The effect of gender on equity ownership:

Focusing on the mediating roles of financial literacy

by

Gina Lynn Hall

B.S., Columbus State University, 2011
M.S., College for Financial Planning, 2016

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

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2023

Abstract

This dissertation research explored the potentially mediating variable of financial literacy on the relationship between gender and equity ownership. Females typically live longer than males; therefore, they need to be willing and able to take more investment risk by owning equities to account for the additional income required to reach a possible extended age. This study examined three financial literacy factors (*financial knowledge*, *financial ability*, and *financial confidence*) to determine why previous research has found the opposite to be true (Brooks et al., 2019; Charness & Gneezy, 2012; Gudmunson & Danes, 2011; Marinelli et al., 2017; Montford & Goldsmith, 2016). The theoretical framework and definition for financial literacy, as described by Huston (2010) was utilized throughout the study and two comparison datasets were reviewed including the 2021 National Financial Capability Study (NFCS) as well as the 2019 Survey of Consumer Finances (SCF).

According to Huston (2010), there are two distinct components of financial literacy, which are separated into the "knowledge dimension" and the "application dimension" (p. 307). Huston (2010) postulated that all three factors affect financial behavior and well-being, when accounting for outside influences such as family/peer financial socialization, self-control problems, socioeconomic/community conditions, and time preferences. Based on this theory, cognitive limitations in financial knowledge (found within Huston's "knowledge dimension") as well as financial ability and confidence (found within Huston's "application dimension") (p. 307), would influence a person's financial outcomes and were reviewed throughout the study.

The 2021 NFCS sample was reduced to the 2,824 respondents that have investments outside of their retirement accounts to pinpoint particular and intentional investment decisions. This sample subset is known as the "Investors Survey" within the NFCS. These investors were

asked several clarifying questions regarding their investment holdings outside of their retirement assets.

The 2019 SCF consisted of 5,777 respondent households and multiple imputation techniques were utilized to account for missing data and to ensure respondent privacy, for a total of 28,885 observations. The research focused on equity ownership, gender, and financial literacy; therefore, the sample was reduced to 20,183 respondent observations that had brokerage accounts, public stock accounts and/or managed investment accounts outside of their retirement assets to pinpoint particular and intentional investment decisions.

Understanding the relationship between gender and equity ownership is increasingly important for the financial planning profession given expanded life expectancies for females. Overall, results from both datasets indicated that there were direct negative relationships between gender and financial literacy, direct positive relationships between financial literacy and equity ownership, both the NFCS and SCF datasets showed significant direct and indirect (mediating) relationships between gender and equity ownership when factoring in the above-mentioned financial literacy variables.

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Major Professor
Martin Seay

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Acknowledgements

First and above all, I praise God for providing me this opportunity and granting me the capability to complete this program. I am truly grateful for His unconditional and endless love, mercy, and grace.

I'd like to acknowledge my loving husband, Bryan, for helping me get to this point. From the very first flight to Kansas, you have been my biggest supporter. During this program, we have sold two houses, purchased our forever home, raised two beautiful, kind and intelligent daughters, and welcomed our son into the world. Thank you for your commitment to our family and for your dedication to me. Without you, this dream would never have become a reality.

I'd also like to acknowledge my faculty at Kansas State for their mentorship and unwavering support. Each and every professor at K-State has helped me overcome obstacles over the past several years, and I greatly appreciate each of you. A special thank you to Dr. Martin Seay and Dr. Derek Lawson, who have always answered my Zoom calls, even in the late Friday afternoons, and have stuck around throughout this program to provide ongoing support and mentorship. Thank you to my remaining committee members, Dr. Han Na Lim and Dr. Melissa Wilmarth; I strive to live up to your expectations and will continue to envy your research accomplishments and accolades. To my editor, Nikki Wyatt Weeks, thank you for your time, talent, and expertise; you have been an absolute pleasure to work with.

I'd like to acknowledge my work colleagues, The Morris Hancock Hall Group, for their understanding with doctoral commitments, travel, and all-around encouragement and support. It is not often that an individual loves their work environment and looks forward to a new work week; because of each of you, I can confirm that statement is true for me. I sincerely feel blessed to be part of the team and I look forward to what we will accomplish in the years to come.

Dedication

This dissertation is dedicated to my family. To my husband, Bryan, for your continued support and encouragement to complete this program. Thank you for always pushing me to do better and strive for those things that seem unachievable. We make a great team, and I love doing life with you! To my children, Lexie, Katryn, and Elijah, I know it was difficult to share my time with such an undertaking; I hope I have made you proud even through the long hours, late nights, and early mornings. I love you more than you will ever know. Be good to each other and continue to make us proud! To my parents, Scott and Darlene, you are my foundation for success, and I owe you both a debt of gratitude that could never be repaid. Thank you for instilling your values, work ethic, and compassion into me and my family. We love you both dearly. To all of my colleagues, cohort, professors, advisors, friends, family, and friends who are just as close as family, thank you! Thank you for listening to me complain, reading over this dissertation, whether it made your head spin or if it was used to lullaby you each to sleep, thank you all.

Chapter 1 - Introduction

According to the Society of Actuaries (2022) for a married couple currently at age 50 with average health and that do not smoke, a male has a 20% chance of reaching age 95, and a female has a 29% chance of living to age 95. Although females statistically live longer than males, they are less likely to invest in equity assets (Montford & Goldsmith, 2016). Whereas males tend to be more willing to own equities, have higher previous investment experience, and are generally more risk tolerant; females rarely own equity investments, are more risk-averse, and have lower financial self-efficacy (Brooks et al., 2019; Charness & Gneezy, 2012; Gudmunson & Danes, 2011; Marinelli et al., 2017; Montford & Goldsmith, 2016; Wilmarth et al., 2015).

There is a litany of reasons females may neglect to own equities. Some of those justifications include sociodemographic attributes, investment motives, financial characteristics, feelings about risk, family financial socialization, absence of financial planner use, self-esteem, and/or financial self-efficacy (Brooks et al., 2019; Charness & Gneezy, 2012; Gudmunson & Danes, 2011; Marinelli et al., 2017; Montford & Goldsmith, 2016; Wilmarth et al., 2015). Previous literature has noted that a lack of financial literacy has often been a precursor to an absence of equity investments (Deo & Sundar, 2015; Dwyer et al., 2002; Sachse et al., 2012).

