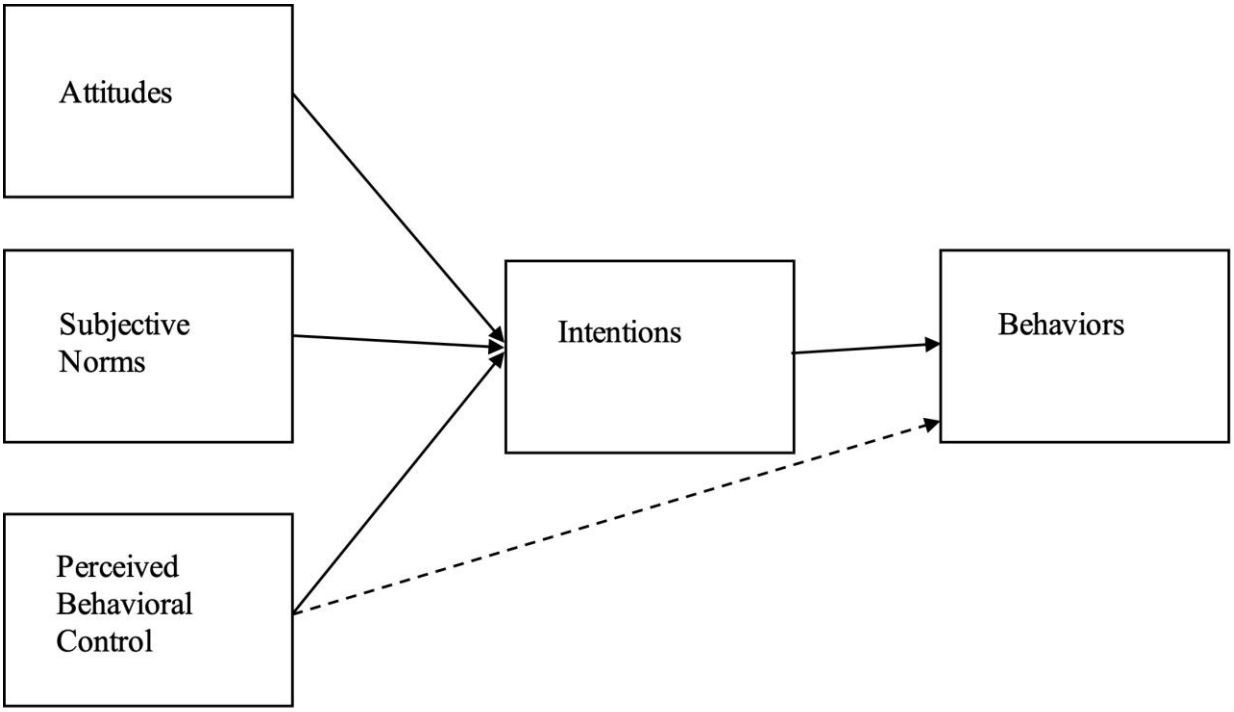
The theory of planned behavior (TPB) (Ajzen, 1991) describes how psychological makeup and environmental variables interact to form a set of intentions and behaviors. The theory has been applied in many different settings covering a wide variety of applications (e.g., Ajzen et al., 2011; Cheng et al., 2019; Sanaeinasab, 2020; Shmueli, 2021; Yuriev, 2020), including personal finance (e.g., Cuccinelli, 2016; Xiao et al., 2011). Ajzen's 2011 study compared applications of the TPB in different domains and provided empirical evidence supporting the theory. The basis of the TPB is that attitudes, subjective norms, and perceived behavioral control affect intentions, and that intentions, along with perceived behavioral control, affect the decision to engage in a particular behavior (Figure 1.1).

At the heart of the TPB is the idea that behaviors can be explained, and even predicted, based on factors which describe the decision-making process. Among these are attitudes, subjective norms, perceived behavioral control, intentions, and ultimately, behaviors (Ajzen, 1991). Perceived behavioral control was of particular interest for this study. The concept of perceived behavioral control focuses on an individual's belief that they can control a behavior and that they also have the ability to execute decisions which control that behavior. This is

strongly related to the concept of self-efficacy, which is a person's belief that they have the capacity to perform the steps or behaviors to produce a specific outcome (Bandura, 1977). Self-efficacy, like perceived behavioral control, is driven by the capacity to have agency over a situation. Without this sense of agency, an individual is likely to avoid acting or changing behavior (Bandura & Adams, 1977).

Figure 1.1

The Theory of Planned Behavior



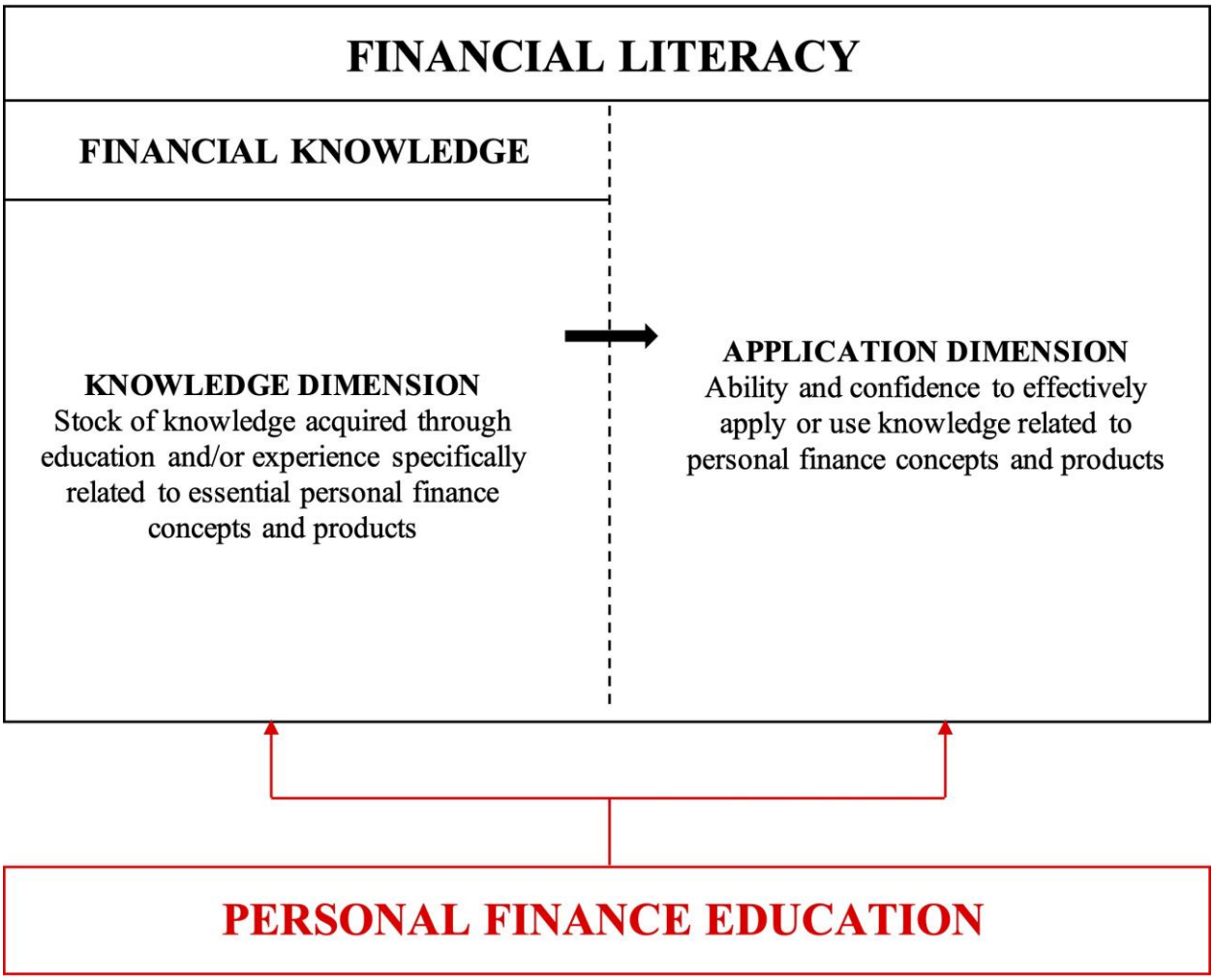
In the TPB, perceived behavioral control has a direct effect on intentions and has a direct effect on behaviors (Ajzen, 2002). In this sense, perceived behavioral control has significant influence on decision making, as perceived control has the potential to bypass the other paths of decision-making influences encapsulated in the TPB. Based on this, any environmental input which affects perceived behavioral control would be expected to have an impact – direct or indirect – on behaviors. Note that self-efficacy and perceived behavioral control are distinct from financial knowledge, and both focus on the perceived ability to carry out a behavior (Ajzen, 2002). Accumulated factual knowledge, without the belief that it will help the individual

meaningfully control their behavior, does not represent an increase in perceived behavioral control.

Closely related to the concept of financial perceived behavioral control is financial literacy. The term “financial literacy” is defined many ways in different studies (Huston, 2010) and may or may not include concepts beyond financial knowledge. Huston (2010) introduces a concise framework for financial literacy (Figure 1.2). The framework indicates that financial literacy is the product of both a knowledge dimension (financial knowledge) and an application dimension, which is the ability to apply that knowledge and the confidence to use it (Huston, 2010). Huston’s financial literacy construct is more than having some definitional or factual knowledge about finances and the related numeracy; financial literacy requires financial capability and includes the wherewithal to apply knowledge on a practical basis, presumably to make good decisions. This framework aligns well with the concept of perceived behavioral control in the TPB, and this study used the Huston (2010) model of financial literacy as the construct of perceived behavioral control in the TPB.

Figure 1.2

Financial Literacy Framework



Adapted from Huston (2010)

In Huston's (2010) financial literacy model, financial education is an input to both the knowledge and application dimensions of financial literacy. Informed by this structure, this study used financial education as an input for the construct of perceived behavioral control. Financial

education may be expected to positively influence an individual's financial self-efficacy by increasing their financial knowledge and improving their perception of successfully being able to execute a financial behavior. Thus, if financial education is limited to disjointed facts or is delivered in such a way that it is not a useful decision-making resource, then its impact on perceived behavioral control is likely limited. Similarly, if financial education is limited in scope, such as a program which only focuses on the choices inside a workplace 401(k) account, then any gains in financial self-efficacy and perceived behavioral control are likely limited to that topic and would not necessarily extend to other personal finance domains. A financial education paradigm which provides knowledge and understanding of a wide range of personal financial domains would reasonably be expected to positively impact perceived control over financial decisions. Hence, the impact of financial education on an individual's perceived behavioral control, and ultimately their financial behaviors, is subject to the variables surrounding the educational program itself (Lusardi, 2019A).

Huston (2010) also notes that there are numerous influences which can affect an individual's application of financial literacy to their financial decisions and ultimately to the outcomes of those decisions. Individuals are subjected to their own impulsiveness, may have biases regarding financial behaviors, and may be subjected to other external influences (Huston, 2010). This flows conceptually with the TPB's (Ajzen, 1991) inclusion of attitudes and subjective norms as inputs affecting intentions, and then an additional step from intentions to actual behaviors.

This study will also draw on the work of Joo (2008), using a financial wellness framework to consider the outcomes of financial education. This study augmented Joo's work (2008) by adding objective economic measures to the measures of financial wellness to develop

a measure of financial health. This concept is analogous to physical health, where a combination of subjective factors (for example, how do you feel?) and objective factors (blood pressure, temperature) combine to form an overall assessment of health. Financial health was the key outcome in this study. Most studies using the TPB (Ajzen, 1991) stop at behaviors, but this study extended the TPB to focus on the consequences of their behaviors, the individual's financial health.

Research Questions and Hypotheses

This study considered the following research questions: (1) What effect does financial education have on downstream financial health? (2) What features of a financial education program make the program more effective? (3) What are the mechanisms by which financial education affects financial health? Each of these questions was viewed through the lens of the TPB. For example, the effect of financial education on financial health was analyzed through the path of the TPB constructs. The features of financial education, limited to timing in this study, were part of the education construct used as an antecedent to the TPB construct of perceived behavioral control. The TPB itself formed the framework for analyzing how financial education and financial health are related.

Informed by the associations between financial education and financial health components found in the literature, the following hypotheses were proposed:

H_1: Financial education is positively associated with financial health.

H_2: The timing of financial education affects the strength of the association of financial education on financial health.

H_3: Financial education has a significant path to perceived behavioral control as a construct in theory of planned behavior.

A path from financial education to perceived behavioral control is an indicator of education as both an antecedent to financial outcomes, as well as a linkage to financial education as a contributor to financial self-efficacy.

H_4: The relationship between financial education and financial health is mediated by the TPB constructs of perceived behavioral control and behaviors.

This has explanatory value regarding the presence and strength of other influences beyond financial education which can affect financial decisions and outcomes.

Financial Education

There are many avenues by which financial literacy may be improved. Financial education in schools is one avenue, although when to expose individuals to financial education is a major consideration (Kaiser & Menkhoff, 2017). It is a reasonable proposition that, since high school is the terminal mandatory education in the US, financial education in high school would appear to have the best chance to affect the most people. College financial literacy programs, even if mandatory and efficacious, will miss a significant portion of the population, as not everyone goes to college. Workplace education addresses adults and is required under certain circumstances for some topics (frequently limited to investments as part of 401(k) educational requirements), and while this may have the advantage of increased immediate relevancy for those in the education programs, the disadvantages include much more limited reach and limited scope.

Financial education appears to have the most impact when the topic is currently relevant to the recipient (Fernandes et al., 2014; Kaiser & Menkhoff, 2017). This is known as just-in-time education (Fernandes et al., 2014; Gerrans, 2021). A combination of delivery times, supplemented by reliable information on the internet or other information sources, may provide a

powerful combination to expose the maximum number of people to financial education. This also would be the natural approach using the concept of teachable moments (Kaiser & Menkhoff, 2017), which focuses on the immediate relevance and actionability of the educational topic. High school has the advantage of reaching the largest guaranteed population on a mandatory basis, but for many students is separated by several years from the time they will have to make financial decisions. This study addressed how successful and effective financial education is in improving financial literacy (Huston, 2010) and, more important, the financial outcomes of those who receive it. Also addressed is whether the significant investment needed for financial education economically justifiable (see Kaiser et al., 2020; Willis, 2008), if it would have had impact on recent financial crises, and if it would improve the financial lives of Americans going forward.

Financial education may be an important avenue to address financial literacy, but there is still not a lot known about the downstream impact on individuals' financial health (Huston, 2010). Similarly, there is little information on the differential effects that the quality, timing, and structure of financial education have on financial health. Further, little is known about the differences in financial decision-making between those who have received financial education and those who have not. As of 2022, twenty-three states have included some level of financial education in their high school graduation standards; to do so requires significant investments in curriculum, educational materials, and properly trained staff. The investments in financial education, particularly if it is mandatory, likely comes at the expense of other educational programs which are superseded by financial education (Urban et al., 2020). So, mandatory financial education at the high school level requires a great deal of economic investment as well as political capital.

Some states are extending financial education further with mandatory high school classes (Povich, 2022) and outreach programs and information; some colleges offer or require financial education (Lusardi, 2019B); and Federal regulations require some education, at least around the topic of retirement planning for companies which offer 401(k) plans (ERISA Sec. 404(c)). Still, the question to be answered is whether the efficacy of such programs justifies the significant investment in financial education. Further, if financial education does improve the lives of those who receive it, we must determine when it is most effective (see Fernandes et al., 2014; Gerrans, 2021), along with the optimal delivery frameworks. With limited funds in any context, funds devoted to financial education need to be spent in a wise and efficacious manner.

Financial Health

In this study, the construct of financial health was proposed. This construct built upon the financial wellness framework of Joo (2008) and the TPB (Ajzen, 1991). Like financial wellness, financial health includes subjective measures such as financial well-being and financial satisfaction, but also includes objective measures to indicate the current financial status. The proposed financial health construct differed from financial wellness because financial behaviors, attitudes, and knowledge are part of the financial wellness model (Joo, 2008), while the TPB indicates that attitudes and knowledge are antecedents to behaviors (Ajzen, 1991). Financial behaviors logically lead to financial results and are antecedents to financial health. Thus, financial health aims to measure current subjective and objective financial status.

A linkage between financial education in the workplace and financial wellness has been demonstrated by Garman et al. (1999), but it was limited in time, size, and scope, as it covered just 178 employees of a single employer and evaluated an educational program which had been ongoing for three years. Yakoboski et al. (2019) and Prawitz & Cohart (2014) further studied the

association between financial education and increases in financial literacy and wellness. However, the literature has largely stopped short of showing an association between financial education and financial health. Financial wellness studies, to date, largely focus on the behaviors which would lead to financial health, including tracking money, saving money, planning, and paying bills on time (Yakoboski et al., 2019). These are all important precursors, but in the end, these behaviors may or may not lead to the accumulation of wealth or other positive economic outcomes. This study looked to extend the literature by adding the construct of financial health and studying the association between receiving financial education and financial health (see hypothesis H_1). This represents a step on the path of determining the economic value of financial education.

The construct of financial health is analogous to human health using objective medical tests, criteria, and end-states. Health behaviors and health outcomes are often separated, with behaviors used to predict outcomes (De Jong et al., 2014; Hunter et al., 2019; Proper et al., 2011; Tay et al., 2013). Exercising regularly, eating healthy foods, and not smoking are healthy behaviors, and they predict good health outcomes, but do not guarantee good health. De Jong et al. (2014, p. 8) described health outcomes in terms of "clinical and physical symptoms, psychosocial outcomes, and satisfaction".

The construct of financial health applies the same structure to personal finance. Following the logic of the TPB, a person's attitudes toward their physical health and their knowledge of what constitutes good health are antecedents to their health-related behaviors. Those behaviors help determine their actual physical health status. Boshara et al. (2015) constructed an objective measure they called the financial health scorecard, which included questions on spending, missed payments, credit card behaviors, liquidity, and debt service. The

scorecard included some objective economic measures, as well as some behaviors. This further informed the construct of financial health used herein, including the dimensions of symptoms (objective measures), psychosocial outcomes (well-being measures), and financial satisfaction.

Financial Education, Knowledge, Health and the TPB

Financial knowledge was measured using objective financial knowledge questions in the NFCS, and financial education was measured using the financial education questions in the NFCS. This study addressed the ideas that knowledge without context is difficult to apply, and financial education without retained knowledge is not likely to be useful. Hence, it was proposed that, while financial education will have a positive impact on financial wellness, retained financial knowledge and a number of other factors interact with the concepts learned in financial education, leading to a complex pathway from education to health.

Financial health was added as a terminal outcome, separate from financial behaviors. This outcome is a measure which demonstrates the current financial status of the respondent, much like physical health, and is viewed as the ultimate effect of financial education. Financial behaviors, by themselves, may not always reflect the same end state, because behaviors, even those presumed to be positive, are subject to both inconsistent application and may even be incompatible with a particular financial situation. Financial states, both objective and subjective, in the National Financial Capability Study (NFCS) were used to measure financial health.

Sample and Population of Interest

The population of interest is the adult population, age 18 and over, of the US. This study used secondary data, specifically the 2021 wave of the National Financial Capability Study (NFCS). The dataset includes 27,118 adults aged 18 or more across the United States and is designed to be representative of that population. Survey respondents were not necessarily the

head of the household or the primary financial decision maker for the household. Surveys were administered between June and October 2021. The NFCS is one of the few secondary datasets which contain questions regarding the respondents' financial education, which is key to this study.

The NFCS is a rich dataset which includes data on a wide range of financial topics, including financial education. Respondents answered questions regarding whether they received financial education and when they received it. Respondents who refused to answer questions regarding whether they received financial education were removed from the data set for this study. Given the central importance of this variable, imputation is not appropriate, and listwise deletion was used for this variable only. This reduces the sample size from 27,118 to 24,563.

Potential Implications

In an ideal world, households would have three to six months of living expenses put away. This cushion might buy government agencies some time to plan financial aid to those who need it in an economic crisis, and possibly minimize the cost of those financial aid programs. Instead, nearly immediate action was necessary to address the economic and social impact of the COVID shutdown, programs which had to be sustained and augmented as the crisis dragged on. Greater financial resilience, by itself, would not have eliminated the need for aid; the shutdowns lasted longer than many households would have been able to bear, even with substantial emergency funds. However, if societal financial preparedness and resilience had been greater, it is likely that the amount of government financial intervention needed would have been smaller, and perhaps would have been targeted differently. As trillions of dollars (Parlapiano et al., 2022) were added to the US economy as direct government payments (without goods being produced),

the consequences of such action would logically include the higher inflation we are seeing now in 2022-23 (Cline, 2023).

The Great Recession of 2008 is another example of the destabilizing combination of financial fragility and poor financial decision making. Lax lending practices in the early 2000's allowed homebuyers to qualify for and obtain adjustable-rate mortgages based on low, initial rates. As those mortgages began to adjust, with higher interest rates and substantially higher payments, many homeowners were priced out of their homes. This led to a meltdown in the financial sector due to mortgage defaults and real estate due to excess supply, and this rapidly spread through the economy. Ultimately, the Federal government had to step in to prevent an economic meltdown (Bible & Joiner, 2009). Certainly, responsible mortgage underwriting and financial leverage policies by large institutions could have prevented this crisis, and regulations were created to address this issue. However, if more borrowers understood the risks of the mortgages they were obtaining (Smith, et al., 2019) and chose safer fixed-rate loans (or accumulated funds as a contingency in case rates rose), the crisis could also have been minimized or averted. Note here that for the purpose of decision-making, an individual needs more than knowledge of what types of mortgages exist and even how they work, but also understanding of the attendant risks (and benefits) of different types of mortgages, when they make sense, and when they should be used.

It would be challenging to regulate our financial institutions to offset deficiencies in financial capability and prevent individuals and households from making bad decisions. The thriving auto title loan, payday loan, and rent-to-own industries, along with high credit card interest rates, provide evidence that consumers are still vulnerable to – and willing or compelled to use – potentially harmful financial products. A more financially capable populace would likely

be less susceptible to risky financial products (Lusardi, 2019). Similarly, a less financially fragile populace should be more resilient to suboptimal financial decisions if those products are chosen.

There are resources available for people to increase their own financial capability, but not everyone chooses to use them. Adults are generally free to make their own decisions; despite a great deal of information on effective health strategies, for example, many people still engage in potentially harmful behaviors. This may be true even when health education is presented in high school (or earlier). As we consider the low levels of financial literacy, clearly many individuals are not addressing this on their own. Hence, for an effective increase in financial literacy and capability, governmental and/or social intervention is likely required. The US requires a certain amount of civic education for our youth, as well as standards on mathematics, language, and science. Financial capability is generally not viewed the same, as financial education standards are limited in coverage and vary widely in content (Urban et al, 2020). Financial capability is likely a topic which the government will have to mandate to truly impact a large segment of our citizenry (Fox et al., 2005).

Summary

This study used the theory of planned behavior (Ajzen, 1991) as a framework to illustrate how financial education is associated with the behavioral and objective financial outcomes that comprise financial health. The study added to the literature by demonstrating that financial education is associated with downstream financial health and by using structural equation modeling (SEM) and matching techniques to create synthetic samples to compare those who have received various forms of financial education with similar individuals who have not received financial education. The matching allowed for more isolation of financial education as a potential cause of downstream financial outcomes.

This study addressed the effects of financial education on financial outcomes, namely financial health. There are numerous ways for society to approach financial illiteracy, financial inequality, and financial fragility. To remediate these issues on a wide scale, significant investments, public and/or private, are likely to be needed. Financial education is one potential answer, a part of a package of interventions to address financial illiteracy and its effects. Financial education would represent a large, likely public, investment in human capital, with the goal of intervening prior to an individual making poor financial decisions. Tackling the serious financial issues which face many Americans is a multifaceted problem, and this study illuminated the role financial education can play in this mix.

Chapter 2 - Review of the Relevant Literature

This chapter will present the theoretical constructs used to guide the analysis of financial education as well as to define financial health as a paradigm. Issues related to financial health, financial literacy, and financial education will also be covered.

Constructs of the Theory of Planned Behavior

There are five constructs in the TPB: attitudes, subjective norms, perceived behavioral control, intentions, and behaviors (Ajzen, 1991). Attitudes, norms, and behavioral control form a path to influence intentions, which then forms a path to influence behaviors. There is also a direct path from behavioral control to behaviors (Figure 1.1).

Attitudes

In the TPB (Ajzen, 1991), attitudes toward a behavior reflected an individual's mindset about a behavior. That, in part, influenced whether the behavior actually occurs. Magwegwe and Lim (2018) noted that one must examine a person's attitudes and perceptions to understand their retirement planning behaviors. They further used the NFCS to measure attitudes toward retirement using questions such as financial planning horizon, setting long-term financial goals, worry about running out of money in retirement, and risk tolerance. Kimiyaghalam et al. (2016) pointed out that positive attitudes toward a behavior increases the likelihood of carrying out that behavior, and they noted that those who have more financial knowledge and have more positive financial attitudes tended to be financially better off.

Subjective Norms

Subjective norms indicate the perceived approval or disapproval of other influential people in the individual's life regarding a particular behavior. Cuccinelli et al. (2016) found that subjective norms were a key predictor of investor's choices to purchase specific products from

an advisor. They also analyzed advisor behavior with and without subjective norms included and found that subjective norms had a significant impact on the products advisors chose to present to their clients. Subjective norms also include a component representing whether a person believes that others in an individual's social network perform a behavior, and any resulting pressure to perform or not perform the behavior (Rhodes & Courneya, 2003). Measuring subjective norms requires questions which focus on those who influence the individual (Ajzen, 2006); the NFCS lacks suitable questions for this purpose, so subjective norms were omitted from this study.

Perceived Behavioral Control

Perceived behavioral control is the extent to which an individual believes they can execute a behavior and some control over a behavior. Farah (2017) noted that control beliefs were positively influenced by an individual's knowledge of a behavior, as well as the individual's belief that they can carry out the behavior. Farah further pointed out that control beliefs had a significant impact on individual's choices to switch banks or stay with their current bank during a bank merger. Martinez and Lewis (2016) studied the effects of attitudes, norms, and perceived behavioral control on intentions. Their conclusions suggested that perceived behavioral control is a precondition to the intention to act, even if an individual had positive attitudes and subjective norms toward the behavior. Self-efficacy is a key component of perceived behavioral control (Ajzen, 2020), and questions in the NFCS which indicate confidence or ability to perform financial behaviors were used to measure this construct.

Intentions

In the TPB, intentions are a predictor of, but not a guarantee of, action. Ajzen (2020) noted several reasons for this, including forgetting, changing one's mind, and inability to perform the behavior. Xiao et al. (2011) demonstrated that attitude, subjective norms, and

perceived behavioral control were predictors of financial intentions. Similarly, students with intentions to perform positive financial behaviors were less likely to take on more risky or negative behaviors (Xiao et al., 2011). The presence of a savings account was an indicator of intention to have liquidity (Despard et al., 2020), for example, but does not imply a particular amount of savings or that there will even be money in the account. The NFCS only included one suitable question on intentions, a binary question in retirement planning, so this construct was omitted from the extant study.

Behaviors

The endpoint of the traditional TPB model is behaviors. Behaviors can refer to a class of behaviors rather than just an individual behavior (Ajzen, 2020). This allows for the analysis of financial behaviors in general rather than several analyses of specific behaviors. Behaviors are not outcomes in the sense of an end-state but can and perhaps should lead to outcomes (Ajzen & Fishbein, 2002). Adopting a behavior does not necessarily assure a particular outcome due to differences in the ability to execute the behavior, extraneous circumstances which may affect the outcome regardless of behavior, and the consistency and commitment to the behavior. This study took the extra step of separating behaviors from the outcomes of those behaviors. For example, having overdrawn an account or having skipped a medical procedure in the past are behaviors which would be associated with negative outcomes, but those behaviors, particularly in the past tense, do not indicate positive or negative end states now. By contrast, having a sufficient emergency fund, having investments, feeling satisfied about one's financial circumstances, and not feeling burdened by financial stressors are current end-state indicators of financial health, rather than antecedent behaviors.

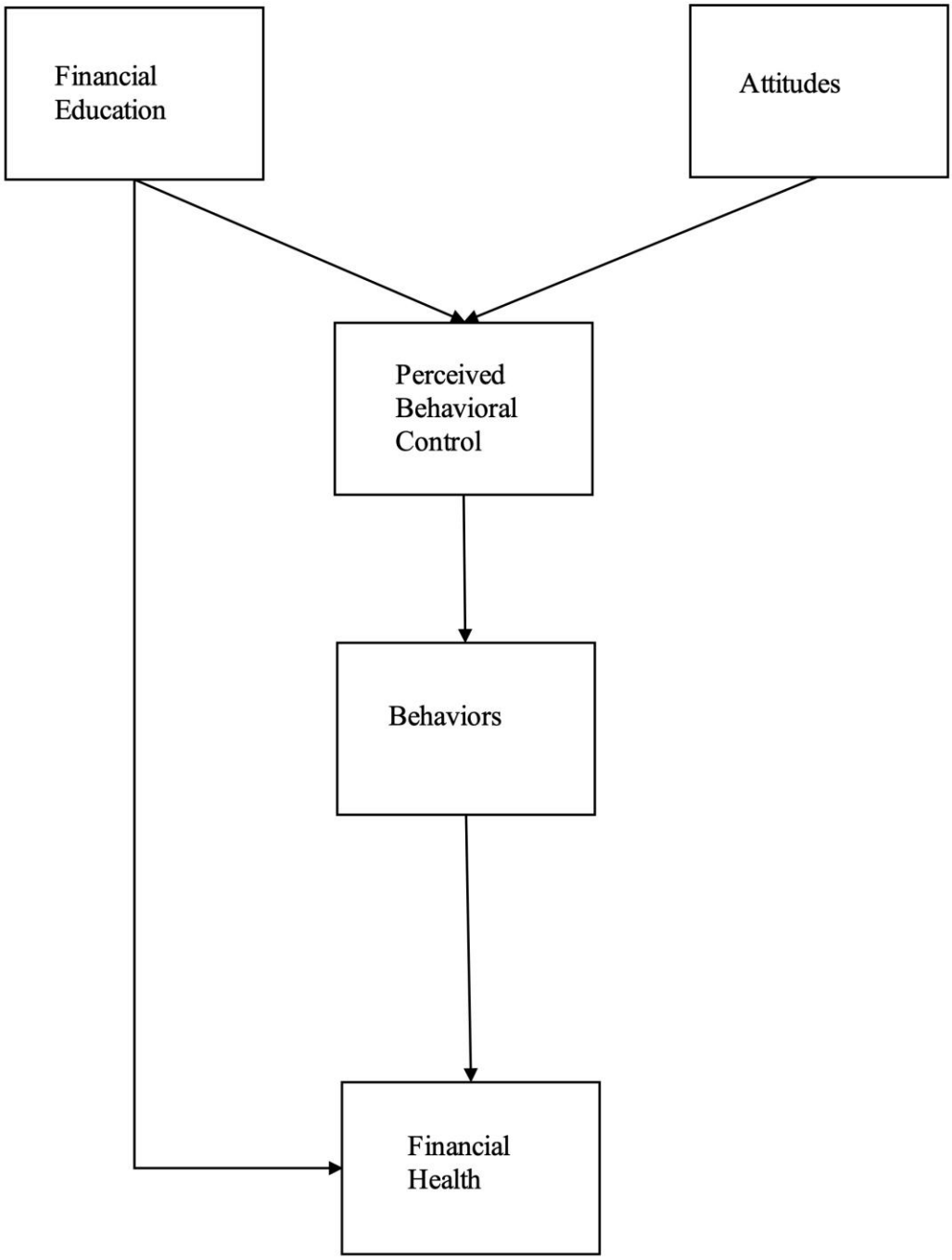
Additional Constructs to TPB

The TPB can be extended or augmented with the addition of predictors and constructs. Ajzen (2020) proposed that augmenting the TPB with additional constructs requires that the theory's original constructs and propositions be included. Additional predictors need to be conceptually distinct from the TPB constructs (Ajzen, 2020). Additional predictors should be able to be justified as causal when considering a behavior (Ajzen, 2020). Due to the lack of suitable data, subjective norms and intentions were excluded. This study augmented the TPB by creating additional constructs related to financial education and financial health.

Financial education has been shown to have positive causal effects on financial knowledge, financial self-efficacy, and, ultimately, financial behaviors (Kaiser et al., 2020). The constructs of financial education can therefore be added as an antecedent construct to the TPB. Locus of control, a component of self-efficacy (Ajzen, 2002), was shown to be a mediator between financial knowledge and financial behaviors (Perry & Morris, 2005). The construct of perceived behavioral control will be measured by financial knowledge and perceived financial skill. Financial education has been shown to affect both. Hence, financial education will be linked as a precursor to perceived behavioral control. The augmented model is shown as a path diagram in Figure 2.1.

Figure 2.1

Path Diagram of Augmented and Modified TPB Model



Financial health, contrasted with financial well-being and financial wellness

Financial well-being and financial wellness are areas where definitions are evolving, are not always distinct from each other, and are not consistent from study to study. Financial health is a new construct designed to create a unified outcome from the concepts of financial well-being and financial wellness.

Financial well-being

Financial well-being can be defined as "the perception of being able to sustain current and anticipated desired living standards and financial freedom" (Brüggen et al., 2017, p. 7). In this context, financial well-being is not the same as financial satisfaction, although financial satisfaction can be applied as a measure of financial well-being. Brüggen et al. (2017) point out that the consequences of financial well-being are not limited to individual and family psychological and health benefits, but also include societal economic benefits. This is currently on display in the form of falling savings rates, increasing levels of personal debt, and lack of retirement savings (Brüggen et al., 2017).

The Consumer Financial Protection Bureau (CFPB) developed a scale of Financial Well-Being (FWB) in 2015. The National Financial Capability Study (NFCS) included five of the questions, which the CFPB considers the short version of its scale, as of the 2018 wave. The scale has been shown to track well to other measures of FWB (Collins & Urban, 2020). This scale is entirely subjective and is based on the concept that financial well-being is not necessarily related to a specific level of wealth or a specific set of ratios. The version of this scale included in the NFCS formed the basis of the financial well-being dimension of financial health in this study. The CFPB scale has been used to measure the relationship between financial knowledge

and financial well-being (Lee et al., 2020), changes in financial well-being over time (Collins & Urban, 2020), and retirement planning using the TPB (Magwegwe & Lim, 2018).

Financial wellness

Financial well-being has a current dimension in meeting today's needs, while also encompassing the future dimension of a financially secure future (Netemeyer et al., 2018). This is closely related to, but not the same as, the concept of financial wellness. The view of financial wellness is notably depicted by Joo's (2008) model. The model includes subjective and objective measures of wellness, as well as financial satisfaction. Key components of the Joo model are subjective perception, financial behaviors, financial satisfaction, and financial status. FWB, defined as a perception and captured by the CFPB scale, addresses subjective perceptions as noted by Joo. However, the CFPB questions do not include any objective financial measures, nor do they address financial satisfaction directly.

Financial health

Financial health was measured in this study using elements of Joo's (2008) financial wellness, specifically financial well-being and financial satisfaction, and objective measures of financial status akin to Boshara et al. (2015). As noted earlier, financial behaviors were considered an antecedent construct to financial health. The new construct created an outcome state like that of physical health, encompassing an individual's current objective financial status, their psychological state related to finances, and satisfaction with their finances.

The NFCS has been widely analyzed on the objective dimensions of the financial health construct. Kim & Yuh (2018) found that financial knowledge was associated with increased savings, defining savers as those who spent less than they make over the last 12 months. Financial literacy and knowledge were associated with having an emergency fund (Despard et

al., 2020; Babiarz & Robb, 2014). Magwegwe and Lim (2018) used the TBP to analyze the predictive factors, including financial knowledge and education, on the ownership of a retirement account. Financial knowledge increased the likelihood of an individual having a workplace or non-workplace investment account, and having participated in financial education was greater for those who had non-workplace accounts than for those with workplace accounts or the overall population (Fisch et al., 2019). Student loan debt was found to have a negative effect on financial wellness, as measured by a scale which included having medical insurance, spending less than income, and having an emergency fund as indicators (Henager & Wilmarth, 2018). Financial literacy was associated with credit outcomes, including credit score, and if an individual improves their financial literacy, they may see better credit outcomes as a result (Courchane & Zorn, 2005).

Negative financial outcomes included in the financial health construct (reverse scored) have also been studied in the NFCS. Having unpaid medical debts was associated with financial knowledge, but not with formal financial education (Braga et al., 2017), although that study used medical insurance as a control. Higher use of alternate financial services, such as payday loans and auto title loans, was associated with financial knowledge, with those who were overconfident in their level of financial knowledge showing the greatest propensity to use these products, even absent actual need (Robb et al., 2015). Similarly, overconfident individuals were more likely to have calls from debt collectors (Balasubramnian & Sargent, 2020). Women were more likely than men to have disregarded medical advice (skip appointments, not have medical procedure, not fill prescription) due to cost, known as CRN or cost-related non-adherence (Zhang et al., 2017).

Low levels of financial literacy in the US

The relationship between low levels of financial literacy and unfavorable financial outcomes is pervasive in the literature. Lusardi (2012) used data from the 2004 Health and Retirement Survey to illustrate the low level of numeracy of American adults, focused on adults who were then in the 51 – 56 age range. A question about the time value of money (compound interest), which required virtually no mathematical computation, was answered incorrectly or "don't know" 81.7% of the time. Similarly, Mandell (2008) reviewed the Jump$tart survey of financial literacy. The survey was administered to 6,856 high school seniors in February 2008, and contained 49 multiple-choice questions about a variety of financial topics. The results demonstrated not just the low financial literacy rates in America, but a disturbing trend of decreasing scores over time, indicating that young Americans were becoming less financially literate with each successive graduating class. This indicates that financial literacy is problematic across all age levels.

Financial literacy, financial outcomes, and wealth inequality

Wagner (2019) demonstrated an association between financial education and financial literacy. Mitchell and Lusardi (2015) showed that American financial literacy was affected by level of education, gender, and socioeconomic status and provide an association between financial education and financial literacy. They also discussed the implications of low financial literacy, including a significant impact on the wealth gap. The wealth gap – the difference in accumulated wealth between different households or groups of people – is significant between genders and between races and ethnic groups. The wealth gap between races is widening, and is associated with differences financial literacy, which may require a multifaceted approach to address (Al-Bahrani et al., 2019). In the US, men continue to exhibit a wealth advantage over

women (Ruel & Hauser, 2013), as well as a higher level of financial literacy (Al-Bahrani et al., 2020). This inequality can manifest itself with a variety of social issues, and is associated with disparities in financially fragility households, particularly among women and minorities (Hasler et al., 2018). Differences in financial literacy account for more than one third of wealth inequality in the United States (Mitchell & Lusardi, 2015; Lusardi et al., 2017).

Lusardi and Mitchell (2014) also note numerous ways in which low financial literacy affects individuals: less participation in financial markets, greater use of high-cost debt, higher fees associated with credit and banking, and a higher rate of making financial errors. These effects of low financial literacy were most prevalent in the youngest and oldest individuals, immigrants, those with lower income, and those with less education. These populations have less ability, due to time, lack of earning potential, and lack of resources, to recover from financial mistakes, particularly in times of financial stress.

Financial fragility increases the economic instability of negative economic events. In the case of COVID, the widespread inability to meet financial needs due to loss of income required emergency governmental interventions. These interventions required the US government to use deep deficit spending (Zarroli, 2020) which will continue to take a significant amount of time to be reconciled even as economic recovery has occurred. COVID was especially notable, as the time between losing jobs and running out of money was particularly short for many Americans, requiring immediate and significant aid to stave off a catastrophe. In this case, the inability of 37% of the US population to be able to cover an unexpected $400 expense [which would likely be much less than the income loss of sudden unemployment] (Federal Reserve, 2020) forced rapid governmental intervention to stave off a potential economic disaster.

The financial crisis of 2008 also illustrates the potential costs of low financial literacy. During this period, adjustable-rate and interest-only mortgages saw upward adjustments to their interest rates, resulting in higher mortgage payments. This led to widespread defaults, the Great Recession, and a significant amount of governmental intervention to prevent more severe economic damage. Seay et al. (2017) demonstrated an association between those with lower financial literacy and increased usage of interest-only mortgages.

Financial education, financial literacy, and positive financial behaviors

Financial education increases financial literacy and the performance of positive financial behaviors, as Kaiser and Menkhoff (2017) showed in a meta-analysis of 126 studies. They also noted that the concept of the teachable moment, where the proximity of the financial education and the desired financial behavior is important. This has implications because high school is the terminal educational experience for a large segment of the population and may represent the last opportunity for many individuals to receive structured financial education. Longer (more intense) courses had greater impacts on financial knowledge, as well as behavioral impacts, particularly those courses which lasted 10 hours or more (Kaiser & Menkhoff, 2020). Decay, or lost effectiveness over time, in the effects of financial education is a concern, and this was noted in the first six months after an educational program, but was not significant thereafter (Kaiser & Menkhoff, 2020). Financial education is unlikely to be effective as a quick fix; Lusardi and Mitchell (2008) cast doubt on the idea that a one-time seminar can make up for years of suboptimal financial decision making.