Justification/Purpose of Research and Research Question

Financial literacy has been and continues to be a concern throughout the United States (Bernheim et al., 2001; Johns, 1955; Scott; C. H., 1990). The 2020 U.S. National Strategy for Financial Literacy focused on financial education as a key to unlocking the foundations of economic opportunity and powering a strong and resilient economy (Department of the Treasury, 2020b). Americans who have previously acquired financial skills and knowledge have been

better able to participate in the dynamic economy and focus on key best practices to increase financial literacy and education. However, there remains a large gap in financial literacy in females when compared to males (Lusardi & Mitchell, 2014; Lusardi & Mitchell, 2007). In order to provide recommendations that are in the best interest of female clients, wealth advisors need a better understanding and assessment of females' investment behavior through reliable and effective methods (Faff et al., 2011). With access to these insights, financial planning professionals can work towards addressing the lack of equity ownership, specifically for females. Financial planners will be able to provide a more knowledgeable recommendation and promote action for that recommendation. Thus, this study asks the following question:

RQ: Is the relationship between gender and equity ownership mediated by financial literacy, which is defined to include financial knowledge, financial ability, and financial confidence?

According to Fairchild and McDaniel (2017), statistical mediation analysis affords an opportunity to understand the rationale between intervening variables and makes it possible to elaborate the cause and effect of two or more additional variables. A mediator, oftentimes referred to as an intermediate variable, is a third variable that explains how or why two or more variables are related in a presumed causal pathway (Fairchild & McDaniel, 2017). Throughout this study, mediation will be explored in greater depth to better define the relationship between gender and equity ownership and whether the indirect effect path of a mediating variable, financial literacy, influences that relationship.

Introduction to Theoretical and Conceptual Framework

Huston's (2010) theoretical framework and definition for financial literacy will be utilized throughout the study. The research is centered on the potential mediating characteristics

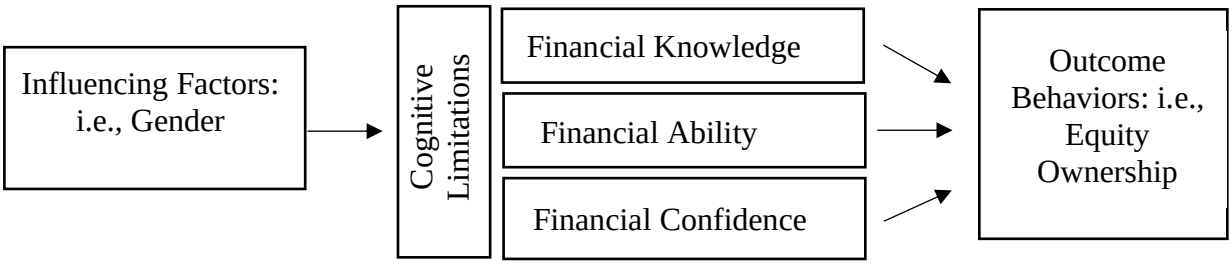
of financial literacy amongst gender and equity ownership. There are identified differences in financial literacy when comparing males to females (Bannier & Neubert, 2016), oftentimes due to financial socialization differences (LeBaron-Black et al., 2021) which can lead to an imbalance in equity ownership (Heo et al., 2016).

Gender, defined as the respondent's sex within this study, is described by Huston (2010) as an "influencing factor" that can affect respondents' financial behaviors and overall financial well-being. Other items in this category can include behavioral/cognitive bias, self-control problems, family/peer involvement, economic opportunity, community outreach, and institutional availability (p. 308). The family financial socialization and peer learning environment has been researched in prior literature; oftentimes females are not given the same financial literacy advances simply due to their gender (Eagly, 2009; Gudmunson & Danes, 2011; LeBaron-Black et al., 2021), society's expectation of their financial knowledge, and overall financial literacy needs are often disregarded (LeBaron et al., 2018). Based on this information, the independent variable of gender is incorporated within the Huston (2010) framework based on these systematic differences that occur between the environments of males and females, as shown in Figure 1.1.

According to Huston (2010), financial literacy can be defined as measuring how well an individual can understand and use personal finance-related information. Huston (2010) incorporated three distinct aspects: the actual knowledge one acquires over time; their ability to apply the knowledge they possess; and the confidence to act on that acquired knowledge. These distinct financial literacy characteristics will be summarized as one's financial knowledge, financial ability, and financial confidence, also shown in Figure 1.1.

Figure 1.1

Huston's Financial Literacy Theoretical Framework



This study expects individuals to make rational decisions, but their decision-making abilities are constrained by a number of competing constraints, i.e., bounded rationality, whether from their outer or inner environments (Simon, 2000). This study concentrates on the inner environmental boundary of "cognitive limitation", where the decision-maker may not have the knowledge, ability, and/or confidence to make optimal financial behavior decisions. Individuals are expected to make rational decisions; taking a calculated investment risk by owning equities is a rational behavior and is similar to rational expectations across previous literature (Neelakantan, 2010; R. Yao & Hanna, 2005).

There is often a gap found in gender differences when evaluating investment outcome behaviors (Cupák et al., 2021). Past literature has established that females are less likely to hold equity investments when compared to men (Bannier & Neubert, 2016), but mediating factors are often debated (Montford & Goldsmith, 2016). Based on an inherent need for efficiently allocated portfolios, because of longer expected life span, females should fundamentally own higher equity allocations within their portfolios than males (Montford & Goldsmith, 2016; R. Yao & Hanna, 2005). Nevertheless, research has shown the opposite effect among females, oftentimes described as due to systematic differences in family and peer financial socialization (Brooks et

al., 2019; Charness & Gneezy, 2012; Gudmunson & Danes, 2011; Marinelli et al., 2017; Wilmarth et al., 2015).

Throughout this study, the mediating variable of financial literacy will be explored to further define the relationship between gender and equity ownership. According to Judd and Kenny (1981), there are four requisite considerations to support evidence for mediation:

(1) the independent variable (*gender*) must affect the outcome (*equity ownership*);

(2) the independent variable (*gender*) must affect the mediating variable (*financial literacy*);

(3) the mediating variable (*financial literacy*) must affect the outcome (*equity ownership*); and

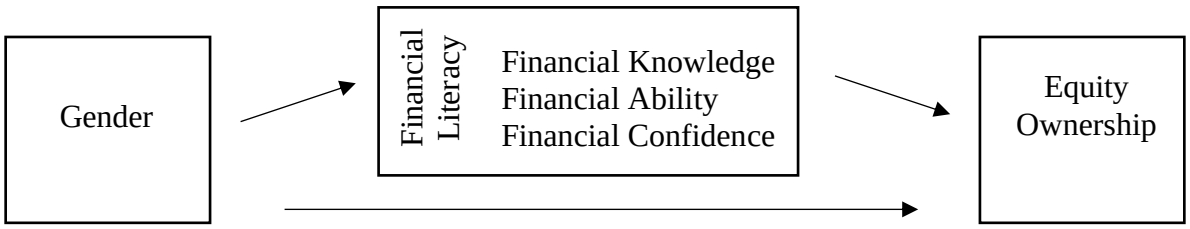
(4) the independent variable (*gender*) must not affect the outcome (*equity ownership*) when the mediating variable (*financial literacy*) is controlled.

Since 1981, additional proposals have suggested that sufficient evidence for mediation could be shown if the relation between the independent variable (*gender*) and the outcome (*equity ownership*) was simply reduced in magnitude once the mediator (*financial literacy*) was introduced, rather than requiring it to be zero (as originally suggested) this occurrence is often referred to as partial mediation in past research (Baron & Kenny, 1986).

The research question explores the relationship between gender (an influencing factor) and equity ownership (a personal financial behavior outcome) and whether that relationship is mediated by financial literacy, which is defined to include financial knowledge, financial ability, and financial confidence. This mediation model is shown in as shown in Figure 1.2.

Figure 1.2

Financial Literacy Mediation Model



Hypotheses

In accordance with prior research, this study expects to find an association between gender and equity ownership (Deo & Sundar, 2015; Dwyer et al., 2002; Bogan et al., 2013; Marinelli et al., 2017). Additionally, that assocation is expected to be reduced when mediating the increasing financial literacy variables. The hypotheses are presented below:

H_1 Females have lower levels of financial literacy, compared to males.

H_2 Financial literacy is positively associated to equity ownership.

- H_{2a} Financial knowledge is positively associated to equity ownership.
- H_{2b} Financial confidence is positively associated to equity ownership.
- H_{2c} Financial ability is positively associated to equity ownership.

H_3 Females are less likely to exhibit equity ownership, compared to males.

H_4 Financial literacy mediates the relationship between gender and equity ownership.

- H_{4a} Financial knowledge mediates the relationship between gender and equity ownership.

H_{4b} Financial confidence mediates the relationship between gender and equity ownership.

H_{4c} Financial ability mediates the relationship between gender and equity ownership.

Summary

The study investigates if differences in financial literacy may explain the equity ownership gap between genders. Huston's (2010) framework is used both to provide a comprehensive definition of financial literacy, as well as indicate why gender differences in equity ownership exist. Specifically, Huston's framework indicates that family and peer financial socialization and experiences are important, with a deficiency resulting in females being less likely to be exposed to financial conversations and development opportunities (Glenn, 2018; LeBaron et al., 2019; Shim et al., 2010). It is expected that differences in financial literacy are a result of these socialization differences (Bannier & Neubert, 2016; Bannier & Schwarz, 2018) and that including financial literacy as a mediating variable will help explain the imbalance in equity investments (Marinelli et al., 2017; Mountain et al., 2021).

This study focuses on understanding how non-retirement investment accounts are managed, given significant opportunity to fully customize investment decisions. Consequently, this study is limited to individuals that own non-retirement assets, with two parallel data analyses being conducted to provide a robust investigation given slightly different available measurements, one utilizing the National Financial Capability Study (NFCS) and one utilizing the Survey of Consumer Finances (SCF).

Chapter 2 - Literature Review

Based on Huston's financial literacy framework (2010), the study investigates if differences in financial literacy may explain the equity ownership gap between males and females. The research aims to articulate an encompassing definition for financial literacy by refining the term to include financial knowledge, financial literacy, and financial confidence. In order to clearly identify these factors, produce robust results and further the existing body of knowledge, the research will identify and analyze two national datasets to show there is a clear difference in financial literacy when analyzing males and females. Specifically, Huston's framework indicates that family financial socialization and experiences matter, with females being less likely to be exposed to financial development opportunities and conversations (Glenn, 2018; LeBaron et al., 2019; Shim et al., 2010). Based on this information including financial literacy as a mediating variable is expected to explain an imbalance in equity investments (Marinelli et al., 2017; Mountain et al., 2021).

The research will utilize the National Financial Capability Study (NFCS) as well as the Survey of Consumer Finances (SCF) and focus only on respondents with non-retirement investments in order to keep any outside influence from employers from skewing the research results as well as to look at intentional investment decisions to clearly evaluate the expected mediating relationship. Given the slightly different measurements available across the two datasets, it is expected that the study will provide a robust investigation of equity ownership differences between males and females.

Financial Literacy Concept/Framework:

Gender, Financial Literacy & Equity Ownership

Gender

Gender is defined as the respondent's biological sex at birth within this study. Huston (2010) describes gender as an influencing feature that can affect ones' financial behaviors and overall financial well-being. Family financial socialization and peer/experiential learning has been thoroughly researched in prior literature; oftentimes females have not been afforded equivalent financial literacy advancements when compared to their male counterparts (Eagly, 2009; Gudmunson & Danes, 2011; LeBaron-Black et al., 2021). Society has also shown low expectations for a female's financial knowledge obtainment and their overall financial literacy needs are regularly marginalized (LeBaron et al., 2018).

The independent variable of gender is incorporated from Huston's (2010) framework based on the systematic differences that occur between males and females regarding life experiences as they relate to acquiring finance associated skills, environmental opportunities regarding financial advancement, exposure to basic financial learning, as well as access to financial learning activities that are obtained throughout childhood and beyond (Brooks et al., 2019). When evaluating gender and financial outcome behaviors, there are previous studies that researched gender as a moderating factor (Falahati & Paim, 2012; Pertiwi et al., 2020; Sriyono & Rif'ah, 2022). Others have researched whether financial risk tolerance and/or financial socialization has mediated the relationship between gender and investment behaviors (Ameliawati & Setiyani, 2018; Heo, Nobre, et al., 2016).

Social learning theory (Rotter, 1982) proposes that humans learn to enact behaviors by observing those behaviors through modeling, thereby suggesting that parental financial modeling

is a primary means for children to learn financial behaviors. According to further social-based explanations, it is argued that gender socialization (masculinity versus femininity) is foundational regarding differences in investment and financial behavior. Specifically, both genders learn general fiscal expectations through a socialization process (Guinn et al., 1989; Slovic, 1966), and they behave in accordance with those societal expectations wherein females are not often expected to excel (Eagly, 2009).

Deo and Sundar (2015) describe several systematic differences among males and females involving their investment behaviors, specifically that men are stronger risk takers and females are often unable to tolerate investment uncertainty. The research describes the gender differences in education level, confidence, environment, psychology, as well as emotional decisions such as mental errors and herd mentality (Deo & Sundar, 2015). Burton (1995) noted that the identities, self- esteem and feeling of power held by males, are innately associated with the achievement and use of assets while females tended to seek immediate satisfaction through spending money wisely rather than acquiring funds and wealth over time.

Financial Literacy

Although there is no standard definition of financial literacy, Huston (2010) defined financial literacy as, "measuring how well an individual can understand and use personal finance-related information" (p. 306). Huston (2010) proposed a number of means to measure financial literacy and found that being able to accurately define and, as a result, appropriately measure financial literacy was essential to review the impact of educational programs and the obstacles that hindered suitable financial decisions. This study will define financial literacy more precisely by segmenting the term into the following attributes: financial knowledge; financial ability; and financial confidence (Huston, 2010).