There are dissenting views of the efficacy of financial education. Mandell and Klein (2007) provide a cautionary note regarding financial education and financial outcome. Specifically, the study considered high school students, the link between financial education and

outcomes was inconclusive. The authors suggested that students in this study generally lacked motivation, and teacher training may influence this relationship. This indicates concerns over the quality of any financial education program. A meta-analysis of 201 studies showed a negligible impact of financial education on subsequent financial behaviors, and that the effect decreased over time (Fernandes et al., 2014). It is notable that there has been a large increase in the number of studies of financial education and financial literacy since 2014 (Kaiser et al., 2020).

More recent and expansive studies indicate that financial education had positive and, notably, causal impacts on both financial knowledge and on downstream financial behaviors (Kaiser et al., 2020). The authors specifically refute the Fernandes et al. (2014) study based on analytic methodology as well as the 2014 study's lack of randomized control trials; Kaiser et al. (2020) included 76 randomized controlled trials (versus 13 for Fernandes et al.), and these studies covered over 160,000 individuals. The magnitude of the effects of financial education on both financial knowledge and financial behavior were statistically and, importantly, economically significant (Kaiser et al., 2020). Further, evidence of decay in the effects after six months were not noted.

Gerrans and Heaney (2019) studied the impact of personal finance education on college undergraduates. Among their key findings were that students who completed the course: demonstrated increased financial literacy; demonstrated increased intentions to perform positive financial behaviors; and actually performed increased positive financial behaviors. Wagner (2019) also showed an association between financial education and financial literacy, and that disadvantaged socioeconomic groups experienced greatest gains in financial literacy. An association between financial knowledge and positive financial behaviors was also demonstrated by Perry and Morris (2005).

Financial literacy and perceived behavioral control

Perceived behavioral control is the mechanism in the TPB (Ajzen, 1991) by which an individual perceives both some control over a behavior and a sense that they can properly execute the behavior. This is like Bandura's (1977) view of self-efficacy, referring to a person's belief in their capabilities, their confidence they can perform a behavior. Huston (2010) created a framework for financial literacy which includes both a knowledge dimension and an application dimension, which includes confidence in one's capabilities. Locus of control is the view that external or internal factors control an individual's behavior, whether they can choose to perform the behavior, or whether external factors will interfere with their ability to perform that behavior (Rotter, 1954).

In the TPB, locus of control (controllability) and self-efficacy are key components of perceived behavioral control, with higher self-efficacy and an internal locus of control associated with higher perceived behavioral control (Ajzen, 2002). If an individual does not believe that there an opportunity to perform a behavior successfully, then they will likely not undertake that action, even if their attitudes toward the behavior and belief that others would approve are otherwise positive toward the behavior (Ajzen, 1991).

Locus of control was shown to be a mediator between financial knowledge and financial behaviors (Perry & Morris, 2005), indicating a key role for perceived behavioral control. An individual's knowledge about a behavior also influences control beliefs, and in personal finance, Farah (2017) demonstrated that control beliefs had a significant impact on the choice to change banks during a bank merger. Perceived behavioral control is key, as it is a precondition for intention to act, even in the face of favorable attitudes and norms (Martinez & Lewis, 2016). Wu et al. (2016) considered the implications of education on the self-efficacy of patients with

chronic kidney disease. They were able to show that knowledge was positively associated with self-efficacy, and that self-efficacy was positively associated with greater self-care. While the study did not cover the same subject matter as the extant discussion, the implications tie knowledge through self-efficacy to perceived behavioral control.

Perceived behavioral control is not an interchangeable term with self-efficacy or locus of control. Higher degrees of self-efficacy and an internal locus of control are, however, associated with higher degrees of perceived behavioral control (Ajzen, 2002). This is key to developing an axis where financial education helps internalize an individual's locus of control over financial matters, increases their financial self-efficacy, and thereby increases perceived behavioral control. This is an important alignment, as perceived behavioral control is a key antecedent to behaviors (Ajzen, 2002).

Summary

The TPB (Ajzen, 1991) provides a framework for associating inputs to financial behaviors and has been used frequently in financial contexts. Huston (2010) proposes a definition of financial literacy which is consistent with the principles of the TPB. Huston's financial literacy framework aligns well with Ajzen's perceived behavioral control construct, and this draws financial education into the model as a natural input to financial literacy and perceived behavioral control. Financial literacy is low in the US, and this has been associated in the literature with negative financial decision-making and financial outcomes, as well as racial disparity in financial outcomes (see Lusardi, 2012; Seay et al., 2017; Wagner, 2019). However, the literature does not directly connect financial education to financial outcomes, as education has been associated with financial literacy and financial behaviors downstream, and financial

literacy has been associated with financial outcome, but the direct path is not noted between education and outcome.

Chapter 3 - Methodology

This chapter describes the dataset, conventions, and specific information regarding the coding of variables, and the statistical techniques used to analyze the data. Included is a discussion of structural equation modeling as applied to the data, including the underlying empirical equations.

Sample Description

This study used secondary data, specifically the 2021 wave of the National Financial Capability Study (NFCS) to measure the association between financial education and financial health.

National Financial Capability Study

The NFCS is a triannual survey of over 25,000 households across the United States administered by the Financial Industry Regulatory Authority (FINRA). The sample includes approximately 500 households from each state, as well as the District of Columbia, except that approximately 1,250 people each were sampled in the states of California and Oregon. The survey seeks to be generalizable to the population of adults 18 years of age or older in the United States. Respondents were chosen from online panels who are recruited to join and paid to participate in online surveys.

The NFCS sample is quota-based, not probability-based. This means that respondents were chosen to fit the 500-per-state requirement, and that within each state, the respondents fit the demographic characteristics of that state, based on the Census Bureau's American Community Survey, for age, gender, ethnicity, education level, and income. As individuals responded, individuals with similar demographic characteristics were increasingly likely to be turned away as their demographic slot quota was filled.

The 2021 survey includes 27,118 adults aged 18 or more across the United States. Survey respondents were not necessarily the head of the household or the primary financial decision maker for the household. Surveys were administered between June and October 2021. Interviews were conducted via a self-administered survey on a website. No interviewer was involved, which allows for consistency of questions from one respondent to the next. However, this doesn't allow respondents to expand on their answers in a meaningful way or ask for questions or definitions beyond what is provided in the survey instrument.

Respondents who refused to answer questions regarding whether they received financial education were removed from the data set. Given the central importance of this variable in grouping the respondents, imputation is not appropriate, and listwise deletion was used for this variable. This reduced the sample size from 27,091 to 24,563. The NFCS is cross-sectional, so this study was not able to follow specific participants. Individuals were not measured prior to and then after receiving financial education. Demographic data for the overall sample and broken down by those who have and have not received financial education is presented in Table 3.1.

Table 3.1

Demographic Data

	Unweighted Sample		No Financial Education		Financial Education	
Variable	*n*	%	*n*	%	*n*	%
Financial education	5,765	23.47			5,765	100.00
Had financial education in:						
High school	3,345	13.62			3,345	58.02
College	3,183	12.96			3,183	55.21
Workplace	2,322	9.45			2,322	40.28
Age						
18 - 24	2,724	11.09	1,808	9.62	916	15.89
25 - 34	4,250	17.30	3,260	17.34	990	17.17
35 - 44	4,159	16.93	3,267	17.38	892	15.47
45 - 54	4,152	16.90	3,219	17.12	933	16.18
55 - 64	4,286	17.45	3,284	17.47	1,002	17.38
65 or over	4,992	20.32	3,960	21.07	1,032	17.90
Gender (Male)	11,377	46.32	8,355	44.34	3,042	52.77
Ethnicity (White)	18,142	73.86	14,002	74.49	4,140	71.81
Income						
Less than $15,000	2,919	11.88	2,346	12.58	555	9.63
$15,000 - 24,999	2,624	10.68	2,074	11.03	550	9.54
$25,000 - 34,999	2,650	10.79	2,129	11.33	521	9.04
$35,000 - 49,999	3,489	14.20	2,752	14.64	737	12.78
$50,000 - 74,999	4,528	18.43	3,495	18.59	1,033	17.92
$75,000 - 99,999	3,260	13.27	2,422	12.88	838	14.54
$100,000 - 149,999	3,197	13.02	2,308	12.28	889	15.42
$150,000 - 199,999	1,125	4,58	743	3.95	382	6.63
$200,000 - 299,999	529	2.15	348	1.85	181	3.14
$300,000 or more	242	0.99	163	0.87	79	1.37
Employment Status						
Self employed	1,990	8.10	1,502	7.99	488	8.46
Full time employee	9,591	39.05	7,082	37.67	2,509	43.52
Part time employee	2,122	8.64	1,576	8.38	546	9.47
Homemaker	1,617	6.58	1,340	7.13	277	4.80

Full time student	663	2.70	424	2.26	239	4.15
Disabled	1,351	5.50	1,097	5.84	254	4.41
Unemployed	1,937	7.89	1,600	8.51	337	5.85
Retired	5,292	21.54	4,177	22.22	1,115	19.34
Number of Dependents						
None	16,037	65.29	12,378	65.85	3,659	63.47
1	3,659	14.90	2,799	14.89	860	14.92
2	2,979	12.13	2,217	11.79	762	13.22
3	1,199	4.88	883	4.70	316	5.48
4 or more	689	2.81	521	2.77	168	2.91
Education						
Did not complete high school	654	2.66	599	3.19	55	0.95
High school graduate	4,362	17.76	3,655	19.44	707	12.26
GED or alternate credential	1,688	6.87	1,450	7.71	238	4.13
Some college	6,396	26.04	4,901	26.07	1,495	25.93
Associate degree	2,658	10.82	1,944	10.34	714	12.39
Bachelor's degree	6,065	24.69	4,322	22.99	1,743	30.23
Post graduate degree	2,740	11.15	1,927	10.25	813	14.10
Married	12,159	49.50	9,184	48.86	2,975	51.60
Parent/Guardian education						
Did not complete high school	1,639	6.78	1,358	7.35	281	4.93
High school graduate	7,463	30.87	6,070	32.86	1,393	24.43
Some college	4,694	19.42	3,601	19.49	1,093	19.17
Associate degree	2,273	9.40	1,700	9.20	573	10.05
Bachelor's degree	5,401	22.34	3,891	21.06	1,510	26.48
Post graduate degree	2,707	11.20	1,855	10.04	852	14.94

N = 24,563

Financial Education Questions

Two financial education questions were used in this study. First, the basic categorizing question of whether the respondent received financial education. The other question, asked only of those who received financial education, is whether the education was received in high school, college, and/or in the workplace.

Financial Health Questions

Financial health was represented via multiple dimensions in the NFCS. The 5-question version of the financial well-being questions from the Consumer Financial Protection Bureau is represented in the NFCS, beginning with the 2018 wave. Other objective indicators of positive financial outcomes are also available, as is a subjective question on financial satisfaction.

Missing Data.

The NFCS allows for answers such as "don't know" and "prefer not to say", which leads to the issue of missing data. For the SEM analysis, weighted least squares (WLSMV) was the analytical method, and this used pairwise deletion to handle missing data. For propensity score matching analysis, respondents with missing data in the dependent variable were listwise deleted. This resulted in a sample size reduction from 24,563 to 21,860 for all regression and ANOVA analyses. As mentioned, respondents who failed to answer questions regarding whether they received financial education were listwise deleted from the data set on the basis that their responses cannot be properly categorized and analyzed in the context of financial education received.

Analytic Notes.

The NFCS sample is weighted so that a respondent represents their demographic in the same proportion as the US population. For example, a sample of 500 people from each state

would not be representative of the US population, since each state does not have an equal population. Hence, weighting is applied to give more influence to population subgroups which are underrepresented in the sample, and less to those which are overrepresented.

Weighting information is available as a field in the NFCS. The weights are determined by Census Division, age, gender, ethnicity, and education, so that the overall sample, when weights are applied, is representative of the US adult populations with respect to these demographic characteristics. This study deleted respondents who did not answer a question regarding whether they received financial education. Since this would likely change the demographic makeup of the sample, upon which the weights are based, unweighted results are reported throughout.

Empirical Model and Variables

The study analyzed the hypotheses that financial education is associated with financial health, and that the association between financial education and financial health will be mediated by the constructs of the theory of planned behavior (TPB). The conceptual framework of the empirical model was guided by the TPB, augmented by two additional constructs. One construct, financial health, was the dependent variable. Three constructs of the TPB, financial attitudes, financial perceived behavioral control, and financial behaviors, were represented as latent independent variables in the SEM model. Additionally, financial education was an independent variable, which preceded the initial constructs in the TPB.

This study made two modifications to the TPB (Ajzen, 1991). First, the constructs of subjective norms and intentions were not included. This was due to the lack of an acceptable set of measures in the NFCS to produce reliable variables which measure those constructs. Second, the construct attitude, which normally loads onto intentions (which was omitted), was loaded instead onto perceived behavioral control. In the TPB, perceived behavioral control dually loads

onto intentions and behaviors, while attitude does not load directly onto behaviors. Since perceived behavioral control, like intentions, is a direct antecedent of behaviors, loading attitude onto perceived behavioral control preserved the consistency of what directly effects behavior. See Figure 2.1 for the path diagram of the analysis.

The study also analyzed the direct effect of financial education on financial health. This was done using a nearest neighbor propensity score (Rosenbaum & Rubin, 1983) matching model, which compared the financial health of individuals who received financial education to that of similar individuals who did not receive financial education. Similarity was based on demographic factors such as age, gender, state of residence, income, education, and ethnicity. This reduces the effect of heterogeneity caused by these variables on the outcome and serves to create synthetic random samples. A SEM model with a pure direct effect of education on financial health was also run, both to consider the direct effect and to allow for mediation analysis.

Descriptive data for operationalized variables, for the overall sample as well as for those who have and have not received financial education, is presented in Tables 3.2 and 3.3.

Dependent Variables

Financial health was the dependent variable in this study and was implemented as a latent variable with the dimensions of financial well-being, objective measures of positive financial results or end states, and financial satisfaction for SEM analysis. For regression and ANOVA analyses, the three dimensions were scaled from 0 to 33, and then added together to produce a financial health scale from 0 to 99. The scores for the dimensions of financial well-being (5 to 25), objective positive financial outcomes (0 to 9), and financial satisfaction (1 to 10) were

factors for the financial health variable. The dimensions of financial health, and the questions which comprise them, were also used as dependent variables in sub analyses.

The construct of financial health included the abbreviated version of the CFPB scale of financial well-being, which is a subjective measure. In the NFCS, the CFPB scale is implemented with following five questions. The first three are scored on a Likert-type scale from 1 (does not describe me at all) to 5 (describes me completely): “Because of my money situation, I feel like I will never have the things I want in life”, “I am just getting by financially”, and “I am concerned that the money I have or will save won’t last”. These three questions were reverse-coded so that higher scores reflected greater financial health. Two additional questions from the CFPB are scored on a Likert-type scale from 1 (Never) to 5 (Always): “I have money left over at the end of the month”, and “My finances control my life”. The second question was reverse-coded. Possible scores for financial well-being range from 5 to 25.

A second dimension of financial health focused on indicators of positive financial results or status. These indicators are designed to be objective measures of an economic state, rather than a behavior or a subjective measure. These questions, and their associated scoring, are as follows: “do you have an emergency fund” (Yes = 1); “could you come up with $2,000 in case of an unexpected need” (Yes = 1); “how would you rate your credit record” (Likert-type scale from 1 [very bad] to 5 [very good], scaled from 0 to 1); “do you have non-retirement investments” (Yes = 1); “do you have unpaid medical bills” (Yes = 0); “have you been contacted by a debt collection agency” (Yes = 0); “are you covered by health insurance” (Yes = 1); “do you have a savings account / money market account / CDs” (Yes = 1); and “do you have any retirement…” investments (Yes = 1). The range of scores for positive financial outcomes is from 0 to 9.

Financial satisfaction was measured by the question "Overall, thinking of your assets, debts and savings, how satisfied are you with your current financial condition?" This is measured on a Likert-type scale from 1 (not at all satisfied) to 10 (extremely satisfied). Thus, for financial satisfaction, the range of possible scores is from 1 to 10.

Sub-domains were also analyzed, including five questions which indicated asset accumulation as well as specific questions such as whether and individual had a retirement plan.

Independent Variables

The independent variables were the constructs representing financial education, as well as three of the five constructs of the TPB (Ajzen, 1991).

Financial Education

Whether a respondent received financial education was determined by the question "Was financial education offered by a school or college you attended, or a workplace where you were employed?" (For the answer "Yes, and I did participate in the financial education", the variable was be coded as 1, otherwise 0.) Respondents who answered "Don't know" or "Prefer not to say" were not included in the study. Financial education was implemented as a latent variable for SEM analysis, which indicated whether and when the individual received financial education. The specific question was "When did you receive that financial education?" This question has four yes/no answers for high school, college, an employer, and the military. Dummy variables were created for high school, college, and workplace. A variable indicating the total number of exposures to a financial education program (0 to 3) was also created for the purpose of sub analysis.

Financial Attitudes

Financial attitudes were represented by a latent variable which measures the respondent's beliefs about financial behaviors. Responses were coded so that positive beliefs have higher scores. The questions used are based on the determinants of financial worry identified in Magwegwe et al. (2020). One question asked respondents to assess the amount of anxiety caused by finances, on a Likert-type scale from 1 (strongly disagree) to 7 (strongly agree) and was reverse-coded. Another dimension of financial attitudes is whether the respondent feels they have too much debt right now; this is a Likert-type scale from 1 (strongly agree) to 7 (strongly disagree) and was reverse coded. A third question is how frequently the respondent thinks about finances, with six answers ranging from "never" (1) to "more than once per day" (6); this question was also reverse-coded. The final question used for this construct was "in a typical month, how difficult is it for you to cover your expenses and pay all your bills", with answers ranging from "very difficult" (1) to "not at all difficult" (3).

Financial Perceived Behavioral Control

Financial perceived behavioral control measures the respondent's beliefs that they can make good financial decisions and have control over those decisions and behaviors. This was implemented as a latent variable. Scores were coded so that higher degrees of perceived behavioral control received higher scores. There were two dimensions to financial perceived behavioral control: subjective, which is the respondent's perception of their financial agency, and objective, which measures the respondent's actual financial knowledge.

The following questions were factors for the subjective dimension of this variable: "If you were to set a financial goal for yourself today, how confident are you in your ability to achieve it?" ("Not at all confident" = 1, up to "Very confident" = 4); "On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall financial

knowledge?"; "I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses" (Likert-type scale from 1 [strongly disagree] to 7 [strongly agree]); and "I am pretty good at math" (Likert-type scale from 1 [strongly disagree] to 7 [strongly agree]).

Financial knowledge was implemented as a total score of correct answers to the financial knowledge questions in the NFCS. There are a total of 7 questions, covering the topics of compound interest, inflation, interest rates and bond prices, interest compounding on a loan, diversification, and risk and probability. Each correct answer will receive one point, and incorrect answers, along with the responses of "don't know" and "prefer not to say" will receive no points. The total possible score ranges from 0 to 7.

Financial Behaviors

This construct measures the preponderance of the respondent's positive financial behaviors. This was implemented as a latent variable. Answers were coded so that positive or beneficial financial behaviors have higher scores. There were 4 factors for this variable. The questions which served as factors for this variable are: "Do you overdraw your checking account occasionally?" (No = 1, Yes = 0); ; "Have you taken out an auto title loan, payday loan, tax refund advance, or used a pawn shop or rent-to-own store in the last five years" (Never to all = 1); "Over the past year, would you say your spending was less than, more than, or about equal to your income?" (Less than = 1, Equal = 0.5, More than = 0); and "have you not filled a prescription, skipped a medical test or treatment, or chosen not to go to a doctor due to cost in the last 12 months" (No to all = 1).

Control Variables

Control variables for OLS regression and ANOVA analyses included race, gender, age, education level attained, income, employment status, and the number of dependents. All these variables are either categorical or binary. These variables are used widely in financial planning studies, and were cited by Mitchell and Lusardi (2015) as variables which affect financial literacy.