Financial Knowledge

Financial knowledge, or an individual's level of understanding regarding financial matters which enables them to process financial information and make informed decisions about personal finance, is frequently measured with questionnaires and true-false questions (Bhushan, 2014; Hastings et al., 2013; A. Lusardi & Mitchell, 2014). Financial knowledge measures have been useful in previous literature when assessing wealth accumulation (Gustman et al., 2010) and stock investing (Abreu & Mendes, 2010; Jappelli, 2010). The number of survey questions (or length of scale) required to measure financial knowledge has been debated (Huston, 2010; Knoll & Houts, 2012; A. Lusardi & Mitchell, 2014). A standardized measure has yet to be established (Henager & Cude, 2016; Huston, 2010; Knoll & Houts, 2012; Remund, 2010).

Lusardi and Mitchell (2007) explored financial knowledge within the United States and expressed disparities across minorities and genders, "financial illiteracy was particularly acute for Blacks and Hispanics, females, and those with low educational attainment" (Lusardi & Mitchell, 2007). The study also identified several findings that postulated that most consumers were not only poorly informed about financial fundamentals such as interest rates and mortgages, but they were also lacking knowledge in two of the most important components of retirement wealth within the US: Social Security and pension income (Lusardi & Mitchell, 2007). These findings are disconcerting in that financial illiteracy may inhibit a population's ability to save and invest for retirement, undermining their overall financial comfort as they age.

Gustman et al. (2010) found that when higher financial knowledge was applicable, a consistent relationship between knowledgeable workers (regarding their pension comprehension) was found, which was positively correlated to the overall value of the pension assets. Similarly, Jappelli (2010) used data from the 2007 UniCredit Customer Survey and found that poor

financial literacy was a contributing factor when respondents had minimal portfolio diversification. In an effort to investigate investors' perceived investment risk, Sachse et al. (2012) found that gender and age did not influence perceived investment risk, rather the higher financial literacy the lower the perceived risk. Financial literacy, in this study, was determined only by means of a knowledge test (Sachse et al., 2012). These findings suggest that the requirement of financial institutions to rate investors' financial sophistication through the use of questionnaires to determine financial knowledge is both valid and necessary (Jappelli, 2010).

Bannier and Neubert (2016), explored the difference between actual and perceived financial knowledge when comparing females to males and how that related to financial risk-taking behaviors. Their research had mixed findings regarding differing investment types, including standard and sophisticated investments. The study found that actual and perceived financial knowledge for males was positively associated with financial risk-taking behavior, but only actual knowledge was positively associated with financial risk taking for females. Also, higher risk tolerance was related to both stand and sophisticated investments for males, but only for standard investments for females (Bannier & Neubert, 2016). Mountain et al. (2021) examined the differing types of financial learning activities that were expected to affect young adults' objective financial knowledge. Their multilevel mediation regression model found significant indication that objective financial knowledge had an important role when improving financial behaviors, specifically while mediating the association between voluntary and nonvoluntary learning activities and financial behavior (Mountain et al., 2021). Similarly, Tang and Baker (2016), studied objective and subjective financial knowledge simultaneously regarding their effect on financial behaviors. Their research found that objective financial knowledge was an important but insufficient driver of responsible financial behavior and posited

that self-esteem related to financial behavior both directly and indirectly through subjective financial knowledge; in summary, both objective and subjective financial knowledge factors were significant in explaining financial behavior differences (Tang & Baker, 2016).

Financial Ability

Financial ability is known as the capacity to make sound financial decisions by applying what an individual knows about finance (Porter & Garman, 1993). Financial ability is often associated with financial experience (Chang et al., 2022; Kuhnen & Melzer, 2018). Experiential financial learning and financial experience can be seen through the lens of financial ability (oftentimes referred to as financial capability). According to Brooks et al. (2019), investment experience played the most significant role in the financial risk tolerance difference between males and females more than that of age and/or employment. Additionally, whether females interacted in the decision-making process as well as meeting with a financial advisor together or separately affected a female's risk tolerance. Also, Remund (2010) found that financial ability was associated with an individual's capability to manage their personal finances. Low levels of financial knowledge also had broad implications regarding financial ability and were associated with an inability to save money for the long-term or to manage day-to-day financial tasks (Klein, 2007).

Higher financial knowledge is often noted as an outcome of family financial socialization, which can also depict financial ability (LeBaron-Black et al., 2021; LeBaron, 2021). LeBaron (2021) found that experiential learning of finances was key to family financial socialization. Experiential learning of finances was defined as the process of using life experiences to internalize financial knowledge (LeBaron, 2021). Through modeling and discussion, oftentimes parents teach children both explicit (or purposeful) and implicit financial

socialization (Gudmunson & Danes, 2011). In emerging adults, family financial socialization, specifically financial experience methods and scales, were imperative in overall financial development (LeBaron et al., 2019). As mentioned above, Rotter (1982) proposed the theory of social learning, where humans learn behaviors by observation through modeling, suggesting that parental financial modeling is a primary means for children to learn financial behaviors. Klein (2007) conducted a study to determine how poverty and inequality affected the financial well-being of low-income individuals focusing on their opportunities to participate in mainstream financial markets. It was found that the students' knowledge and experiences in their lives that were related to money were likely to influence the way they understood the presented material (Klein, 2007).

Also mentioned above, gender socializations (masculinity versus femininity) occur and help establish those differences in investment and financial behavior. Through a socialization process, both genders learn social beliefs (Guinn et al., 1989; Slovic, 1966) and they behave in accordance with public expectations (Eagly, 2009). Slovic (1966) focused on willingness to take risks and found that boys were "bolder" than girls; furthermore, that boldness was found to be positively correlated with popularity for males but negatively correlated with popularity for females. Guinn et al. (1989) reviewed the cultivation effect, which assumed that different demographic characteristics (such as gender) would have differing life experiences, oftentimes inhibiting financial abilities that could also lead to different perceptions of social reality, resulting in a difference in financial outcomes or behaviors.

Financial Confidence

Financial confidence (often used interchangeably with subjective financial knowledge) is defined by Huston (2010) as the self-assurance to act on one's acquired financial knowledge. It

has been analyzed with many different variables and empirical tests and is frequently self-reported from respondents. Self-reported gender differences in equity ownership have been examined widely. Empirical findings generally agree that females, on average, own less equity investment holdings and are less confident in asset allocation decisions than males (Allgood et al., 2015; Courchane et al., 2008; Fagerlin et al., 2007).

Allgood et al. (2015) reviewed data from the National Financial Capability Study (NFCS) and found that across five financial topics – credit cards, investments, loans, insurance, and financial counseling – perceived financial confidence was as essential in explaining financial behavior as objective financial knowledge. It was also found that the combination of both attributes (financial confidence and financial knowledge) had the greatest effect on financial well-being (Allgood et al., 2015).