Table 3.2

Categorical Responses

	Unweighted Sample		No Financial Education		Financial Education	
Variable	*n*	*%*	*n*	*%*	*n*	*%*
Paying bills is:						
Very difficult	2,563	10.62	2,060	11.17	503	8.85
Somewhat difficult	8,168	33.86	6,332	34.34	1,836	32.30
Not difficult	13,395	55.52	10,049	54.49	3,346	58.86
Do not overdraw account	17,549	71.44	13,510	71.87	4,039	70.06
Have no risky debt	16,512	67.22	12,826	68.23	3,686	63.94
Spending vs income						
Spend less	10,912	44.42	8,192	43.58	2,720	47.18
Spend same	8,279	33.71	6,483	34.49	1,796	31.15
Spend more	5,372	21.87	4,123	21.93	1,249	21.67
Did not skip medical treatment due to cost	17,149	69.82	13,272	70.60	3,877	67.25
Have emergency fund	13,326	54.25	9,792	52.09	3,534	61.30
Could raise $2,000	16,740	68.15	12,433	66.14	4,307	74.71
Have investments	9,007	36.67	6,313	33.58	2,694	46.73
No unpaid medical bills	18,462	75.16	14,155	75.30	4,307	74.71
No debt collections calls	19,498	79.38	14,950	79.53	4,548	78.89
Have medical insurance	21,769	88.74	16,626	88.45	5,170	89.68
Have a savings account	18,278	74.41	13,694	72.85	4,584	79.51
Have retirement assets	14,834	60.39	10,897	57.97	3,937	68.29

Table 3.3

Continuous Responses

	Unweighted Sample		No Financial Education		Financial Education	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Not anxious (1 - 7)	3.35	1.95	3.31	1.93	3.51	1.98
Don’t feel too much debt (1 - 7)	4.50	2.26	4.48	2.26	4.55	2.26
Don't obsess (1 - 6)	2.77	1.36	2.77	1.38	2.77	1.29
Confidence in achieving financial goal (1 - 4)	3.03	0.88	2.98	0.89	3.19	0.83
Good at daily finances (1 - 7)	5.65	1.51	5.59	1.53	5.85	1.42
Math skill (1 - 7)	5.41	1.69	5.32	1.72	5.73	1.53
Subjective financial knowledge (1 - 7)	5.10	1.34	4.98	1.36	5.48	1.20
Objective financial knowledge test score (0 - 7)	3.40	1.90	3.27	1.88	3.82	1.88
Feel they can get what they want (1 - 5)	3.21	1.42	3.16	1.42	3.53	1.38
Feel better than "just getting by" (1 - 5)	3.13	1.41	3.09	1.41	3.24	1.39
Money will last (1 - 5)	2.81	1.36	2.77	1.36	2.96	1.35
Have money left over at end of month (1 - 5)	3.30	1.32	3.23	1.33	3.52	1.28
Do not feel controlled by finances (1 - 5)	3.04	1.26	3.02	1.27	3.10	1.23
Financial well-being scale (5 - 25)	15.51	5.53	15.30	5.67	16.19	5.36
Financial satisfaction (1 - 10)	5.90	2.81	5.77	2.83	6.30	2.72
Credit rating (0 - 1)	0.72	0.30	0.71	0.31	0.76	0.29
Positive outcome scale (0 - 9)	6.18	2.33	6.06	2.35	6.56	2.20
Financial health total scale (0 - 99)	58.06	23.87	56.84	24.11	61.96	22.63

Analytical Methods

Several different statistical methods were applied to the data to address different research questions and the specific hypotheses. In some cases, multiple methodologies were used to address a hypothesis more fully.

SEM

Structural equation modeling represents the simultaneous solution of linked regression models, along with the calculation of latent variables which measure characteristics (such as attitudes) which cannot be directly observed. SEM was used to determine the effect of financial education on financial health, both directly and indirectly (mediated effect) through the constructs of the TPB (Ajzen, 1991).

The direct SEM model between financial health and financial education is straightforward:

$$(1)\ Financial\ Health_i = \alpha + \beta_1(Financial\ Education_i) + \varepsilon_i$$

A significant result would support H_1.

The full SEM model which includes the constructs of the TPB (Ajzen, 1991) is the simultaneous solution to the following set of regression equations:

$$(2)\ Perceived\ Behavioral\ Control_i = \alpha_1 + \beta_2(Financial\ Education_i) + \beta_3(Financial\ Attitudes_i) + \varepsilon_{i1}$$

$$(3)\ Financial\ Behaviors_i = \alpha_2 + \beta_3(Financial\ Perceived\ Behavioral\ Control_i) + \varepsilon_{i2}$$

$$(4)\ Financial\ Health_i = \alpha_4 + \beta_4(Financial\ Behaviors_i) + \beta_5(Financial\ Education_i) + \varepsilon_{i3}$$

A significant value of β_2 would support H_1 and H_3.

SEM Mediation

SEM was also used to determine the mediation effect of the TPB (Ajzen, 1991) constructs on the relationship between financial education and financial health. For this, the parameter β_1 from equation (1) in the direct SEM model was compared to the parameter β_2 from equation (2) in the full SEM model. Mediation is detected if β_2 is lower than β_1, and full mediation is detected if β_2 is reduced to an insignificant level. The detection of mediation would support H_4.

Propensity Score Matching

Propensity score matching is a statistical technique where an individual who did not receive treatment (in this case, those who did not receive financial education) is matched with an individual who did receive financial education. The propensity score is based on demographic factors and is designed to create synthetic samples of similar individuals who differ only in whether they received the treatment. Everyone in the financial education group is matched with one individual in the no-education group, based on how close (nearest neighbor) their propensity scores are.

Rosenbaum and Rubin (1983, 1985) demonstrated that matching on observed covariates can reduce or eliminate selection bias into treatment. Lanza et al. (2013) outlined a process for which propensity score matching could be used to determine causality. The steps include developing a propensity score based on observed covariates, matching the individuals in the groups based on propensity score, assessing the balance between the groups based on the covariates used for the propensity score, and then analyzing the two groups. In so doing, selection bias is reduced, and the analysis can be used to develop causal relationships, not just associations between variables.

The effect of the treatment on those who received it can then be isolated, and the heterogeneity of the model is reduced. This statistically simulates experimental random assignment and can provide support for the existence of a causal relationship.

Matching seeks to allow us to determine the following quantity:

$$E\left[y_{1,i} \mid D_i = 1\right] - E\left[y_{0,i} \mid D_i = 1\right]$$

indicating the difference in the expected value of financial health for individuals who received financial education compared to the expected value of financial health for the counterfactual of the same individuals had they not received financial education. This will provide the average treatment effect on the treated (ATT). ATT can only be estimated when we have a reasonable proxy for the individual who received treatment (in this case, financial education) to provide their result given that they did not receive treatment. Matching, in the extant case, matches everyone who received financial education with a demographically similar individual who did not; in so doing, we will have eliminated a great deal of the unknown heterogeneity in the sample. The matching algorithm only considered those who had a calculable score for financial health (no missing components).

Using both the matched and unmatched data, ordinary least squares (OLS) regression, t-tests, and analysis of variance (ANOVA) were used to examine the effectiveness of the matching algorithm, as well as to perform statistical analyses of the effects of financial education.

OLS Regression

OLS regression was used as a robustness check for the direct SEM model. OLS regression was also used to model the direct relationship between financial education and financial health. H_1 was evaluated using OLS regression for the nearest-neighbor dataset, both with and without controls.

Chi-square tests and t-tests

Chi-square were used to compare the demographic differences between those with financial education and those without financial education, and then to confirm that the matching algorithm produced samples of each which were more similar than the overall sample. Chi-square tests and t-tests were used to analyze differences in responses to the independent and dependent variables between the two groups.

ANOVA

ANOVA was used to compare differences in the effects of the timing of education on financial health. It was also used to evaluate the effects of different amounts of financial education on financial health. ANOVA for the matched data also allowed for the analysis of demographic variables on the strength of the relationship between financial education and financial health. H_1 and H_2 were evaluated using ANOVA for the nearest-neighbor dataset, both with and without covariates.

Summary

The study utilized data from the 2021 wave of the NFCS. Variables were operationalized to represent the constructs of the TPB (Ajzen, 1991). These variables were used in a SEM analysis, which shows the associations between the constructs of the TPB, augmented with financial education as an antecedent and financial heath as an outcome. The SEM analysis addressed the research questions regarding the effect of financial education on financial health, and the mediating effect of the TPB. SEM was used to evaluate hypotheses H_1, H_3, and H_4.

The study also used propensity score matching, where analogous groups of individuals were compared, with the groups differing only in whether they had received financial education. This allowed for deeper and more direct analysis of H_1 and H_2, as well as an examination into the

features – specifically timing – which might affect the association between financial education and financial health. Matching also was used for a closer examination of the differences in the association between financial education and financial health among several demographic characteristics. Using the matched dataset, tests included OLS regression, t-tests, and ANOVA.

Chapter 4 - Results

In this chapter, the results of the statistical analyses will be presented. Support for the hypotheses will be determined. For the primary analyses, several sub analyses will be performed, as robustness checks and to establish key variables which significantly influenced the results.

Financial Education and the Theory of Planned Behavior

The effects of financial education through the constructs of the TPB (Ajzen, 1991) were analyzed using SEM.

Confirmatory Factor Analysis

For each construct, a confirmatory factor analysis (CFA) was performed. The CFA provides information about the factors (input variables) used to determine a latent variable or construct. A CFA model which has good SEM model fit statistics provides confirmation that the factors are related to each other (internal consistency) and the variable in question. CFA statistics will be augmented with Cronbach's alpha to determine construct reliability. CFA results are summarized in Table 4.4 (SEM fit statistics) and Table 4.1 (CFA factor loadings).

Financial Education CFA

The financial education construct used three factors, which means the model is considered just-identified. As such, the SEM model fit statistics are not as meaningful ($\chi^2[0] = 0.00$, $p < .001$, *RMSEA* = 0.00, *CFI* = 1.00, *TLI* = 1.00, *SRMR* = 0.00). Construct reliability was tested by Cronbach's alpha ($\alpha = 0.65$), which is an acceptable result. Standardized factor loadings were 0.77 for high school, 0.87 for college, and 0.80 for workplace. All these results are significant at $p < .001$.

Financial Attitude CFA

Financial attitude was constructed using four factors. Model fit statistics were good ($\chi^2[1] = 27.31$, $p < .001$, *RMSEA* = 0.03, *CFI* = 1.00, *TLI* = 0.99, *SRMR* = 0.01). χ^2 is significant, which is not desirable, but is common when the number of observations is over 400 (Kenny, 2015) and can be discounted in that case. All other model fit statistics are within the appropriate ranges (Kline, 2016). Cronbach's alpha was also good ($\alpha = 0.70$). The standardized factor loadings were 0.71 for anxious, 0.64 for obsessed, 0.70 for debt problems, and 0.67 for difficulty with bills. All factor loadings were significant at $p < .001$.

Financial Perceived Behavioral Control CFA

Five factors were used to construct perceived behavioral control. Per guidelines in Kline (2016), the SEM model fit statistics were all within desirable ranges ($\chi^2[2] = 1.702$, $p = 0.43$, *RMSEA* = 0.00, *CFI* = 1.00, *TLI* = 1.00, *SRMR* = 0.00). Cronbach's alpha was good as well ($\alpha = 0.70$). Factor loadings were as follows: confidence 0.47, financial skill 0.73, math skill 0.64, subjective knowledge 0.69, and objective knowledge 0.37. All loadings were significant at $p < 0.01$. Financial perceived behavioral control contained one factor which was itself a scale, objective knowledge. The reliability of that scale was acceptable ($\alpha = 0.63$).

Financial Behaviors CFA

The financial behaviors CFA was constructed using four behaviors. SEM model fits were all good ($\chi^2[1] = 3{,}809$, $p = 0.05$, *RMSEA* = 0.01, *CFI* = 1.00, *TLI* = 1.00, *SRMR* = 0.00) and within recommended ranges from Kline (2016). Cronbach's alpha was in the acceptable range ($\alpha = 0.63$), but the other SEM statistics point strongly to a reliable construct. Factor loadings were also good: overdraw at 0.72, toxic debt at 0.83, overspending at 0.47, and skipping medical treatments at 0.63. All factor loadings were significant at $p < .001$.

Financial Health CFA

Financial health, the primary dependent variables, has three factors, two of which are scales themselves. The SEM model for the construct was just-identified, so SEM model fit statistics are not as meaningful ($\chi^2[0] = 0.00$, $p < .001$, *RMSEA* = 0.00, *CFI* = 1.00, *TLI* = 1.00, *SRMR* = 0.00). However, Cronbach's alpha was good ($\alpha = 0.75$), indicating construct reliability. Factor loadings were 0.84 for financial well-being, 0.76 for financial satisfaction, and 0.77 for positive financial outcomes. All factor loadings were significant at $p < 0.001$. Financial well-being ($\alpha = 0.87$) and positive financial outcomes ($\alpha = 0.78$) are scales as well, with good Cronbach alpha measures.

Table 4.1

CFA Factor Loadings

Construct / Factor	α	Factor Loading	*p*
Education	0.65		
High School		0.77	< .001
College		0.87	< .001
Workplace		0.80	< .001
Attitude	0.70		
Anxious		0.71	< .001
Obsessed		0.64	< .001
Debt Problems		0.70	< .001
Bill Difficulty		0.67	< .001
Perceived Behavioral Control	0.70		
Confident		0.47	< .001
Financial Skill		0.73	< .001
Math Skill		0.64	< .001
Subjective Knowledge		0.69	< .001
Objective Knowledge	0.63	0.37	< .001
Behaviors			
Behaviors	0.63		
Overdraw		0.72	< .001
Toxic Debt		0.83	< .001
Overspending		0.47	< .001
Skipping Medical Treatments		0.63	< .001
Financial Health	0.75		
Financial Well-Being	0.87	0.84	< .001
Financial Satisfaction		0.76	< .001
Positive Financial Outcomes	0.78	0.77	< .001

Note: Cronbach's alpha reported for all latent constructs and scaled factors.

Baseline Education Structural Model

The baseline education structural model is a simplified SEM model, consisting of a single path from financial education to financial health. This provides two vital pieces of information. First, it indicates whether there is an association between financial education and financial health, in the absence of all other variables. Second, this model will provide a structural coefficient that can be used to test for mediation.

SEM model fit statistics were good for this model ($\chi^2[8] = 385.73$, $p = 0.00$, *RMSEA* = 0.04, *CFI* = 0.99, *TLI* = 0.96, *SRMR* = 0.03) (Kline, 2016). χ^2 was significant, but this can be discounted due to large sample size (Kenny, 2015), and all other fit statistics were in the desirable range. Factor loadings for the education construct remained significant at $p < .001$. The path coefficient from financial education to financial health was 0.22, which is significant at $p < .001$. The significance of the model and the path coefficient provided support for H_1, that financial education is positively associated with financial health. SEM fit and path statistics for this model are presented in Tables 4.4 and 4.5, and path statistics are also presented in Figure 4.1.

Full TPB Measurement Model

A measurement model provides an indicator of whether the CFAs will fit together and produce a reliable structural model. This model is an important intermediate step, as it can be an early indicator of model misspecification. This model will not produce path coefficients, so it was used only to determine if a viable structural model is possible. For the measurement model, χ^2 was significant, but discounted by large sample size (Kenny, 2015), and all other SEM fit statistics were good ($\chi^2[77] = 1{,}078.10$, $p = 0.00$, *RMSEA* = 0.02, *CFI* = 0.99, *TLI* = 0.98, *SRMR* = 0.02) per Kline's (2016) guidelines. All factor loadings remained above 0.40 and were all

significant at $p < .001$. Based on the results of this model, we can proceed to the full TPB (Ajzen, 1991) structural model. Correlations for the independent variables are presented in table 4.2, and correlations for the latent variables are presented in table 4.3. SEM fit statistics for this model are presented in Table 4.4.

Table 4.2

Correlations of Independent Variables

Variable	1	2	3	4	5	6	7
1	1.00						
2	.49***	1.00					
3	.46***	.36***	1.00				
4	.48***	.48***	.41***	1.00			
5	0.01	0.00	-0.02	0.01	1.00		
6	.07***	.02**	0.00	.05***	.41***	1.00	
7	.05***	0.01	0.02	.04***	.35***	.41***	1.00
8	.41***	.34***	.29***	.46***	.06***	.11***	.11***
9	.26***	.22***	.17***	.32***	.06***	.09***	.09***
10	.15***	.09***	.08***	.17***	.08***	.13***	.10***
11	.23***	.15***	.13***	.24***	.11***	.17***	.16***
12	.23***	.16***	.04***	.25***	.07***	.15***	.11***
13	.26***	.29***	.17***	.36***	-0.02	0.02	-0.02
14	.27***	.30***	.19***	.35***	-.03*	0.01	-.03**
15	.32***	.33***	.23***	.38***	0.02	.04***	0.02
16	.33***	.34***	.26***	.38***	-.03***	0.02	-0.01
17	.67***	.57***	.53***	.67***	.03***	.09***	.08***
18	.45***	.42***	.43***	.52***	.03***	.10***	.11***
19	.42***	.48***	.33***	.59***	.05***	.13***	.12***

Variable	8	9	10	11	12	13	14
8	1.00						
9	.34***	1.00					
10	.23***	.47***	1.00				
11	.39***	.50***	.44***	1.00			
12	.18***	.27***	.33***	.25***	1.00		
13	.18***	.25***	.12***	.12***	.24***	1.00	
14	.13***	.22***	.11***	.07***	.27***	.39***	1.00
15	.28***	.24***	.14***	.17***	.23***	.28***	.325***
16	.22***	.20***	.11***	.11***	.16***	.28***	.34***
17	.61***	.37***	.22***	.33***	.29***	.34***	.34***
18	.57***	.37***	.24***	.44***	.16***	.19***	.16***
19	.50***	.41***	.25***	.36***	.41***	.40***	.42***

Variable	15	16	17	18	19
15	1.00				
16	.23***	1.00			
17	.43***	.40***	1.00		
18	.31***	.26***	.64***	1.00	
19	.38***	.37***	.64***	.58***	1.00

** p < 0.05, ** p < 0.01, *** p < .001*

Legend:

1 = financial anxiety, 2 = debt problems, 3 = financial obsession

4 = bill payment problems, 5 = financial education in high school

6 = financial education in college, 7 = financial education at work

8 = financial confidence, 9 = financial skill, 10 = math skill

11 = subjective knowledge, 12 = objective knowledge, 13 = overdrawn account

14 = toxic debt, 15 = overspending, 16 = skipped medical treatment

17 = financial well-being, 18 = financial satisfaction

19 = positive financial outcomes

Table 4.3

Correlations of Latent Variables

Variable	Attitude	Education	Perceived Behavioral Control	Behavior	Financial Health
Attitude	1.00				
Education	.07***	1.00			
Perceived Behavioral Control	.95***	.27***	1.00		
Behavior	.88***	.25***	.93***	1.00	
Financial Health	.87***	.20***	.91***	.98***	1.00

* p < 0.05; ** p < 0.01; *** p < .001

Full TPB Structural Model

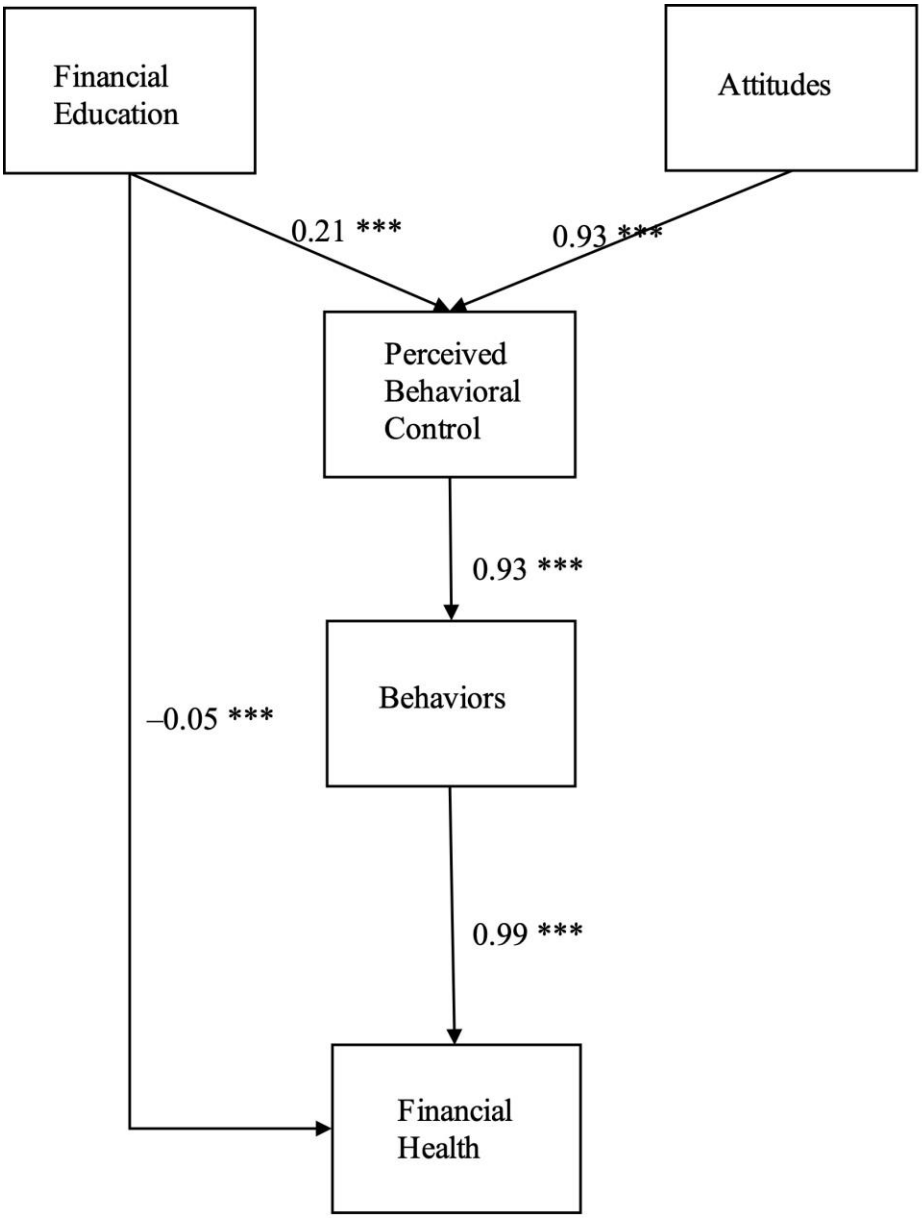
The full TPB (Ajzen, 1991) model is the SEM model that considers all paths from education to financial health through the TPB constructs, as well as the direct path from

education to financial health. This model will allow for the analysis of the loading of financial education, the relationship between financial education and financial health through the constructs of the TPB, the value of the TPB itself as an explanatory paradigm, and whether the TPB constructs mediate the relationship between financial education and financial health. This model tests indirect paths from education to health, and bootstrapping was performed to provide confidence intervals for the model parameters.

The structural model had good (Kline, 2016) fit statistics ($\chi^2[63] = 2{,}643.95$, $p = 0.00$, *RMSEA* = 0.04, *CFI* = 0.97, *TLI* = 0.92, *SRMR* = 0.02). χ^2 was significant, but this can be discounted due to large sample size (Kenny, 2015). Factor loadings all remained significant at $p < .001$. Model paths were all significant at $p < .001$, with key standardized path statistics of education to health –0.05, education to perceived behavioral control 0.21, and behaviors to health 0.99, 95% CIs [–0.07, –0.03], [0.19, 0.23], and [0.98, 0.99] respectively. SEM fit and path statistics for this model are presented in Tables 4.4 and 4.5. Path statistics are also illustrated in Figure 4.1.

Figure 4.1

TPB Path Diagram with Path Statistics



Standardized coefficients
* p < .05; ** p < .01; *** p < .001

The overall path from financial education to financial health is composed of two separate segments: a direct path, and an indirect path through the TPB (Ajzen, 1991) constructs. The

indirect path has a coefficient of 0.19, 95% CI [0.17, 0.21], and is significant at $p < .001$. This yields a total effect, direct and indirect, of 0.15, 95% CI [0.13, 0.16].

The fit and significant path statistics of the overall model supported the use of the TPB (Ajzen, 1991), as modified, as an explanatory paradigm for the relationship between financial education and financial health. Further the significance of the path between financial education and perceived behavioral control supported H_3. The significance of the total effect (direct and indirect) between financial education and financial health provided additional support for H_1 as well.

Table 4.4

SEM Fit Statistics

Model	χ^2	*p*	*RMSEA*	*CFI*	*TLI*	*SRMR*
CFAs						
Education	0.00*	< .001	0.00	1.00	1.00	0.00
Attitude	27.31	< .001	0.03	1.00	0.99	0.01
Perceived Behavioral Control	1.70	0.43	0.00	1.00	1.00	0.00
Behaviors	3.81	0.05	0.01	1.00	1.00	0.00
Health	0.00*	< .001	0.00	1.00	1.00	0.00
Direct Structural Model	385.73	< .001	0.04	0.98	0.96	0.03
TPB Measurement Model	1,078.10	< .001	0.02	0.99	0.98	0.02
TPB Structural Model	2,643.95	< .001	0.04	0.97	0.92	0.02

** model is just-identified*

Table 4.5

SEM Path Coefficients

Model / Path	*B*	*SE B*	*β*	*SE β*	*p*
Direct Education to Health					
Education to Health	1.32	0.07	0.22	0.01	< .001
TPB Full Model					
Direct Education to Health	-0.18	0.04	-0.05	0.01	< .001
Education to PBC	0.10	0.01	0.21	0.01	< .001
Attitude to PBC	0.44	0.01	0.93	0.01	< .001
PBC to Behavior	1.30	0.03	0.93	0.01	< .001
Behavior to Health	5.70	0.11	0.99	0.00	< .001
Indirect Education to Health	0.74	0.05	0.19	0.01	< .001
Total Education to Health	0.56	0.04	0.15	0.01	< .001

Testing for Mediation

In the direct SEM model, the path from financial education to financial health was significant and positive ($\beta = 0.22$, $p < .001$). In the full SEM model, that path remained

significant ($\beta = -0.05$, $p < .001$), but the sign switched from positive to negative. Meanwhile, the indirect path from financial education to financial health, through perceived behavioral control and behaviors, was significant and positive ($\beta = 0.19$, $p < .001$). The behavior of the direct path – the sign change – was unexpected, but the fact that the effect was lessened and even slightly negative in the presence of a significant positive indirect path supported a mediation effect (H_4).

Robustness Checks (OLS Regression and ANOVA)

To validate the SEM conclusions regarding the significance of the simple direct effect of financial education on financial health, two additional tests were made. First, a direct regression of financial health on financial education was performed. The regression was significant ($F(1, 21858) = 184.00$, $p < .001$, $R^2 = 0.01$), and the regression coefficient for financial education was also significant ($B = 5.12$, $p < .001$, $\beta = 0.09$). While this simple regression did not explain a high proportion of the variation in financial health, the coefficient of 5.12 is nonetheless notable in the context of financial health as a scale from 0 to 99. Regression results are presented in Table 4.6.

Table 4.6

Direct Regression Model Statistics

Coefficient	*B*	*SE B*	*β*	*p*
Financial Education	5.12	0.38	0.09	< .001
Intercept	56.84	0.18		< .001

$F(1, 21858) = 184.00$, $p < .001$, $R^2 = 0.01$

An ANOVA analysis was also performed, using the number of exposures to financial education received, from 0 to 3, as the categorical independent variable. The ANOVA was significant ($F(2, 21857) = 106.50$, $p < .001$), and all Tukey mean contrasts were also significant at p < .001 except for 2 exposures to financial education versus 3 ($t = 2.79$, $p = 0.027$). More exposures to education had a higher mean than fewer exposures in all 6 comparisons. The ANOVA results are presented in Table 4.7.

Table 4.7

Direct ANOVA Model Statistics

Source	*df*	*F*	*p*
Model	3	106.50	< .001
Total Sources of Financial Education	3	106.50	< .001

$R^2 = 0.01$

The simple regression and the ANOVA were not designed to draw conclusions beyond what the SEM analysis indicated. Their purpose was to validate the SEM conclusions that financial education is positively associated with financial health and, since the SEM education construct featured three levels of education, to validate the positive loadings of all the levels.

Propensity Score Matching Regression Analysis

Demographic differences existed between those who received financial education and those who did not. Individuals who reported that they had financial education tended to be younger, have higher incomes, be more likely to be working full time, to have attained higher levels of education, and to have parents who attained higher levels of education (see Table 3.1). Merely controlling for these variables is not sufficient to eliminate the heterogeneity indicated by these differences. This study created two groups which were demographically much more homogeneous, using propensity score matching. In so doing, results of statistical analyses are much more likely to isolate on the variables which differentiate the groups, in this case, the financial education variables.

Descriptive Statistics After Nearest Neighbor Matching

Before doing any comparative analysis using matched data, it is key to determine if the matching algorithm significantly reduced demographic differences between the groups. All demographic variables used are categorical, so χ^2 was used to evaluate the differences between the groups who did and did not receive financial education. In the unmatched sample, every χ^2 test was significant at $p < .001$. This is indicative of significant differences in the demographic makeup of the two groups. After the matching algorithm, the only χ^2 test which was significant was for employment status (χ^2 [7] = 17.09, p = .017). All other demographic variables had insignificant χ^2 results ($p > .05$). The testing indicates that the matching algorithm effectively reduced demographic differences, which will allow further testing to isolate the effects of the education variables. The full results of the demographic comparisons are presented in Table 4.8.

Table 4.8

Demographics: Matched vs Unmatched

	Unmatched				Matched			
Variable	No Financial Education (%)	Financial Education (%)	χ^2	*p*	No Financial Education (%)	Financial Education (%)	χ^2	*p*
Financial education	0.00	100.00			0.00	100.00		
Had financial education in:								
High school	0.00	58.02			0.00	57.61		
College	0.00	55.21			0.00	56.26		
Workplace	0.00	40.28			0.00	41.15		
Age			190.07	< .001			3.33	0.65
18 - 24	9.62	15.89			13.16	14.00		
25 - 34	17.34	17.17			18.56	17.59		
35 - 44	17.38	15.47			16.48	16.00		
45 - 54	17.12	16.18			16.59	16.72		
55 - 64	17.47	17.38			17.38	17.68		
65 or over	21.07	17.90			17.84	18.01		
Gender (Male)	44.34	52.77	126	< .001	52.66	53.14	0.24	0.62
Ethnicity (White)	74.49	71.81	16.34	< .001	73.28	72.70	0.43	0.51
Income			231.44	< .001			2.19	0.99
Less than $15,000	12.58	9.63			8.39	8.41		
$15,000 - 24,999	11.03	9.54			8.97	9.02		

$25,000 - 34,999	11.33	9.04			9.20	8.97		
$35,000 - 49,999	14.64	12.78			13.08	13.12		
$50,000 - 74,999	18.59	17.92			18.66	18.30		
$75,000 - 99,999	12.88	14.54			15.04	14.96		
$100,000 - 149,999	12.28	15.42			15.94	15.88		
$150,000 - 199,999	3.95	6.63			6.74	6.88		
$200,000 - 299,999	1.85	3.14			2.72	3.16		
$300,000 or more	0.87	1.37			1.26	1.30		
Employment Status			213.61	< .001			17.09	0.02
Self employed	7.99	8.46			7.61	8.62		
Full time employee	37.67	43.52			46.00	45.33		
Part time employee	8.38	9.47			8.72	9.16		
Homemaker	7.13	4.80			5.52	4.90		
Full time student	2.26	4.15			2.84	3.30		
Disabled	5.84	4.41			3.77	4.31		
Unemployed	8.51	5.85			6.46	5.17		
Retired	22.22	19.34			19.10	19.21		
Number of Dependents			16.13	< .01			7.05	0.07
None	65.85	63.47			63.18	62.34		
1	14.89	14.92			16.15	15.42		

2	11.79	13.22			13.41	13.66		
3 or more	7.47	8.39			7.26	8.58		
Education			462.63	< .001			0.96	0.99
Did not complete high school	3.19	0.95			0.71	0.79		
High school graduate	19.44	12.26			11.49	11.44		
GED or alternate credential	7.71	4.13			3.62	3.93		
Some college	26.07	25.93			25.90	26.00		
Associate degree	10.34	12.39			12.61	12.55		
Bachelor's degree	22.99	30.23			31.34	31.05		
Post graduate degree	10.25	14.10			14.33	14.25		
Married	48.86	51.60	13.33	< .001	53.30	53.08	0.05	0.83
Parent/Guardian education			292.29	< .001			6.63	0.25
Did not complete high school	7.35	4.93			4.29	4.76		
High school graduate	32.86	24.43			24.07	24.08		
Some college	19.49	19.17			19.59	19.13		
Associate degree	9.20	10.05			10.65	10.08		
Bachelor's degree	21.06	26.48			27.72	26.86		

Post graduate degree	10.04	14.94		13.69	15.10

N = 24,563 Unmatched; N = 10,440 Matched

The effects of the matching algorithm on the differences in the variables used in the study, both independent and dependent, were also considered. Here, there was no goal to eliminate differences, or even change them one way or another. Rather, it was just to see how the data changed. Z-tests for proportions or t-tests for means, as appropriate, were used to compare respondent responses between groups. Overall, the matched set indicated that by reducing the demographic differences between the groups, the differences in the responses was also reduced.

The contrasts in the differences between those with and without financial education, for the unmatched and matched datasets, are presented in Tables 4.9 and 4.10. There were two clear trends in the data. First, the differences between groups generally changed in favor of the no-education group when going from unmatched to matched data. This indicates that by reducing demographic differences between the two groups, the characteristics of the no-education group changed. Second, the changes generally involved improvements in the no-education group, while the financial education group generally had similar scores. In the overall dataset, the financial education group generally had more favorable demographics, including higher income and education levels, so eliminating these differences, by effectively culling out some of the individuals with unfavorable demographic characteristics, would be expected to improve the scores for the no-education group that remains.

Table 4.9

Categorical Responses: Matched vs Unmatched

Variable	No Financial Education (%)	Financial Education (%)	*z*	*p*	No Financial Education (%)	Financial Education (%)	*z*	*p*
Do not overdraw account	71.87	70.06	2.66	0.01	73.51	71.00	2.86	< .01
Have no risky debt	68.23	63.94	6.08	< .001	69.54	63.93	6.09	< .001
Did not skip medical treatment due to cost	70.60	67.25	4.85	< .001	71.57	67.70	4.30	< .001
Have emergency fund	52.09	61.30	-12.28	< .001	59.83	62.32	-2.61	0.01
Could raise $2,000	66.14	74.71	-12.22	< .001	72.97	76.28	-3.89	< .001
Have investments	33.58	46.73	-18.12	< .001	39.90	47.91	-8.24	< .001
No unpaid medical bills	75.30	74.71	0.91	0.36	77.51	74.56	3.53	< .001
No debt collections calls	79.53	78.89	1.05	0.29	81.24	78.58	3.40	< .001
Have medical insurance	88.45	89.68	-2.59	0.01	89.75	90.40	-1.11	0.27
Have a savings account	72.85	79.51	-10.14	< .001	79.46	80.86	-0.18	0.07
Have retirement assets	57.97	68.29	-14.02	< .001	66.80	70.33	-3.88	< .001

Table 4.10

Continuous Responses: Matched vs Unmatched

	Unmatched						Matched					
	No Financial Education		Financial Education				No Financial Education		Financial Education			
Variable	*M*	*SD*	*M*	*SD*	*t*	*p*	*M*	*SD*	*M*	*SD*	*t*	*p*
Not anxious (1 - 7)	3.31	1.93	3.51	1.98	-6.86	< .001	3.40	1.96	3.50	1.97	-2.61	0.01
Don’t feel too much debt (1 - 7)	4.48	2.26	4.55	2.26	-2.20	0.03	4.55	2.26	4.49	2.26	1.31	0.19
Don't obsess (1 - 6)	2.77	1.38	2.77	1.29	0.32	0.75	2.80	1.33	2.75	1.27	2.31	0.02
Not late with bills (1 - 3)	2.43	0.68	2.50	0.65	-6.50	< .001	2.50	0.66	2.50	0.66	0.37	0.71
Confidence in achieving financial goal (1 - 4)	2.98	0.89	3.19	0.83	-15.66	< .001	3.09	0.84	3.19	0.82	-6.35	< .001
Good at daily finances (1 - 7)	5.59	1.53	5.85	1.42	-11.58	< .001	5.71	1.45	5.89	1.38	-6.58	< .001
Math skill (1 - 7)	5.32	1.72	5.73	1.53	-16.50	< .001	5.47	1.62	5.77	1.50	-9.53	< .001
Subjective financial knowledge (1 - 7)	4.98	1.36	5.48	1.20	-25.11	< .001	5.10	1.28	5.51	1.17	-17.02	< .001
Objective financial knowledge test score (0 - 7)	3.27	1.88	3.82	1.88	-19.46	< .001	3.56	1.88	3.90	1.85	-9.30	< .001
Feel they can get what they want (1 - 5)	3.16	1.42	3.53	1.38	-9.00	< .001	3.26	1.41	3.35	1.38	-3.26	< .01
Feel better than "just getting by" (1 - 5)	3.09	1.41	3.24	1.39	-7.05	< .001	3.22	1.42	3.24	1.39	-0.86	0.39
Money will last (1 - 5)	2.77	1.36	2.96	1.35	-9.12	< .001	2.85	1.37	2.95	1.34	-3.45	< .001
Have money left over at end of month (1 - 5)	3.23	1.33	3.52	1.28	-14.52	< .001	3.45	1.30	3.53	1.27	-3.29	< .01

Do not feel controlled by finances (1 - 5)	3.02	1.27	3.10	1.23	-4.00	< .001	3.05	1.26	3.07	1.22	-0.84	0.40
Financial well-being scale (5 - 25)	15.30	5.57	16.18	5.36	-10.42	< .001	15.82	5.48	16.14	5.29	-2.91	< .01
Financial satisfaction (1 - 10)	5.77	2.83	6.30	2.72	-12.52	< .001	6.22	2.71	6.31	2.69	-1.76	0.08
Credit rating (0 - 1)	0.71	0.31	0.76	0.29	-9.10	< .001	0.76	0.29	0.76	0.29	0.13	0.90
Spend less than income (0 - 1)	0.61	0.39	0.63	0.39	-3.28	< .01	0.65	0.39	0.63	0.39	1.76	0.08
Positive outcome scale (0 - 9)	6.06	2.35	6.56	2.20	-14.10	< .001	6.43	2.24	6.56	2.18	-3.16	< .01
Financial health total scale (0 - 99)	56.84	24.11	61.96	22.63	-13.56	< .001	60.61	23.30	61.96	22.63	-3.01	< .01

Still, the matched results indicated that the financial education group had better scores overall, and that there were specific types of differences between two groups. For financial health, the financial education group scored significantly higher, 61.96 to 60.61 ($t = –3.01$, $p = .003$). Consistent with the earlier assertion from the SEM analysis that financial education loads onto perceived behavioral control, this was one of the areas where the financial education group showed the most favorable differentials: financial confidence ($t = –6.35$), self-assessed beliefs about financial skill ($t = –6.58$), math skill ($t = –9.53$), and financial knowledge ($t = –17.02$), and scores for objective financial knowledge ($t = –9.30$); all of these differences were significant at $p < .001$. The dimensions of financial well-being ($t = –2.92$, $p = .004$) and positive outcomes ($t = –3.16$, $p = .002$) also favored those with financial education, but many of the component factors were more mixed in significance and direction.

Financial outcomes that represented quantifiable economic advantages, such as having an emergency fund ($z = –2.61$, $p = .009$), being able to raise $2,000 ($z = –3.89$, $p < .001$), and having investments ($z = –8.24$, $p = < .001$) and retirement funds ($z = –3.88$, $p < .001$), tended to favor those with financial education. On the other hand, those without financial education performed better on some positive outcomes, such as not having unpaid medical bills ($z = 3.53$, $p < .001$), not having bills in collections ($z = 3.40$, $p = .001$).

Similarly, when considering behaviors (which lead to outcomes), those without financial education tended to post better responses: not overdrawing their checking accounts ($z = 2.86$, $p = .004$), not using alternative financial services ($z = 6.09$, $p < .001$), and not skipping medical procedures due to finances ($z = 4.30$, $p < .001$). The financial education group only performed better on not overspending ($t = –3.01$, $p = .001$) in the dimension of financial behaviors. This warrants further investigation.

Regression Results

Given that the matched data set has eliminated many sources of heterogeneity, regression analysis should yield average treatment effects on the treated. The regressions still controlled for demographics, as the fact that the groups are demographically similar does not remove the demographic variables as a source of variation, it just reduces or removes them as a source of variation between groups.