Other areas of research where the topic of financial confidence was assessed included credit scores (Courchane et al., 2008), medical self-assessments, and patient literacy in healthcare (Fagerlin et al., 2007). Courchane et al. (2008) found that self-assessment of credit score was related to financial outcomes and that inaccurate self-assessments lead to increased probabilities of higher interest rates on mortgages and potentially being denied credit. It was also found that respondents who were more optimistic about their credit situation experienced substantially better market outcomes (Courchane et al., 2008). Fagerlin et al. (2007) found that assessing medical literacy via subjective measures was quicker to administer and less evasive; therefore, it limited the number of unpleasant questions that may have prompted a change in behavior for patients. The conclusions reported the subjective measures took less time, were less stressed/frustrated, and 50% of the respondents volunteered to participate in a second study versus only 8% who were tested based on objective medical literacy. Results for self-assessed

patient literacy were similar to results regarding self-assessed financial literacy, finding the simpler self-assessment proved as helpful in research findings. Cupák et al. (2021) also concentrated on an individual's confidence in their own financial literacy when explaining the gender gap. Their research found that financial confidence was a strong determinant of equity ownership and accounted for a large segment of the gender gap (Cupák et al., 2021).

According to the U.S. Financial Literacy and Education Commission (Department of the Treasury, 2020a), measures used to determine an individual's ability to balance multiple financial decisions (including managing income/expenses, assets/liabilities, and taking steps to build and protect assets) should include a combination of subjective and objective factors to assess a person's financial state of being. Specifically, among the Department of Defense, financial confidence is measured annually via the Status of Forces Survey to better understand overall financial well-being (Department of the Treasury, 2020a).

Contrasting Knowledge, Ability, and Confidence

Huston's (2010) definition and theoretical framework of financial literacy states financial literacy is made up of the knowledge one possesses (financial knowledge) as well as their ability (financial ability) and confidence (financial confidence) to apply effectively that knowledge to their personal finance necessities. These distinct areas of financial literacy were separated by Huston (2010) into the "knowledge dimension" and the "application dimension" (p. 307).

Huston (2010) listed three obstacles in regards to establishing a standardized approach to measuring financial literacy; of these obstacles, the main focus was the lack of standard definition for the construct of financial literacy, which includes the varying elements such as knowledge, ability, and confidence as well as terms used interchangeably throughout previous literature, such as financial literacy and financial knowledge. Huston (2010) stated that

determining those verification efforts would be the first step in creating a standard financial literacy measure. The second barrier was the varying use of measures across the body of knowledge. Finding a comprehensive use of measures would be difficult to achieve but would also be necessary to create a standard measure. The third and final barrier that Huston (2010) described was the lack of guidance for measurement interpretation.

Regarding distinct, precise, and consistent financial literacy definitions, Gudmunson and Danes (2011) analyzed family financial socialization and noted that family members can have varying levels of agreement and that subjective indicators were based on individual perspectives and opinions. Also, although objective and subjective measures are often correlated, treating them as distinct and independent constructs is important for analysis, this included examining how they are interrelated. More recently, Henager and Cude (2016) reviewed the associations between objective financial knowledge, subjective financial knowledge or confidence, and subjective financial management ability, which helped further refine the definition for financial literacy, citing Huston's (2010) theoretical framework. While Henager and Cude (2016) focused on differing age groups, they found that financial confidence was more strongly related to younger sub-samples and financial knowledge was more highly correlated to the older age groups. Financial ability was also significant in the two older age groups, but at a much lower odds ratio than that of financial knowledge. Huston (2010) found the need to better define financial literacy to be the most important obstacle to establishing a standard financial literacy measure.

Regarding standardized measures (or instruments) and the interpretation of those measures, Huston (2010) noted four main areas of interest that were needed while measuring financial knowledge, those included the following: money basics, borrowing, investing and

protecting resources. Throughout the analysis, Huston (2010) noted that the majority of the studies referenced did not provide any guide to interpret the measurements lists. Due to this lack of clarity, the general understanding of any financial literacy construct is lost in translation.

Equity Ownership

Equity ownership and overall investment allocation is a crucial factor that economists investigate to explain differences in individual investment behaviors and well-being (Bucciol & Zarri, 2015). Regarding investments and finance behavior specifically, females adopt less equity-heavy strategies (Grable & Lytton, 1999), invest a lower overall percentage of their general wealth into equity asset classes (Bernasek & Shwiff, 2001) and are more concerned with potential losses than possible returns (Olsen & Cox, 2001).

Across many areas in life, males tend to display greater risk-seeking behaviors than females (Brooks et al., 2019). Whether in a driving context or in regards to taking risks in sports, their careers, their health and within personal finance decisions (Byrnes et al., 1999) females tend to show lower risk-seeking behaviors comparatively. Heo et al. (2016), studied the mediation effect of risk tolerance among marital status, gender and risky investment behavior, i.e., equity ownership. The study found financial risk tolerance was positively associated with equity ownership in all four time periods studied (2008, 2009, 2010, and 2011) and that risk tolerance mediated the relationships by amplified and/or diminished levels of equity ownership. Also, single and married females were more likely to hold lower financial risk tolerance attitudes (i.e., be more risk averse) across all of the periods, but especially in 2008 and 2011 when the U.S. equity markets were down, this translated into owning fewer equities as a percent of total investment wealth.

Historical Context and Relevant Research

According to Huston (2010), public policy has pushed for an increase in overall financial literacy to improve overall financial welfare through enhanced decision making abilities. The drastic need for improvements to financial literacy in the U.S. has ample evidence for its support; most recently those include widespread mortgage crises, consumers over indebtedness, and fundamentally increased bankruptcy rates (Huston, 2010). All of these events call for a more defined and widely implemented financial literacy approach. Noted best practices to improve financial literacy in the U.S. from the Financial Literacy Education Commission (Department of the Treasury, 2020b) included the following:

(1) Know the individuals and families to be served;

(2) Provide actionable, relevant and timely information;

(3) Improve key financial skills;

(4) Build on motivation;

(5) Make it easy to make good decisions and follow through;

(6) Raise standards for financial educators;

(7) Provide ongoing support; and

(8) Evaluate for impact.

Seven of the eight listed best practices concentrate directly on the areas of financial knowledge, confidence, and ability throughout the U.S. The U.S. has had auxiliary segmented financial literacy divisions without an overarching national plan for decades. These segmented areas of government included: Consumer Financial Protection Bureau, Department of Labor, Department of Housing and Urban Development, Department of Education and Department of Defense (CFPB, DOL, HUD, ED & DoD) who are now striving to work in cooperation with one another

to better develop and integrate financial literacy and education across the U.S. (Department of the Treasury, 2020b).