The first regression considered financial education in a dichotomous sense. The regression model was significant ($F(34, 10405) = 197.35$, $p < .001$, $R^2 = .39$), and the coefficient for financial education was significant as well ($B = 1.19$, $SE = 0.35$, $p = .001$, $\beta = 0.03$). This supports H_1, and this is strong support considering the two relatively homogeneous groups. Most classes of control variables were significant as well, with no unexpected results. This regression model indicated that financial health is predicted to be 1.19 units higher with financial education than without it, all other variables held constant. This is a small but significant positive effect. The standardized coefficient of 0.03 was similar in magnitude to many of the control variables typically associated with changes in financial outcomes. The model explained approximately 39% of the variation in financial health. Full regression statistics are available in Table 4.11.

Table 4.11

Regression of Financial Health – Matched Data

Coefficient	*B*	*SE B*	*β*	*p*
Financial education	1.19	0.35	0.03	< .01
Age (Ref: 18- 24)				
25 - 34	-3.71	0.68	-0.06	< .001
35 - 44	-4.21	0.74	-0.07	< .001
45 - 54	-3.58	0.72	-0.06	< .001
55 - 64	1.53	0.74	0.03	0.04
65 or over	5.57	0.88	0.09	< .001
Gender (Male)	3.55	0.37	0.08	< .001
Ethnicity (White)	1.33	0.41	0.03	< .01
Income (Ref: < $15,000)				
$15,000 - 24,999	0.47	0.86	0.01	0.59
$25,000 - 34,999	3.54	0.87	0.04	< .001
$35,000 - 49,999	8.34	0.82	0.12	< .001
$50,000 - 74,999	13.71	0.81	0.23	< .001
$75,000 - 99,999	17.73	0.86	0.28	< .001
$100,000 - 149,999	22.26	0.88	0.35	< .001
$150,000 - 199,999	25.11	1.03	0.28	< .001
$200,000 - 299,999	26.89	1.30	0.20	< .001
$300,000 or more	30.84	1.74	0.15	< .001
Employment Status (Ref: Self-employed)				
Full time employee	1.22	0.68	0.03	0.08
Part time employee	0.02	0.86	0.00	0.99
Homemaker	-0.55	1.03	-0.01	0.59
Full time student	1.04	1.24	0.01	0.40
Disabled	-10.59	1.10	-0.09	< .001
Unemployed	-9.53	0.98	-0.10	< .001
Retired	6.75	0.85	0.12	< .001
Number of Dependents (Ref: None)				
1	-3.09	0.52	-0.05	< .001
2	-3.57	0.58	-0.05	< .001
3 or more	-5.23	0.71	-0.06	< .001
Education (Ref: Did not complete high school)				
High school graduate	3.34	2.11	0.05	0.11

GED or alternate credential	3.69	2.23	0.03	0.10
Some college	1.39	2.08	0.03	0.51
Associate degree	3.89	2.12	0.06	0.07
Bachelor's degree	7.09	2.09	0.14	< .01
Post graduate degree	7.03	2.13	0.11	< .01
Married	4.16	0.44	0.09	< .001
Intercept	39.77	2.24		

$F(34, 10405) = 197.36$, $p < .001$, $R^2 = 0.39$

The next regression model considered the time when financial education occurred: high school, college, and/or in the workplace. The regression model was significant (F(36, 10403) = 187.12, $p < .001$, $R^2 = .39$). The regression coefficients for high school ($B = 0.86$, $SE = 0.42$, $p = .04$, $\beta = 0.02$) and workplace were significant ($B = 1.62$, $SE = 0.47$, $p = .001$, $\beta = 0.03$), but surprisingly when considering high school and workplace being significant, the coefficient for financial education in college ($B = 0.45$, $SE = 0.45$, $p = .32$, $\beta = 0.02$) was not statistically significant. The model explains 39% of the variation in financial health, and the control variable values were essentially the same as the prior model. Full regression statistics are available in Table 4.12. This consequence of this regression is important, as the timing of financial education led to different results. This supports H_2, but the result indicating that financial education in college did not have a significant impact on financial health warrants further investigation.

Table 4.12

Regression on Timing of Financial Education

Coefficient	*B*	*SE B*	*β*	*p*
High School	0.86	0.42	0.02	0.04
College	0.45	0.45	0.01	0.32
Workplace	1.62	0.47	0.03	< .01
Age (Ref: 18- 24)				
25 - 34	-3.72	0.68	-0.06	< .001
35 - 44	-4.21	0.74	-0.07	< .001
45 - 54	-3.59	0.72	-0.06	< .001
55 - 64	1.45	0.74	0.02	0.05
65 or over	5.52	0.88	0.09	< .001
Gender (Male)	3.51	0.37	0.08	< .001
Ethnicity (White)	1.32	0.41	0.03	< .01
Income (Ref: < $15,000)				
$15,000 - 24,999	0.44	0.86	0.01	0.61
$25,000 - 34,999	3.53	0.87	0.04	< .001
$35,000 - 49,999	8.31	0.82	0.12	< .001
$50,000 - 74,999	13.66	0.81	0.23	< .001
$75,000 - 99,999	17.62	0.86	0.27	< .001
$100,000 - 149,999	22.17	0.88	0.35	< .001
$150,000 - 199,999	24.96	1.03	0.27	< .001
$200,000 - 299,999	26.69	1.30	0.20	< .001
$300,000 or more	30.66	1.74	0.15	< .001
Employment Status (Ref: Self-employed)				
Full time employee	1.24	0.68	0.03	0.07
Part time employee	0.07	0.86	0.00	0.93
Homemaker	-0.37	1.03	0.00	0.72
Full time student	1.17	1.24	0.01	0.35
Disabled	-10.52	1.10	-0.09	< .001
Unemployed	-9.45	0.98	-0.10	< .001
Retired	6.74	0.85	0.12	< .001
Number of Dependents (Ref: None)				
1	-3.16	0.52	-0.05	< .001
2	-3.64	0.58	-0.05	< .001
3 or more	-5.30	0.71	-0.06	< .001

Education (Ref: Did not complete high school)				
High school graduate	3.31	2.11	0.05	0.12
GED or alternate credential	3.60	2.23	0.03	0.11
Some college	1.27	2.08	0.02	0.54
Associate degree	3.80	2.12	0.05	0.07
Bachelor's degree	6.99	2.10	0.14	< .01
Post graduate degree	6.93	2.13	0.11	< .01
Married	4.13	0.44	0.09	< .001
Intercept	39.86	2.23		< .001

$F(36, 10403) = 187.12$, $p < .001$, $R^2 = 0.39$

A third regression model considered how many financial education exposures an individual has received. The independent variable here was 0 if no financial education was received, 1 for education at any one of the times (high school, college, or workplace), 2 for any combination of two times, and 3 for an individual who received financial education at all three levels. Given that these levels may not be similar in terms of how long the courses are (and one may even receive multiple courses at a single level), this variable was treated as categorical. The reference was no financial education. The regression model was significant (F(36, 10403) = 187.25, $p < .001$, $R^2 = .39$), and like the others, explained approximately 39% of the variation in financial health. See Table 4.13 for full regression statistics. Having two ($B = 2.36$, $SE = 0.50$, $p < .001$, $\beta = 0.04$) and three ($B = 2.51$, $SE = 0.74$, $p = .001$, $\beta = 0.03$) exposures to financial education was significant, but having just one ($B = 0.17$, $SE = 0.43$, $p = .69$, $\beta = 0.00$) was not significant. The initial conclusion here is that multiple exposures to financial education are needed to have a significant impact on financial health. The coefficient for two exposures is 2.36, which indicates that having two exposures to financial education predicts a 2.36-point increase in financial health, and the standardized coefficient of 0.04 is in line with control variables which have been found in prior literature to influence financial outcomes. Note that three exposures produced very little additional gain versus two exposures. This result was further analyzed using

ANOVA techniques to determine the relationship between the number of exposures and when those exposures occurred.

Table 4.13

Regression on Number of Financial Education Exposures

Coefficient	*B*	*SE B*	*β*	*p*
1 Program	0.17	0.43	0.00	0.69
2 Programs	2.36	0.50	0.04	< .001
3 Programs	2.51	0.74	0.03	< .01
Age (Ref: 18- 24)				
25 - 34	-3.72	0.68	-0.06	< .001
35 - 44	-4.21	0.74	-0.07	< .001
45 - 54	-3.60	0.72	-0.06	< .001
55 - 64	1.48	0.74	0.02	0.05
65 or over	5.55	0.88	0.09	< .001
Gender (Male)	3.48	0.37	0.08	< .001
Ethnicity (White)	1.31	0.41	0.03	< .01
Income (Ref: < $15,000)				
$15,000 - 24,999	0.48	0.86	0.01	0.58
$25,000 - 34,999	3.59	0.87	0.04	< .001
$35,000 - 49,999	8.34	0.82	0.12	< .001
$50,000 - 74,999	13.71	0.81	0.23	< .001
$75,000 - 99,999	17.66	0.86	0.27	< .001
$100,000 - 149,999	22.27	0.88	0.35	< .001
$150,000 - 199,999	25.05	1.03	0.27	< .001
$200,000 - 299,999	26.80	1.30	0.20	< .001
$300,000 or more	30.78	1.74	0.15	< .001
Employment Status (Ref: Self-employed)				
Full time employee	1.26	0.68	0.03	0.07
Part time employee	0.06	0.86	0.00	0.95
Homemaker	-0.36	1.03	0.00	0.73
Full time student	1.13	1.24	0.01	0.36
Disabled	-10.48	1.10	-0.09	< .001
Unemployed	-9.45	0.98	-0.10	< .001
Retired	6.76	0.85	0.12	< .001
Number of Dependents (Ref: None)				
1	-3.16	0.52	-0.05	< .001
2	-3.63	0.58	-0.05	< .001
3 or more	-5.33	0.71	-0.06	< .001

Education (Ref: Did not complete high school)				
High school graduate	3.29	2.11	0.05	0.12
GED or alternate credential	3.62	2.23	0.03	0.11
Some college	1.05	2.08	0.02	0.62
Associate degree	3.50	2.12	0.05	0.10
Bachelor's degree	6.68	2.09	0.13	< .01
Post graduate degree	6.66	2.13	0.10	< .01
Married	4.11	0.44	0.09	< .001
Intercept	40.16	2.23		< .001

$F(36, 10403) = 187.25$, $p < .001$, $R^2 = 0.39$

ANOVA Results

Regression analysis indicated significant effects for financial education on financial health, and these effects varied based on when financial education was received and how much financial education an individual received. There may be interactions which could illuminate these relationships further. Therefore, ANOVA analyses were performed to examine the potential effects of these interactions.

The first ANOVA analysis considered a three-way factorial model between receiving financial education in high school, college, and/or the workplace. The overall model was significant ($F(10400, 39) = 168.57$, $p < .001$, $R^2 = .39$). The three-way interaction term was also significant ($F = 4.23$, $p = .04$). The two-way interaction terms were not significant, and the main effects for high school and workplace were significant, but college was not. This was consistent with the regression results. The contrasts of the set of three-way interactions was examined, using Tukey adjustments for significance, and the only significant terms were: high school X workplace vs no financial education (contrast = 2.92, $SE = 0.93$, $p = .04$); high school X college X workplace vs no financial education (contrast = 2.49, $SE = 0.74$, $p = .02$); and high school X college X workplace vs college (contrast = 2.78, $SE = 0.91$, $p = .04$). There were other interactions that had higher contrasts, but due to higher standard errors, were not statistically

significant. Full ANOVA statistics are presented in Table 4.14 (model statistics) and Table 4.15 (Tukey contrast comparisons). As with the regression models, high school and workplace financial education stood out as being efficacious in combination, but financial education in college did not.

Table 4.14

ANOVA – Interaction Model Between Levels of Financial Education

Source	*df*	*F*	*p*
Model	40	168.57	< .001
High School	1	5.27	0.02
College	1	1.47	0.23
Workplace	1	13.45	< .001
High School X College	1	0.08	0.78
High School X Workplace	1	0.08	0.77
College X Workplace	1	0.18	0.67
High School X College X Workplace	1	4.23	0.04
Age	5	41.30	< .001
Male	1	88.55	< .001
White	1	10.13	< .01
Income	9	154.68	< .001
Employment Status	7	58.20	< .001
Dependents	3	29.29	< .001
Education Level	6	25.32	< .001
Married	1	89.29	< .001
Residual	10,399		
Total	10,439		

$R^2 = 0.39$

Table 4.15

ANOVA – Contrast Comparisons Between Levels of Financial Education

Comparison	Contrast	*SE*	*p*
Main Effects			
High School	1.10	0.48	0.02
College	0.61	0.50	0.22
Workplace	1.76	0.48	< .001
2-Way Interaction Effects			
High School X College			
(0, 1) vs (0, 0)	0.48	0.65	0.88
(1, 0) vs (0, 0)	0.97	0.67	0.47
(1, 1) vs (0, 0)	1.71	0.63	0.04
(1, 0) vs (0, 1)	0.49	0.75	0.91
(1, 1) vs (0, 1)	1.23	0.68	0.27
(1, 1) vs (1, 0)	0.74	0.73	0.74
High School X Workplace			
(0, 1) vs (0, 0)	1.89	0.64	0.02
(1, 0) vs (0, 0)	1.23	0.53	0.09
(1, 1) vs (0, 0)	2.86	0.65	< .001
(1, 0) vs (0, 1)	-0.66	0.70	0.79
(1, 1) vs (0, 1)	0.96	0.79	0.62
(1, 1) vs (1, 0)	1.62	0.70	0.10
College X Workplace			
(0, 1) vs (0, 0)	1.96	0.66	0.02
(1, 0) vs (0, 0)	0.81	0.55	0.45
(1, 1) vs (0, 0)	2.36	0.63	< .001
(1, 0) vs (0, 1)	-1.15	0.75	0.42
(1, 1) vs (0, 1)	0.41	0.81	0.96
(1, 1) vs (1, 0)	1.56	0.68	0.10
3-way Interaction Effects: High School X College X Workplace			
(0, 0, 1) vs (0, 0, 0)	1.12	0.82	0.87
(0, 1, 0) vs (0, 0, 0)	-0.30	0.64	1.00
(0, 1, 1) vs (0, 0, 0)	2.36	0.83	0.08
(1, 0, 0) vs (0, 0, 0)	0.13	0.61	1.00
(1, 0, 1) vs (0, 0, 0)	2.92	0.93	0.04
(1, 1, 0) vs (0, 0, 0)	2.04	0.69	0.06
(1, 1, 1) vs (0, 0, 0)	2.49	0.74	0.02

(0, 1, 0) vs (0, 0, 1)	-1.42	0.98	0.84
(0, 1, 1) vs (0, 0, 1)	1.24	1.11	0.95
(1, 0, 0) vs (0, 0, 1)	-0.99	0.95	0.97
(1, 0, 1) vs (0, 0, 1)	1.80	1.18	0.79
(1, 1, 0) vs (0, 0, 1)	0.92	1.02	0.99
(1, 1, 1) vs (0, 0, 1)	1.37	1.05	0.90
(0, 1, 1) vs (0, 1, 0)	2.66	0.98	0.12
(1, 0, 0) vs (0, 1, 0)	0.43	0.83	1.00
(1, 0, 1) vs (0, 1, 0)	3.22	1.08	0.06
(1, 1, 0) vs (0, 1, 0)	2.34	0.87	0.12
(1, 1, 1) vs (0, 1, 0)	2.78	0.91	0.04
(1, 0, 0) vs (0, 1, 1)	-2.24	0.99	0.32
(1, 0, 1) vs (0, 1, 1)	0.55	1.20	1.00
(1, 1, 0) vs (0, 1, 1)	-0.33	1.02	1.00
(1, 1, 1) vs (0, 1, 1)	0.12	1.05	1.00
(1, 0, 1) vs (1, 0, 0)	2.79	1.04	0.13
(1, 1, 0) vs (1, 0, 0)	1.91	0.87	0.35
(1, 1, 1) vs (1, 0, 0)	2.36	0.91	0.16
(1, 1, 0) vs (1, 0, 1)	-0.88	1.11	0.99
(1, 1, 1) vs (1, 0, 1)	-0.43	1.14	1.00
(1, 1, 1) vs (1, 1, 0)	0.45	0.95	1.00

At first blush, the regressions and ANOVA lead to a conclusion that financial education in college did not have an impact on financial health, while exposures in high school or the workplace did have an impact. Given the structure of the models, this may be a naïve conclusion. There is a logical explanation of the apparent lack of efficacy of financial education in college shown in the models. To take financial education in college, one had to attend college. As a control variable, college has a significant positive impact on financial health. The regression analyses indicated that attaining a college degree was associated with a 6.5-to-7-point increase in financial health, at p values of less than 0.01. Hence, to eliminate this potential lack of statistical independence, the same ANOVA was run without educational attainment as a control variable. The overall model was significant ($F(10406, 33) = 191.17$, $p < .001$, $R^2 = .38$) and removing

education as a control only resulted in a 1% loss of explanatory power. In this instance again, the three-way interaction was significant ($F = 5.10$, $p = .02$). The ANOVA post-hoc now indicated the following significant interactions: college X workplace vs none (contrast = 3.14, $SE = 0.83$, $p < .01$); high school X college vs none (contrast = 2.30, $SE = 0.69$, $p = .02$); high school X college X workplace vs none (contrast = 2.59, $SE = 0.74$, $p = .01$); college X workplace vs high school (contrast = 3.62, $SE = 0.97$, $p = .01$); high school X college vs high school (contrast = 2.79, $SE = 0.85$, $p = .02$); and high school X college X workplace vs high school (contrast = 3.07, $SE = 0.90$, $p = .01$). Here, many of the two-exposure combinations become significant, and the three-exposure combinations are significant against more other combinations. See Tables 4.16 and 4.17 for the model statistics. Interestingly, none of the one-exposure triples are significant, even versus no financial education at all. This aligns with the trend detected in the regressions that two exposures to financial education appeared to have the most impact. It is not desirable to remove a control variable, but the point of this ANOVA model was to demonstrate that the potential efficacy of financial education in college cannot be dismissed based on these analyses.