Lusardi and Mitchell (2011) focus on financial literacy goals of the U.S. Their 2011 study found that prior to the 1980s, many U.S. workers relied ultimately on Social Security and employer defined benefit (DB) pension plans. Due to the recent change in retirement income structures, U.S. individuals and their families have since been required to take on additional responsibility for securing their financial well-being through retirement years. Because of this secular shift, sufficient financial literacy is drastically needed to obtain overall financial well-being (Lusardi & Mitchell, 2011). Their research found a large majority of U.S. individuals fail to understand critical financial knowledge concepts, including interest compounding, inflation, and risk diversification. This lack of financial knowledge was most acute for certain groups, including females, the less-educated, as well as older individuals (Lusardi & Mitchell, 2011).

Due to findings like the above, U.S. agencies have focused on increasing financial literacy efforts, starting with primary education avenues. A focused chapter within the Handbook of Consumer Finance Research (Xiao, 2016) explored exactly that, with five biennial national surveys of high school seniors from 1997 to 2006 that have been utilized frequently to assess the financial literacy of young American adults. Throughout Chapter 11, Walstad et al. (2016), describes the various ways in which financial literacy is defined, including conceptual knowledge as well as decision-making ability, quoting Remund's (2010) definition:

> Financial literacy is a measure of the degree to which one understands key financial concepts and possess the ability and confidence to manage personal finances through appropriate, short-term decision-making and sound, long-range financial planning,

> while mindful of live events and changing economic conditions (p. 284).

Walstad et al. (2016) stated that students from families with greater financial resources tended to be substantially more financially literate than those from families with lesser financial wealth, highlighting the financial ability and experience aspect of financial literacy. Furthermore, the text expressed that adding high school classes on personal financial and money management had not proven to be effective in raising those low levels of financial literacy. This information highlighted a drastic need for higher financial literacy that was missing across the U.S.; due to the lack of basic financial literacy, individuals in the U.S. had subsequently been found to make poor financial decisions (Walstad et al., 2016).

There are also several nonprofit organizations that are working towards publishing content guides for financial literacy, this includes a well-known organization known as the JumpStart Coalition for Personal Financial Literacy (Jump$tart) originally appearing in 1998 with their *National Standards in K-12 Personal Finance Education*, now in its fourth edition (Walstad et al., 2016). Another nonprofit, the Council for Economic Education (CEE) has developed the *National Standards for Financial Literacy*, which is associated with many state content standards and curriculum development (Walstad et al., 2016).

This research investigates if differences in financial literacy may explain the equity ownership gap between males and females. Huston's framework is used both to provide a broad definition of financial literacy, as well as provide an indication of why gender differences in equity ownership exist. Specifically, Huston's framework indicates that family and peer financial socialization and available experiences matter, which is a better justification than only measuring objective financial knowledge, as females are less likely to be exposed to financial conversations

and development opportunities at home, in the classroom and even in the workplace (Glenn, 2018; LeBaron et al., 2019; Shim et al., 2010).

Theoretical Mediation Framework / Concept: Influences, Cognitive Limitations and Decision-Making Ability

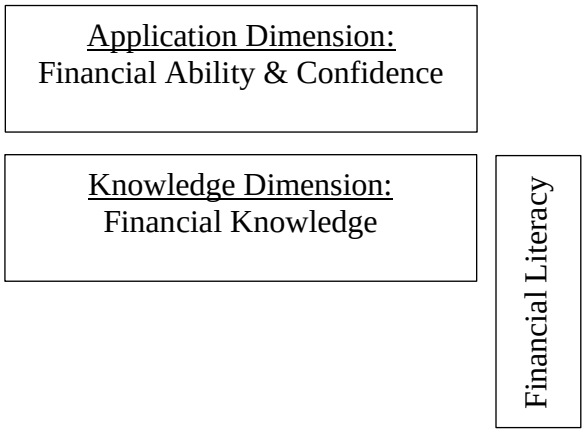
According to Huston (2010), there are two distinct *areas* of financial literacy, which are separated into the "knowledge dimension" and the "application dimension" (p. 307). This concept of applications and/or abilities are key to the expressed financial literacy framework. After identifying financial knowledge, ability, and confidence, Huston (2010) postulated that all three factors affect financial behavior and well-being, when accounting for outside influences such as family/peer financial socialization, self-control problems, socioeconomic/community conditions, and time preferences. Based on this theory, cognitive limitations in financial knowledge (found within Huston's "knowledge dimension") as well as financial ability and confidence (found within Huston's "application dimension") (p. 307), would influence a person's financial outcomes.

Cognitive limitation is also a key component throughout the theory of bounded rationality (Simon, 2000). According to the theory of bounded rationality, individuals are expected to make rational decisions, but their decision-making abilities are bounded by several competing constraints, whether from their outer or inner environments. Simon (2000) points to three main areas where individuals are bound and therefore required to make satisficing choices that lead to suboptimal decisions including: cognitive limitations, information imperfection, and time constraints. The theory of bounded rationality has also been utilized throughout literature while reviewing gender differences in financial and investment behaviors (Simon, 2000).

Due to the aforementioned cognitive limitations, a person's decision-making ability is often lacking or insufficient, which can ultimately change their outcome behavior negatively (Simon, 2000). Fagerlin et al. (2007) found that although respondents needed to make informed decisions regarding their medical treatment options, many respondents had substantial difficulty understanding the risks and benefits due to poor literacy and numeracy. This deficient decision-making ability required a measurement that was less intrusive and easy to implement to large groups of people. Fagerlin et al. (2007) reported a subjective measure correlated well with previously given objective numeracy tests and lowered rates of missing or incomplete data. Within Huston's (2010) financial literacy dimensions, shown in figure 2.2, the financial confidence "subjective" measure is expected to add clarity to overall findings when used in conjunction with the more "objective" financial knowledge scale and financial ability measures.

Figure 2.1

Huston's Financial Literacy Dimensions



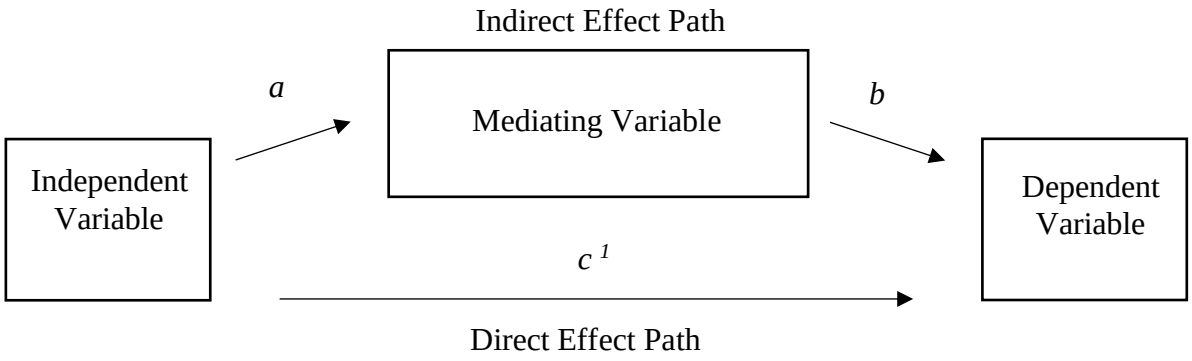
Mediation / Financial Literacy

Mediation analysis is comprised of an independent variable that influences a dependent variable in multiple routes (Hayes, 2013). When the independent variable influences the

dependent variable directly, it is called a direct effect. If the independent variable also influences the dependent variable through an intervening variable, this construct is called the mediating variable and the path is called the indirect effect (Hayes, 2013) which is shown in Figure 2.2.