Table 4.16

ANOVA Removing Education Attained as a Control

Source	*df*	*F*	*p*
Model	34	191.17	< .001
High School	1	1.34	0.25
College	1	8.90	< .01
Workplace	1	12.13	0.72
High School X College	1	0.13	< .001
High School X Workplace	1	0.17	0.68
College X Workplace	1	0.06	0.81
High School X College X Workplace	1	5.10	0.02
Age	5	41.25	< .001
Male	1	97.23	< .001
White	1	10.53	< .01
Income	9	193.90	< .001
Employment Status	7	61.72	< .001
Dependents	3	30.28	< .001
Married	1	87.15	< .001
Residual	10,405		
Total	10,439		

R^2 = 0.38

Table 4.17 - Contrast Comparisons Removing Education Attained as a Control

Contrast Comparisons Removing Education Attained as a Control

Comparison	Contrast	*SE*	*p*
Main Effects			
High School	0.55	0.48	0.24
College	1.43	0.48	< .01
Workplace	1.68	0.48	< .001
2-Way Interaction Effects			
High School X College			
(0, 1) vs (0, 0)	1.26	0.64	0.20
(1, 0) vs (0, 0)	0.38	0.67	0.94
(1, 1) vs (0, 0)	1.99	0.63	< .01
(1, 0) vs (0, 1)	-0.88	0.72	0.62
(1, 1) vs (0, 1)	0.72	0.68	0.82
(1, 1) vs (1, 0)	1.60	0.71	0.11
High School X Workplace			
(0, 1) vs (0, 0)	1.87	0.64	0.02
(1, 0) vs (0, 0)	0.75	0.53	0.48
(1, 1) vs (0, 0)	2.23	0.65	< .01
(1, 0) vs (0, 1)	-1.12	0.71	0.38
(1, 1) vs (0, 1)	0.36	0.79	0.97
(1, 1) vs (1, 0)	1.47	0.71	0.16
College X Workplace			
(0, 1) vs (0, 0)	1.79	0.67	0.04
(1, 0) vs (0, 0)	1.54	0.53	0.02
(1, 1) vs (0, 0)	3.11	0.62	< .001
(1, 0) vs (0, 1)	-0.24	0.74	0.99
(1, 1) vs (0, 1)	1.32	0.79	0.35
(1, 1) vs (1, 0)	1.56	0.69	0.10
3-way Interaction Effects: High School X College X Workplace			
(0, 0, 1) vs (0, 0, 0)	0.91	0.82	0.95
(0, 1, 0) vs (0, 0, 0)	0.30	0.63	1.00
(0, 1, 1) vs (0, 0, 0)	3.13	0.83	< .01
(1, 0, 0) vs (0, 0, 0)	-0.49	0.60	0.99
(1, 0, 1) vs (0, 0, 0)	2.17	0.92	0.27
(1, 1, 0) vs (0, 0, 0)	2.30	0.69	0.02
(1, 1, 1) vs (0, 0, 0)	2.69	0.74	0.01

(0, 1, 0) vs (0, 0, 1)	-0.61	0.98	1.00
(0, 1, 1) vs (0, 0, 1)	2.22	1.11	0.48
(1, 0, 0) vs (0, 0, 1)	-1.40	0.96	0.83
(1, 0, 1) vs (0, 0, 1)	1.26	1.18	0.96
(1, 1, 0) vs (0, 0, 1)	1.38	1.01	0.87
(1, 1, 1) vs (0, 0, 1)	1.67	1.05	0.75
(0, 1, 1) vs (0, 1, 0)	2.84	0.99	0.08
(1, 0, 0) vs (0, 1, 0)	-0.79	0.80	0.98
(1, 0, 1) vs (0, 1, 0)	1.87	1.06	0.65
(1, 1, 0) vs (0, 1, 0)	2.00	0.87	0.30
(1, 1, 1) vs (0, 1, 0)	2.29	0.91	0.19
(1, 0, 0) vs (0, 1, 1)	-3.62	0.97	< .01
(1, 0, 1) vs (0, 1, 1)	-0.96	1.19	0.99
(1, 1, 0) vs (0, 1, 1)	-0.84	1.02	0.99
(1, 1, 1) vs (0, 1, 1)	-0.55	1.05	1.00
(1, 0, 1) vs (1, 0, 0)	2.66	1.04	0.17
(1, 1, 0) vs (1, 0, 0)	2.79	0.85	0.02
(1, 1, 1) vs (1, 0, 0)	3.08	0.90	0.01
(1, 1, 0) vs (1, 0, 1)	0.12	1.10	1.00
(1, 1, 1) vs (1, 0, 1)	0.42	1.13	1.00
(1, 1, 1) vs (1, 1, 0)	0.29	0.95	1.00

A third ANOVA was performed to examine the specific domain in financial health where financial education appeared to produce the largest improvement: the accumulation of assets. An additive variable was created to indicate the presence of the following (with one added for each true condition): emergency fund sufficient to cover three months of expenses; ability to raise $2,000; investments outside retirement accounts; savings account(s); and retirement accounts. These represent five of the nine factors in the positive behavior dimension of financial health. Possible scores ranged from 0 to 5, and the mean score was 3.28 (SD = 1.57). A t-test indicated a difference of 0.19 between the financial education and no-education groups (t = –6.11, p < .001). This score represents approximately a 3.75% increase in the number of accounts for the group which received financial education compared to the group which did not. ANOVA results were

significant as well ($F(10405, 36) = 275.03$, $p < .001$, $R^2 = .38$), and financial education exposures were also significant ($F = 38.26$, $p < .001$). Post-hoc Tukey means testing indicated that each successive number of exposures to financial education resulted in a significant increase in the number of assets, except for moving from two to three exposures (contrast = 0.10, $SE = 0.06$, $p = 0.32$). The movement from no financial education to one exposure was also relatively small (contrast = 0.08, $SE = 0.03$, $p = 0.02$), but was significant. All other comparisons, which represented two exposure and three exposure increases, as well as the increase from one to two exposures, were significant at $p < .001$. As with regression, the comparisons indicated that the jump from one to two exposures is the largest and most significant marginal gain. Full ANOVA results are presented in Tables 4.16 and 4.17.

Table 4.18

ANOVA Financial Assets Sub-Domain on Financial Education Exposures

Source	*df*	*F*	*p*
Model	36	181.44	< .001
Financial Education Exposures	3	38.26	< .001
Age	5	21.53	< .001
Male	1	61.96	< .001
White	1	0.55	0.46
Income	9	148.80	< .001
Employment Status	7	47.19	< .001
Dependents	3	5.46	< .001
Education	6	40.74	< .001
Married	1	64.76	< .001
Residual	10,403		
Total	10,439		

$R^2 = 0.38$

Table 4.19

Contrast Comparison Financial Assets Sub-Domain on Financial Education Exposures

Comparison (Exposures)	Contrast	*SE*	*p*
1 vs 0	0.08	0.03	0.02
2 vs 0	0.30	0.03	< .001
3 vs 0	0.39	0.05	< .001
2 vs 1	0.21	0.04	< .001
3 vs 1	0.31	0.05	< .001
3 vs 2	0.10	0.06	0.32

Summary

First, the study considered financial health and financial education through the lens of the TPB (Ajzen, 1991). SEM analysis was performed on the full dataset to examine the multiple constructs and paths inherent in the TPB. The SEM analyses found that there was a direct

association between financial education and financial health, that there was a significant path from financial health to perceived behavioral control, that there was an indirect path from financial education to financial health which was mediated by other constructs in the TPB (particularly perceived behavioral control and behaviors), and that different levels of financial education had differing effects on financial education. A simple SEM model, containing only financial education and financial health, provided support for the direct association. A full SEM model with all TPB constructs and an additional path from financial education to financial health demonstrated the mediating effect of the TPB as the path from financial education into the TPB constructs (via perceived behavioral control) was positive and significant, and the direct path from financial education to financial health became negative, indicating that the direct effect was mediated away. Finally, the loadings of financial education in high school, college, and the workplace were different, indicating different impacts of the timing on the construct of financial education.

The dataset was then reduced into two groups, one which received no financial education and another which did. Nearest neighbor propensity score matching was used to create the group with no financial education, matching the demographic characteristics of the financial education group. The matched group was statistically similar in all demographics except employment, and there were dramatic differences between the matched no-education group and the total of that group from the full sample. Similarly, testing indicated that there was a substantial difference between the no-education group in the full sample and the one which was created by the matching technique. Matching eliminated a great deal of apparent heterogeneity between the groups, and in so doing, made the no-education matched group more like the financial education group on which its demographics were based. On one hand, this made marginal gains due to

financial health considerably smaller than they would have appeared if the full sample was used. On the other hand, the matched data does a better job of determining the average treatment effect on the treated and could be used to support a causal argument as well.

Regression and ANOVA analyses indicated that there was a significant, direct relationship between financial education and financial health. This relationship was dependent on both the timing of the financial education and the number of exposures to financial education. Of note was the relationship between financial education in college, and college degree attainment as a control variable, which appeared to have depreciated the apparent effect of college financial education. Removing this control allowed a clearer look at financial education in college, and determined that it, too, was a positive contributor to financial health. Interaction effects were analyzed to consider the effect of timing and number of financial education exposures, and numerous significant combinations were found.

Overall, support was found for all four hypotheses. H_1, the positive association between financial education and financial health, was supported by all statistical analyses performed. Both path parameters in SEM and regression and ANOVA coefficients measuring different aspects of financial education, were positive and significant. H_2, that timing affects the relationship between financial education and financial health, was supported by the loading in the SEM models and by regression and ANOVA coefficients, all of which indicated different levels of effect for the different timing of financial education. H_3, the existence of a path, or relationship, between financial education and the construct of perceived behavioral control, was supported by the full SEM model. Finally, H_4, the mediation of the relationship between financial education and financial health, was also supported by the direct path differences between the direct and full SEM models, combined with the positive path into the TPB (Ajzen,

1991) in the full SEM model. The existence of mediation, which indicated the effects of many outside factors which may influence an individual between the time of financial education and the measurement of financial outcomes, also explained why a direct effect is difficult to measure.

There were also additional findings. The concept of a multiple number of exposures as a determinant of the efficacy of financial education was not hypothesized but was well supported by the data. This was clear in both regression and ANOVA models, which demonstrated a larger effect for two exposures than for one and indicated that there is interaction between having financial education multiple times. The asset accumulation sub-domain of financial health also proved to be the area in which financial education produced the largest positive differential. While exact dollar amounts were not available in the NFCS, this concept may prove to be ripe for further investigation into the economic efficacy of financial education, measured in dollars.

The next chapter will discuss the implications of the findings, as well as further research which can extend this study. This will include the potential impact on public policy regarding financial education. The study's limitations will also be illuminated.

Chapter 5 - Discussion and Implications

This study explored the impact of financial education on financial health. The first step was to determine if a detectable relationship existed between the two constructs. Financial health was developed and used as the outcome. This approach adds to the literature on financial education and financial literacy by moving the outcome from behaviors to the actual effects of those behaviors. It is believed that this is the first study to analyze the chain of events from financial education to the economic outcomes an individual experiences later in life. This study also considered the mediating effect that many other decision-making inputs which occur over a person's lifetime would have on the direct relationship between financial education and financial outcomes.

The motivation of this study was to determine the efficacy of financial education as a way of improving the financial outcomes for those who receive it. Financial education comes with a cost, so seeing tangible economic outcomes is important to determine whether providing financial education has economic value. Since we found that financial education does have value, the study can also point us in the direction of future research to maximize the efficacy of financial education and provide the best return on investments in this realm. A full evaluation of the path from financial education to economic outcomes moves the discussion from a behavior-based outcome to an economic-based outcome and adds to financial literacy-based analyses by considering formal financial education's role in developing that literacy.

In this chapter, the results of the statistical analyses will be discussed considering the research questions posed earlier. The practical implications of this study will be discussed. This section will end with a discussion of limitations and areas where further research would be beneficial.

Discussion of Results

Three research questions were posed for this study: (1) What effect does financial education have on downstream financial health? (2) What features of a financial education program make the program more effective? (3) What are the mechanisms by which financial education affects financial health? These questions would be largely aspirational for a single study to provide a complete answer. Nonetheless, the study provides some answers from which to build.

Financial education was shown to have a positive effect on financial health. This effect was small, but detectable, even after controlling for numerous confounders. The strongest effect on financial health was noted in the accumulation of assets. This could be due to an educational focus on investing and building assets and building emergency funds, two pillars of financial planning. There was some offsetting weakness in areas involving late bills. Overall, however, those with financial education showed a greater sense of financial well-being, were more satisfied with their finances, and showed more positive economic outcomes – all three dimensions of financial health showed improved metrics.

The results of the study provide support for a causal relationship between financial education and financial health. Temporally, high school and likely college exposures to financial education occur before the outcome of financial health is measured. The propensity score matching eliminates a great deal of the selection bias and heterogeneity which would normally be encountered in a similar study. By homogenizing the demographic factors, and with supporting temporal occurrence, this study was better able to isolate the effects of financial education from the effects of other variables. The chain of events, as outlined by the TPB (Ajzen,

1991), demonstrates both the role and the causal chain of the various constructs and variables. This is discussed in greater detail in the limitations section.

There were two areas that this study was able to explore. First, the timing of financial education was shown to have different impacts. Financial education at any time was positively associated with financial health, but there were differences in the coefficients associated with the different levels of financial education. Second, the number of exposures was significant, with two exposures having a much larger effect than one exposure, and the marginal value of a third exposure much smaller than the marginal value of a second exposure.

The effects of financial education have historically been difficult to isolate, with some studies indicating minimal value (Fernandes et al., 2014; Mandell and Klein, 2007), while others refute that assertion (Kaiser et al., 2020). This study demonstrated a complicated path between financial education and financial health outcomes, with the perceived behavioral control and financial behaviors as significant mediators. This is consistent with prior research (see Gerrans & Heaney, 2019; Huston, 2010; Perry & Morris, 2005; Wagner, 2019). Given the time between financial education and subsequent financial outcomes, as well as the additional economic and psychological events which end up as additional inputs to a financial decision, the relationship between financial education and financial health becomes less direct. The TPB (Ajzen, 1991) offers a viable explanation for how these effects occur, some of the intervening forces which drive decisions, and the mediated relationship between financial education and financial health.

Path Model of Financial Education to Financial Health

The first portion of the study was to consider a path model using SEM techniques. As mentioned, the path model is useful for explaining the process from receiving financial education

through to having an economic impact. Two areas that are key are financial perceived behavioral control and mediating effects between education and outcome.

Financial Perceived Behavioral Control

Self-efficacy (Bandura, 1977) is well represented in the TPB as major factor of perceived behavioral control (Ajzen, 2002). Financial education was shown in this study to have a significant association with perceived behavioral control. This indicates that an individual who receives financial education would be more likely to both have the ability to make good financial choices as well as the belief that they can execute those decisions effectively. An increase in financial self-efficacy as a proxy for perceived control is a precondition for action (Ajzen, 2002; Martinez & Lewis, 2016). Hence, the positive path from financial education to financial perceived behavioral control indicates that financial education is associated with a greater tendency to undertake positive financial behaviors.

The mechanism of increased self-efficacy does have prescriptive value for what financial education should do. If the goal is to provide financial knowledge and belief in agency over financial decisions, then financial education cannot be just a presentation of facts. Huston (2010) notes that financial literacy consists of a knowledge dimension and an application dimension. A student will need to leave a financial education program with a sense that they have some control over what happens. This would tend to favor an experiential component to learning, as a hands-on approach has been shown to increase self-efficacy in a variety of settings (see Konak, 2018; McCarthy & McCarthy, 2006; Watters et al., 2015). Ultimately, the focus of financial education should be driven to help individuals acquire financial decision-making skills as opposed to passing a test of knowledge. This should provide guidance for both curricula and pedagogy in financial education.

Mediation Effects

The SEM analyses resulted in a direct positive association between financial education and financial health, and a mediated indirect positive association between financial education and financial health. The TPB (Ajzen, 1991) path model suggested this would be the case, as financial education is several steps away from financial health. While it may be possible to see a direct effect of a financial education program in the short term, it would be more difficult to measure in the long run. Kraft (2020) states that effects become increasingly difficult to measure as they progress further down a chain of causal events. The effects of education have also been shown to decay over time (Gerrans, 2021; Kaiser et al., 2020).

With the challenge of measuring direct effects in mind, a mediation model recognizes the steps in between education and financial health and provides a viable explanation for the smaller effect size seen with a long-term set of interactions. Temporally, in the extant study, financial education occurred well before an individual responded to the NFCS in most cases. Hence, direct effects would tend to be smaller, and those constructs which are nearer in time would display stronger effects. The NFCS, and hence the path model, measured relatively current conditions for all constructs, up to and including financial health, except for financial education. In this context, the results from the SEM analysis are what would be expected if financial education had an association with financial health: a small direct effect, and a small, mediated effect.

Results from Matching

As with the SEM analysis, the measurement of a direct effect of financial education on financial health would be expected to find a small effect if one exists. A naïve regression (direct and uncontrolled) indicated a more substantial effect of financial education on financial health, but that effect was subsequently (and properly) reduced when the regression model included

controls and even more so when the group with no financial education was matched to be demographically like the group with financial education. However, the fact that financial education remained significant after homogenizing the two groups, even when viewed through different lenses, provides strong support for a positive effect of financial education on financial health.

Creation of a Homogeneous Dataset

The study used propensity scores to create two groups which were alike in all demographic factors except for whether the individuals did or did not receive financial education. That implies a small but significant change to the first research question, which would include a counterfactual and then becomes, "What is the effect of financial education on financial health compared to the level of financial health the individuals who had financial education would have had if they did not receive financial education?" The question focuses specifically on the treatment effect of those who were treated.

The propensity score matching was successful in creating two demographically similar groups. Chi-square analyses indicated that all demographic variables were widely disparate between the two groups before matching. After the match, only employment was still statistically significantly different between the groups, at $p = .02$, while age, gender, race, and education were all statistically similar. This testing satisfies the balancing step of propensity score analysis and allows for further analysis of the matched groups on the basis that they are indeed similar and have reduced selection bias.

Analyses of the two groups still included control variables. Here, the role of the control variables changes from one of eliminating their confounding effects, which should have been achieved through matching. Instead, the demographic control variables still recognize the impact

of those variables on financial health, so that the estimate for the effect of financial health is more accurate, and variability is reduced. Comparing an uncontrolled regression to a controlled one indicated a small decrease in the financial education coefficient, but a pronounced decrease in variability. This was predictable from the nature of propensity score matching.

Effect of Financial Education on Financial Health

Regression of the propensity score matched sample indicated a significant positive relationship between financial education and financial health. The direct effect of having had any financial education at all was numerically small, accounting for just over one point on a 0 to 99 scale, but the effect size and significance ($p = .001$, $\beta = 0.03$) were similar in magnitude to many of the control variables that are regularly accepted as affecting financial well-being (such as variables related to age, employment, and race). This result confirms what was also seen in the SEM analysis over the full sample.

It is believed that this is the first time that financial education has been linked directly to a set of financial outcomes, particularly in a controlled regression over a matched data set. Further analysis of the dichotomous independent variable revealed that financial education was most strongly associated with the wealth accumulation portion of the financial health index. This is supported in literature, with financial literacy shown to be associated with having an emergency fund (Despard et al., 2020; Babiarz & Robb, 2014). The conclusion of financial education positively impacting financial health occurs after both homogenizing and controlling for income and education, which are frequently associated with accumulation of wealth. While there is not a dollar value attached to this, the concept financial education can be linked to additional wealth begins the logic for calculating a return to education for financial education in general.

Considering the relationship between financial education and economic outcomes completes a path in the literature. Financial education has been linked to financial knowledge, financial literacy, and positive financial behaviors (Kaiser et al., 2020; Kaiser & Menkhoff, 2017; Wagner, 2019). Few studies separate the concepts of financial behaviors from financial outcomes, with many defining financial behaviors as financial outcomes (see Hastings et al., 2013; Kaiser & Menkhoff, 2017; Michell & Lusardi, 2015). The extant study focuses on the outcome states rather than the behaviors leading up to those states.

The subdomain of mismanaged behaviors (overdrawn accounts, overspending) and having some accounts in collections had a seemingly perplexing association with financial education, but this effect was also illustrated by Kaiser & Menkhoff (2017). This can be viewed through the lens of studies into financial overconfidence. If financial education does not provide a full set of tools but provides a feeling of competence where actual competence doesn't exist, this could lead to misinformed behavior. These issues included increased calls from debt collectors, disregarded medical advice, and use of alternate financial service (Robb et al., 2015; Balasubramnian & Sargent, 2020; Zhang et al., 2017), which are some of the issues seen in the extant study. This provides a cautionary note for the importance of quality and comprehensiveness in financial education. For example, if financial education in places such as the workplace is focused on asset accumulation only (i.e., mandatory 401(k) education), then the domains of cash and debt management may not be covered, but the individual has received financial education by this study's definition. In fact, a post-hoc regression on retirement accounts indicated that financial education in the workplace was most associated with this variable, while workplace financial education was least associated with the positive financial outcome domain (of which retirement accounts are a part) compared to financial education in

high school or college. Focus of education appears to matter, although this study does not have specific data on what is taught when.

Levels and Exposures of Financial Education

This study also considered the timing of a financial education program – high school, college, workplace – as well as the number of exposures an individual had to financial education programming, in place of the dichotomous financial education (yes/no) variable. Both factors were found to be significantly associated with financial health. There was nuance in the data.

Financial exposures were significantly associated with financial health, with more exposures leading to a larger effect. However, the increase effect was not the same with each additional exposure. The gain in financial health was greatest when an individual progressed from one to two exposures. The gains from zero to one, and from two to three, were positive and significant, but considerably smaller. The reasons are less apparent. More financial education could be assumed to have a greater impact, and while that is true, the idea that two exposures represent a "sweet spot", and three is subject to diminishing returns, is something to consider when looking for optimal financial education configurations. The structure of the variable, where an "exposure" could be a two-hour seminar at work or a full-semester class in college, may have an impact on this, but even this is unclear, as two exposures could lead to all types of combinations of class lengths and comprehensiveness (and quality).

The idea of financial education in high school as a mandatory course is appealing, especially on the basis that high school is the last time that many students will be in school. This thought pattern could lead to a dichotomous view of whether financial education is best delivered in high school or college. Given the data which supports multiple exposures, this type of thinking could be replaced with how to best deliver multiple financial education exposures, including the

obvious combination of high school and college, as well as workplace intervention, especially for those working right out of high school.

The timing of financial education was also shown to be a significant factor, with differing levels of effect on financial health. The meaning of the differentials proved more problematic to sort out. In some of the analyses, financial education in college was shown not to be significant, while high school and the workplace were. This is counterintuitive. Further analysis indicated that since college education itself was a control variable that had a significant positive impact on financial health (as expected), isolating financial education in college meant considering only individuals who had been to college, and thereby had the significant contribution to financial health from having attended. When education was removed as a control, financial education in college was indeed significant, although it is still possible that the residual impact of having attended college either drove, or more likely augmented, this variable's significance. In sum, the study provides confirmation that there are differences in when financial education is delivered, but no conclusion can be reached regarding which time frame is better. The idea of multiple exposures being a driver, as stated, may make a debate over when to deliver financial education moot – it may be that financial education needs to be delivered in high school, college, and at work (or some other form of adult education).

Effects of Control Variables

Many of the control variables had significant impacts on financial health as well. Compared to those in the 18 to 24 age range, ages 25 through 54 scored lower in financial health, while those over age 55 scored higher. Males scored higher than females, and those identifying as White scored higher than those who did not. Income had very large implications on financial health; compared to those making less than $15,000, every income range above $25,000 had

significantly higher financial health scores, with the differential reaching over 22 points for the income ranges above $100,000, and standardized score increases ranging from 0.12 to 0.35 for incomes over $50,000, the largest gains of all variables. Compared to those who are self-employed, being disabled or unemployed resulted in significantly lower financial health scores, while retired individuals had significantly higher financial health scores. Compared to those with no dependents, increasing numbers of dependents resulted in progressively lower financial health scores. Compared to those who did not complete high school, having a college degree resulted in a standardized score gains over 0.10 in financial health, which was a large impact compared to other variables. As noted earlier, this may have affected the analysis of the efficacy of financial education exposure in college. Married individuals scored higher on financial health than unmarried individuals.

The effects of the control variables were consistent with the effects seen in many other studies that relate demographic data to financial wellness or well-being. The largest positive impacts were higher income and higher levels of educational attainment. Unemployment and disability had pronounced negative impacts on financial health, while retirement was a positive factor. The large impacts of the control variables did not diminish the effect of financial education, but the control variables added a great deal of explanatory power to the model. The control variables do support the context that financial health is an amalgam of many factors; financial education has an impact, but income, education, and other demographic factors have a major impact on financial health as well.

Implications

Financial literacy is a major issue facing the US. Low financial literacy and an unfavorable trend in that regard pose risks to the economy and leaves many individuals at a

disadvantage when making financial decisions. While education may seem to be an obvious solution to this issue, there are cost and efficacy factors to consider. Also, there are reasonable concerns that financial education may produce a short-term increase in financial knowledge or financial literacy but may suffer from diminished effectiveness over time. The real question would revolve around the long-term economic impact of financial education on those who receive it. Here, a causal link between education and downstream financial outcomes, as suggested by this study, would make the efficacy factor much clearer.

Economic and Societal Value of Increasing Financial Literacy and Financial Health

The question of economic impact is key. If financial education does increase financial literacy and financial health, especially in the asset accumulation domain, then the economic impacts at a societal level could be significant. The value of having a populace which would be able to financially advocate for themselves, to make good financial decisions, and to be more financially resilient (Klapper & Lusardi, 2020), cannot be understated. Increased financial literacy and capability could impact the burden on social safety nets, address the wealth gap, and lessen the effect of macroeconomic shocks.

Safety Net Programs

Currently, the United States spends a staggering amount of money on financial safety nets. Some of these programs are income-based, and it seems reasonable to assume that programs for those with lower incomes would not go away even if financial literacy were increased. Still, programs like SNAP, TANF, Medicaid (including long-term care assistance), and SSI have an asset-based component. In 2020, TANF cost $31 billion, SNAP cost $111 billion in 2021, Medicaid cost $630 billion in 2018, and SSI cost $60 billion in 2021 (Center on Budget and Policy Priorities, n.d.). If more individuals can accumulate assets, then some

individuals may be able to exit these programs, and other individuals may not need to enroll in the first place. When considering total costs on the order of $1 trillion, even marginal improvements can have a major impact.

Ideally, the impact would be multifaceted. Individuals who are financially healthier would not need to rely on the safety nets, or their reliance could be reduced. This would allow resources to flow to those who remain eligible, and possibly to other social programs. Further, a reduction in the number of eligible participants in asset-based safety net programs could lead to some combination of reduced spending and taxation and/or resource allocation other areas.

Wealth Gap – Racial and Gender Disparities in Economic Outcomes

There is a significant wealth gap in the United States. Minorities and women are disproportionately affected by lower financial literacy (Mitchell & Lusardi, 2015). This leads to lower asset accumulation and a host of maladaptive financial behaviors (Hasler et al., 2018; Mitchell & Lusardi, 2014). A large proportion of this gap is due to low financial literacy (Mitchell & Lusardi, 2015; Lusardi et al., 2017). Financial education has been shown to have a greater impact for those of lower socioeconomic status (Wagner, 2019), which means that financial education would target those who need the most help.

Practical View from Two Recent Financial Crises

The effects of poor individual financial decision-making are not limited to those individuals. These decisions can have major, widespread economic impacts. Widespread individual economic fragility is everyone's problem. Two recent financial crises can help illustrate the potential value of financial education, and the direct implications of widespread poor financial decision-making.

Great Recession of 2008

The Great Recession is largely viewed as a banking crisis. The narrative is often put as follows: lenders made risky loans, especially mortgages; lenders then issued risky derivative investments based on pools of those loans; banks and other financial institutions bought the risky derivatives; the underlying loans began to fail en masse; the risky derivatives became worthless rapidly; institutions which invested in those derivatives lost money and were not able to meet their obligations; and a cascade of bank, brokerage, and insurance company failures was underway. The consequence of this was over $300 billion disbursed to major financial institutions (Congressional Budget Office, 2010) to prevent an economic meltdown.

Underlying these bad loans, however, were the individuals who borrowed the money. A common theme was loose underwriting, adjustable-rate loans with low teaser rates, and individuals buying the most expensive home that they could qualify for based on the low teaser rates. Many of the loans were fixed for three to five years, and then the rates began to adjust, with widescale adjustments beginning around 2007. Home prices had risen sharply as buyers snapped up homes. The low teaser rates were practically guaranteed to rise, and as they did, households with these loans could not afford to make the new higher payments. With selling pressure from homeowners who couldn't afford to stay in their homes, home prices fell. Eventually, many were in homes that were worth less than they paid. Foreclosures ensued, but lenders couldn't get full value either. Ultimately, many individuals were financially ruined, and the banking issues described above began and sent seismic shocks throughout the economy.

Better decision-making skills could have helped. Even at the worst of the crisis, less than 11% of mortgages were delinquent (Federal Reserve Bank of St. Louis, 2023), so most

homeowners were not in default. But the consequences of those who did default affected the entire economy.

COVID Crisis of 2020

The COVID economic crisis was an entirely different occurrence. The US economy essentially shut down beginning in March 2020, as measures were taken to isolate people from one another to prevent the spread of COVID. This was relatively sudden, and only businesses which were deemed essential remained open. Businesses immediately laid off workers, unemployment spiked, and economic contraction and hardship ensued.

Statistically, most US households are not prepared for even a minor emergency, and the sudden wave of layoffs was much more than that. Given that 40% of US households were unprepared to cover even a $400 emergency (Federal Reserve, 2020), losing a job created an immediate financial crisis for many American households. The Federal government, in this case, took swift action to relieve financial stressors (cash payments to households, moratoriums on evictions, loans to businesses, loan payment holidays), keep Americans in their homes and able to meet their needs, and keep the economy afloat. The total spent to do this was on the order of $3 trillion. Subsequently, $3 trillion added to the money supply without additional production is one of the likely factors for the inflationary period which began in late 2021.

A relatively common and simple rule of thumb is to have between three- and six-months' expenses set aside in an emergency fund. Many Americans don't have this, although in the NFCS, 61% of those who received financial education do, while only 52% of those without financial education do. Controlling for demographic variables in the matched sample, financial education was associated with a 2.24% percentage point increase in the proportion of those who have an emergency fund. Undoubtedly, COVID still would have caused significant economic

pain. However, for households with at least three months of expenses covered in available cash, there would have been the ability to ride out the first few months of the pandemic without help. The Federal and state governments would have had more time to formulate an economic response and get money to those who would be unable to use savings to replace lost income. COVID would still be a history-making economic shock, regardless of emergency funds available to individuals, but the response could well have been more measured and less expensive.

Education Policy Around Financial Education

The need for financial education seems to be widely recognized. States continue to add financial education mandates as a high school (or younger) requirement. Colleges offer financial education and, in many cases, on-campus financial advising. In the workplace, employers are required to offer financial education regarding retirement plans if they offer one. Still, this study offers implications for financial education policy.

Financial Education Mandates in High School

As of 2022, 23 states require some form of financial education in high school, and others are considering adding a requirement (Council for Economic Education, 2022). What constitutes "financial education" for these purposes varies widely. Only nine states require a standalone course. Just four states require standardized testing to validate learning mastery (Council for Economic Education, 2022). Others have requirements which range from some standards to be taught in other courses, or even just a couple of topics to be addressed during economics or other coursework. A few states have financial standards beginning earlier than high school and go into detail about what must be taught, and when. Most states, however, have relatively loose standards, if any.

Data regarding the efficacy of different types of exposures to financial education at the high school level is lacking. However, high school does represent the terminal formal schooling for many Americans, so if access to financial education is to be equitable, high school financial education likely must be mandated. Again, if high school is the only time an individual is going to get structured exposure to personal finance topics, out of necessity, the course would need to be comprehensive and standalone. Financial education requirements should come with appropriate teacher training for those who will be teaching the courses. This does represent an area where the financial services industry could partner with schools to offer their expertise as well. If financial education is not required in high school, then a significant part of the population will enter adulthood and independence with no training in personal finance whatsoever – continuing the cycle of low financial literacy.

Requiring financial education for high school graduation does have other ramifications. There are a limited number of high school credits required to graduate, and if one of those credits is reserved for financial education, that means either another required credit must be freed up, or the student will have one less elective class. In either case, the zero-sum game would likely mean that there are some cuts in other areas, most likely electives, to make credit space for financial education requirements. This could result in the displacement of some teachers or programs, and that might be met with resistance.

Ultimately, adding a new set of requirements for high school graduation entails investments in standard developments, curricula, materials, and teacher training and recruitment. Schools' and students' flexibility may be reduced with one more requirement. Given the investments and structural changes associated with a new graduation requirement, demonstrating the efficacy of financial education is key to gaining support for this.

Financial Education in College

Many colleges offer personal financial education courses, and some require it for graduation. College represents an opportunity to reinforce any personal finance learned in high school, and to build off that scaffold. Also, students attending college generally come straight from high school, so even if a college student had personal financial education in high school, the teachable moment has passed, and taking a course again when it may be more relevant to the student's immediate future would likely be beneficial. The data in this study also indicated that multiple exposures to financial education were optimal, so college represents a chance for students to get their second exposure. Given that many college students graduate with debt and are facing a major transition into the workforce upon graduation, a strong case can be made for mandatory financial education in college.

Workplace Financial Education

Employers tend to offer financial education in limited circumstances, such as when they offer a 401(k) plan to employees. However, financial education at the workplace is expanding beyond that, and there are numerous providers of financial education for adults that can create and staff a workplace financial literacy program. Employers can also offer access to financial education as an employee benefit. It is beneficial to employers to have a workforce which is financially stable and able to focus on their jobs.

While mandating that all employers offer comprehensive financial education to their employees seems a bit heavy handed, especially for smaller businesses, tax incentives to offer financial education, either onsite or through an approved provider, would create positive public policy to encourage these programs. Such incentives could be passed on to employees to encourage participation in a program. Multiple exposures to financial education are positive, and

the workplace represents the second opportunity for high school graduates to receive personal financial training. Workplace programs need to be comprehensive; Lusardi and Mitchell (2008) indicated that a one-time seminar or a quick-fix approach is unlikely to be effective.

Financial Health as a Measurement

This study used an outcome of financial health which differs from most outcomes in personal finance studies. The current literature tends to focus on behavior outcomes when studying concepts such as financial literacy and financial education. This is likely due, in part, to the secondary data available, such as the NFCS, which do not include numerical economic outcomes, while datasets such as the Survey of Consumer Finances, which do have such economic data, do not include questions about financial education. By shifting the focus from behaviors to economic end states, this study addresses a need to determine if those with financial education are truly better off. The concept of financial health can be applied in other areas of financial planning research as well. Ultimately, research may be more compelling if we can put a dollar amount on economic end states, and more directly begin cost/benefit analysis of concepts such as financial education, financial literacy, and other programs or concepts which affect economic outcomes.

The construct of financial health, like financial wellness and well-being, is bound both by how it is defined and, in large part, to the data which is available in a particular dataset. Financial health can be refined in terms of how its dimensions are measured, particularly when financial data is available. If current cash or liquidity and income data are available, for example, then a calculation related to an adequate emergency fund can be performed, which may provide either confirmation of, or a more accurate view than, a self-reported binary answer about adequacy from the respondent. The ultimate use of the financial health construct, particularly the

dimension of positive outcomes, would be to help determine if a respondent is within accepted corridors for adequate liquidity and retirement planning, as well as factors which include adequate insurance, and the presence of an estate plan. As this concept is used and addressed more widely, researchers can enhance and improve the concept which could lead to a generally accepted measure or scale of financial health.

Limitations

This study has several limitations, many of which are a function of using secondary data. Secondary data comes as-is, which means that it is not necessarily designed for a specific study. As such, there are several areas in which the data provides useful information, but not necessarily the optimal information to perform the desired analyses.

The NFCS is a cross-sectional study. There is a strong temporal element to the education – response paradigm, and the cross-sectional data will not pick this up. In other words, the dataset does not allow an individual to be followed after their financial education over a number of years and then determine that individual's financial outcome.

For households with multiple adults, the NFCS interviewed whoever was available, which included those who were not the financial decision-maker for the household. This introduces a greater potential for inaccuracies, as a respondent may not be aware of all household decisions. Further, a non-decision-maker respondent might not answer questions in a way which is consistent with the psychological or intellectual factors which the decision-maker possessed or used in making their decisions, including the presence or absence of financial education.

The financial education questions in the NFCS are limited, and not as robust as would be preferred. However, other secondary, nationally representative data sets either lack financial education data or they lack financial outcome data. Hence, while the limited financial education

data is a limitation, the NFCS represents a suitable choice for the study population. In the 2021 wave, there is no information about whether an individual was required to take a financial education course. There is also no information regarding the characteristics of the financial courses taken (individually or even in aggregate) such as the length of the course, whether it was standalone, the quality of the course, whether the course was comprehensive, the individual's attitude while taking the course, and where in the individual's sequence of financial education the course falls. All these pieces of information could help develop a view of optimal delivery, but the necessary information is unavailable here. In the extant study, this also means that an exposure to financial education could apply to very different educational experiences for different individuals.

Numerical financial outcomes are unavailable in the NFCS, which is a limitation of the study, as the outcome of financial health was limited to subjective data and non-numeric objective data, eliminating financial ratio analysis or financial comparisons among respondents. The NFCS does not include questions on items like net worth, amount of savings, total assets, or any other economic data which could be used to develop a clear, numerical view of an individual's economic situation. Such data would make the financial health paradigm more robust if it were available. For this study, items like "emergency fund" are yes/no items, and numerical analysis of specific economic quantities was not possible.

The NFCS respondent population is limited to those who participate in online surveys. If this sub-population has any differences from the overall US adult population, then those differences will make the survey less useful as a measure of the characteristics of the US adult population. There may be demographic clusters who may be harder to reach by this methodology. It is even possible that higher-income individuals may be less motivated to

participate in the survey, based on the idea that the pay to participate may not be meaningful. These issues could lead to some selection bias in the survey. Also, the selection of respondents is not random, which can affect underlying statistical assumptions. This limits the analytical and inferential power of the survey.

The TPB (Ajzen, 1991) was the theoretical framework for the analysis. However, the NFCS is not designed with the TPB in mind. As such, constructs like financial social norms and financial intentions were not feasible to implement in this study, and the usage of TPB had to be modified accordingly. While the constructs used still provided a logical path analysis, it did not represent a complete implementation of the TPB.

Causal Link

The methodology of this study, including propensity score matching and additional controls on demographics, support the probability of a causal link between financial education and financial health. This is further supported by Kaiser et al. (2020), who found causal links between financial education, financial knowledge, and financial behaviors. Clearly, the extant study did not use experimental data, and the data is also cross-sectional. These factors tend to weaken any assertion of causality. Yet causal conclusions can be drawn from datasets like this if the analytic method eliminates endogeneity and selection bias.

The study does not eliminate all potential sources of endogeneity. It is unlikely that any individual study based solely on cross-sectional observed data can do so. In particular, the possibility that there could be a hidden variable which leads some individuals to self-select toward financial education, while at the same time being interested in and/or innately skilled in personal finance, cannot be ruled out. Financial education at work could also be driven, for some, by a feedback loop in which financial experiences motivate individuals to attend whatever

educational sessions are available. Financially motivated individuals may also seek out financial information or financial advice on their own, and not through or in addition to a formal education program. This may even be more of an issue for the more-educated and higher-income demographics who already score higher in financial health.

A mitigating factor against this line of reasoning is the fact that many states mandate financial education in high school, many colleges offer, and some require, financial education, and many workers are required to attend at least some form of financial education due to 401(k) education requirements. This means that for an unknown but meaningful portion of the financial education group, one or more exposures were mandatory and not necessarily driven by an innate desire to learn about personal finance.

The possibility of a causal link has some factors that favor it. For college, and especially high school exposures, there is the temporal component – financial education happens before the economic outcomes. For many respondents, the time differential is measured in decades. The preponderance of research which shows positive associations between the various path variables in this study's SEM model, combined with the temporal component, swings favorable toward causality, although by itself, still wouldn't be enough. If the propensity score matching, however, did its job of eliminating or dramatically reducing selection bias and endogeneity, then causality is strongly supported (Lanza et al., 2013). If a causal link has already been established going from financial education to financial behaviors (Kaiser et al., 2020), then the additional causal step to financial health, supported by the results of this study, seems likely.

This study is not generalizable to the US population. The propensity score matching to match the demographic which had received financial education resulted in a dataset which is, in

general, younger, more male, more educated, and higher income than the representative dataset from the NFCS. The ability to support a causal link is well worth the tradeoff in generalizability.

Suggestions for Future Research

This study revealed or supplemented important relationships between financial education and economic outcomes. These provide fertile ground for additional exploration.

Primary Survey Data

Research into financial education would be aided by primary research. Few if any existing large-scale datasets contain robust information on both financial education and the economic status of the respondent. New research should focus on two key constructs: financial education received and the financial health of the individual. The educational component should include when education was received (both year and educational setting), information about the structure of the program including length, comprehensiveness, and whether it was standalone, the quality of the program, and the individual's effort level and grade received (if applicable). Financial health information should include information on all three dimensions: financial well-being, financial satisfaction, and positive financial outcomes. In particular, the positive outcomes dimension should include hard economic data such as net worth, assets, liabilities, and data sufficient to calculate financial ratios.

Creating a longitudinal dataset could help provide additional data on how individuals' economic situations change over time given different financial education exposures. Key benchmarks could include completion of high school, receiving financial education in college or the workplace, and significant changes in employment including loss of job, change of job or employment status, and retirement. Such a dataset would allow for trends to be examined

between recipients of different types and levels of financial education, resilience during periods of adverse financial or economic events, and financial health at times of major milestones.

Experimentation

Researchers can develop experiments to measure the effectiveness of different delivery methods of financial education. Note that the optimal method(s) may be multimodal and may differ from one level of education to the next. Ideally, experiments will have follow-up periods which will allow for conclusions about which delivery methods are most effective in the long term.

Experiments do not need to be limited to traditional school or workplace settings. Financial education can be provided and evaluated privately, and an experimental setting outside of educational institutions may create fewer ethical issues, such as the need to make sure that all students ultimately have the opportunity to receive the same educational experience. This would make longitudinal data difficult to obtain. Experimentation outside a school setting may also allow for more flexibility in educational delivery and content.

Conclusion

Financial illiteracy is widespread, and it comes with economic consequences (Lusardi & Mitchell, 2014). Those consequences can occur at both the individual and the societal level. Financial literacy is not equal among different racial, gender, and socioeconomic groups. The different levels of financial literacy between groups exacerbates the wealth gaps between the groups. Financial education is an effective way of increasing both financial literacy and economic outcomes for the individuals who receive it. Multiple exposures to financial education appear to create even greater benefits, but there is little information available regarding optimal choices of curriculum, length of program, and other important features of a financial education

program. Public policy should support financial education as a societal human capital investment with a long-term payoff. Research should focus on optimal delivery methods and generation of information which will allow the efficacy of financial education approaches and programs to be evaluated.

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