Figure 2.2

Simple Mediation Conceptual Model



Mediation analysis is a common practice across prior literature (Heo et al., 2016; Jorgensen & Savla, 2010; LeBaron-Black et al., 2021; Montford & Goldsmith, 2016). Heo et al. (2016) tested whether risk tolerance mediated gender/marital status with investing behaviors. Their reported findings did indicate that risk tolerance somewhat mediated these relationships with mixed associations, sometimes strengthening and occasionally mitigating investment behavior. Montford and Goldsmith (2016) posited that females invest too conservatively with the role of financial self-efficacy mediating the relationship between gender and investment risk. They found evidence that financial self-efficacy did affect the investment outcome of greater financial risk taking (Montford & Goldsmith, 2016).

There is also a body of research that suggests that financial self-efficacy mediates some associations between financial socialization and financial outcomes (Glenn, 2018; Rea et al., 2019) as well as certain financial behaviors acting as a mediator between family financial socialization and financial wellbeing (Gudmunson & Danes, 2011). Due to the expected relationship between financial literacy and equity ownership, mediation analysis will be utilized to explore the effects of gender on equity ownership through financial literacy as an intervening variable.

Conceptual Framework

Based on the abovementioned theoretical focus and review of mediation analysis throughout past literature, an expanded financial literacy conceptual framework is provided in Figure 2.3. This expanded conceptual framework depicts the four regression models including:

(a) The direct effect model representing the direct influence relationship between the independent variable, gender, and the mediating variable, financial literacy (i.e., the relationship identified as path c^{1} in Figure 2.3);

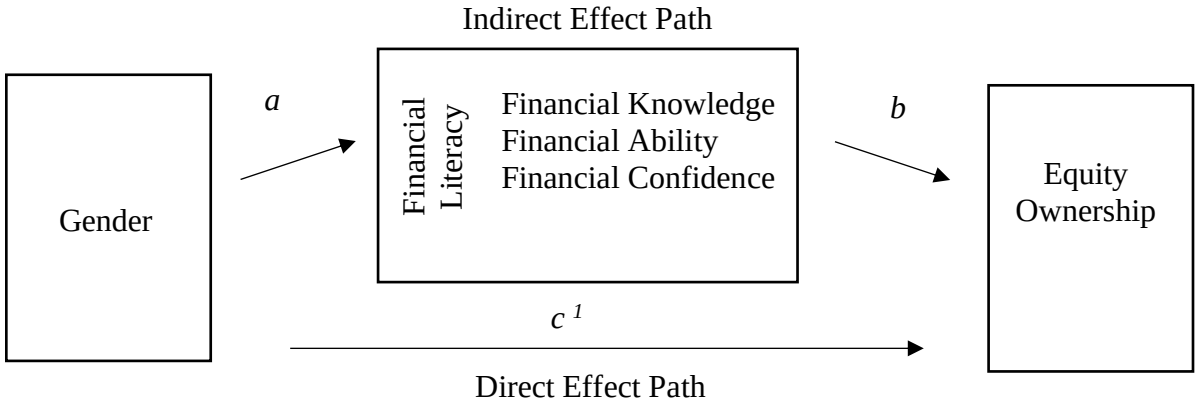
(b) A model representing the relationship between the independent variable, gender, and the mediating (or intervening) variable, financial literacy (i.e., path *a* in Figure 2.3);

(c) A model representing the relationship between the mediating variable, financial literacy, and the dependent variable, equity ownership (i.e., path *b* in Figure 2.3); and

(d) The indirect effect model representing the relationship between the independent variable, gender, through the mediating (or intervening) variable, financial literacy and the dependent variable, equity ownership (i.e., path *ab* in Figure 2.3)

Figure 2.3

Expanded Financial Literacy Conceptual Framework



The relationship between a simple relationship model (known as c) and the simple mediation model is such that the total effect of the independent variable on the dependent variable is equal to the sum of the direct and indirect effects by the independent variable on the dependent variable. Expressed mathematically as $c = c^1 + ab$ (Kline, 2016).

Conceptual Focus: Financial Knowledge, Ability, Confidence and Gender

According to the Department of the Treasury (2020a), in order to accurately address the disparities of financial literacy in the U.S., both the private and public sectors need to offer additional support regarding knowledge, skills, and confidence. Research has shown that females are generally less financially knowledgeable than males, which affects their portfolio choices (Lusardi & Mitchell, 2007). Dwyer et al. (2002) found that the effect of gender on risk taking in mutual fund investment decisions was reduced significantly when controlling for the individual's financial knowledge.

Financial ability, also referred to as financial capability, is often studied as the *building blocks* of financial functions, habits, and norms (Department of the Treasury, 2020a). Financial

ability, also described as the power to balance and prioritize financial decisions, depicts a person's ability to meet current and ongoing financial obligations, feel secure regarding their financial futures, and make choices that allow them to enjoy life (Department of the Treasury, 2020a). Due to gender norms, females are often found to have received less hands-on experience throughout family financial socialization, limiting those "building blocks" for financial ability (LeBaron et al., 2018).

Financial confidence is built early on; according to family financial socialization, hands-on experience with money while growing up was noted as a key component for developing confidence in future financial behaviors (LeBaron et al., 2018). Financial confidence was also reported to be a crucial aspect of how gender and financial self-efficacy influences investment allocation (Montford & Goldsmith, 2016). Faff et al. (2011) found that gender was the most important explanatory factor affecting financial confidence, higher than age, experience, education, knowledge, and asset holdings.

These financial literacy constructs build upon each other; by employing each of these separate, yet enhancing, constructs within the study's conceptual focus the conclusions drawn will be vast and expand throughout the body of literature.

Conceptual Focus: Equity Ownership

The study aims to determine to what extent does the lack of financial literacy mediate the relationship between gender and equity ownership. Based on the theory of bounded rationality (Simon, 2000) making a satisficing and irrational decision to avoid any equity ownership in asset allocations may be caused by internal limitations, such as one's inadequate financial literacy.

Huston's framework is used both to provide a comprehensive definition of financial literacy, as well as indicate why gender differences in equity ownership exist. Previous research

found financial literacy to be negatively associated with females (Lusardi & Mitchell, 2007) and positively associated to equity ownership (Faff et al., 2011; Grable, 2000; Heo et al., 2016; Lusardi & Mitchell, 2014). This study and overarching dissertation research is intended to assist in identifying and exploring the anticipated mediating relationship of financial literacy between gender and equity ownership.

Controlling Factors

Existing research has shown that a number of demographic, socioeconomic, and attitudinal factors affect investment behavior, risk attitudes, and equity ownership; it is necessary to examine these factors and relationships in more detail (Deo & Sundar, 2015). Controlled measures will include the following: marital status, age, race, education, working status, household's net worth, household's income, household's homeownership status, and risk tolerance (or risk-willingness) of the respondent.

Marital Status, Age, and Race

Several researchers have explored the link between marital status, gender, and equity ownership. Sung and Hanna (1996) as well as Sunden and Surette (1998) both identified that single females are less tolerant regarding equity investments than are single males or married couples. Yao and Hanna (2005) found that unmarried males displayed the greatest risk tolerance, while both unmarried and married females have lower risk tolerance than married men.

Yao and Hanna (2005) noted how an individual's risk tolerance was derived and the numerous variables that included a respondent's biological, demographic, and socioeconomic characteristics as well as their psychological makeup (Horvath & Zuckerman, 1993). Additional variable factors that affect investment behavior encompassed years until retirement, knowledge, sophistication, income, and net worth (Mittra, 1995). Finally, a respondent's risk-taking behavior

was correlated to their household situation (marital status), lifecycle stage, and several additional subjective factors (Hanna & Chen, 1997). Yao and Hanna (2005) used the rational economic model to posit that females should be willing and able to take on additional risk, by owning equities within their investment portfolios, to grow and maintain their savings for a longer timeframe. Ho, Milevsky, and Robinson (1994) also noted married couples with combined expected longer lifespans should be able to tolerate more investment risk than single respondents. Because of these rational ideals, Yao and Hanna (2005) found that males were consistently more likely than females to take substantial risk with equity ownership, but married males were significantly less likely to take substantial risk than unmarried males.

Age has been a significant factor associated with financial risk tolerance and equity ownership (Grable et al., 2009; Grable & Lytton, 2001). The consensus has been that older adults own less equities than younger adults, and there is reasonable support for this idea across the body of literature (Gibson et al., 2013; Grable, 2000, 2008; Kannadhasan, 2015; Yao et al., 2011; Yao & Hanna, 2005). Age is also important in determining equity ownership and risk-taking ability, often represented as risk capability or capacity (Swedroe et al., 2010), as age is frequently directly correlated to investment time horizon (Gibson et al., 2013). Although some individuals choose to work longer than others, an individual's ability to work, whether through mental or physical decline, decreases with age (Yao et al., 2011).

Racial and ethnic background also have been found to be important in explaining equity ownership and other investment behaviors (Weber & Hsee, 1998). Barsky, Juster, Kimball, and Shapiro (1997) showed that black respondents have higher mean risk taking levels than do white respondents, but studies based on the Survey of Consumer Finances (SCF) dataset showed that black respondents were less willing than white respondents to take investment risk by owning

equities (Hanna & Lindamood, 2008). Hawley and Fujii (1993) found that white respondents were more likely to own equities than were other racial/ethnic groups. Yao, Gutter and Hanna (2005) found that, compared with their white counterparts, black and Hispanic respondents were more likely to take substantial financial risk (versus high, some, or no risk), but significantly less likely to take some financial risk (versus no risk).

Education and Employment Status

Yao, Gutter and Hanna (2005) found education status to be significant in explaining financial risk-taking and equity ownership. Previous research showed that education level is important to control for in studies of investment behavior and overall risk tolerance (Bernasek & Shwiff, 2001). Klein (2007) found that whether students were required to attend financial education classes versus choosing to take the course made a difference in the likelihood to change certain behaviors, including investment behaviors. Alternatively, Faff et al. (2011) found that education was not a significant differentiating variable in explaining equity avoidance for females.

According to Bernasek and Shwiff (2001) employment type must be controlled for when analyzing investment behaviors and risk tolerance. Within the family socialization framework, employment, including that of young children, was analyzed regarding financially independent behavior (LeBaron et al., 2018). Regarding the influence of income contributions in married couples, a female's employment type effected a shifting of gender roles (Wilmarth et al., 2015). According to Eagly (2009), within U.S. households with children, men spend almost twice as much time as females involved with their employment activities. Due to this imbalance of employment status and the time involved, financial and investment behavior has been found to be similarly skewed (Eagly, 2009).

Net Worth, Income, and Homeownership Status

Higher equity ownership has been reported among individuals with higher income and wealth (Faff et al., 2011; Gibson et al., 2013; Grable, 2000; Yao & Robert, 2008). Yao and Robert (2008) studied the level of non-financial assets was associated positively with higher equity ownership. Financial liabilities often affect equity ownership and existing research shows that an increase in income is associated with higher levels of risk tolerance, while income uncertainty appears to be associated with lower levels of risk tolerance (Grable, 2000). According to Turner and Seo (2007), homeownership is correlated to an array of investment aspects for individuals, this is because as households look to purchase a home, the features and amenities requested to fulfill their consumption needs require a large financial investment further causing a need for financial/investment advancements.

Risk Tolerance (or Risk-Willingness)

Risk tolerance, or the degree to which a person is willing to take risks, plays an important role in household allocation and asset decisions (Sung & Hanna, 1996). According to Gibson, Michayluk and Van de Venter (2013) financial risk tolerance is the level of discomfort individuals are willing to accept while positioning their current assets for future growth. Consequently, risk tolerance has broad implications for both individuals and their financial professionals (Faff et al., 2011). Financial or investment knowledge has been shown to be related positively to financial risk tolerance (Gibson et al., 2013; Grable, 2000; Grable & Joo, 1999; Yao & Hanna, 2005). According to the efficient market hypothesis (Fama, 1965; Samuelson, 1965), investors can expect higher investment returns when they take higher levels of risk.

Alternatively, investors who take lower levels of risk experience lower average returns. They may also have greater difficulty reaching their financial goals and building sufficient

retirement wealth because they are unlikely to invest in risky investment assets such as stocks (Yao & Hanna, 2005). Fisher and Yao (2017) found across their study that gender differences in financial risk-taking behavior was explained by gender differences within the individual determinants of financial risk tolerance and that the disparity does not results from the gender in and of itself. The study found that income uncertainty and net worth were the individual variables that moderated the relationship between gender and equity ownership (Fisher & Yao, 2017).

Recently, the Department of Labor (DOL) further updated their fiduciary policies surrounding an advisor's role in understanding the financial risk capability of their clients (Department of Labor, 2022). This fiduciary ruling requires most advisors to make personal recommendations that are in the best interest of the client, which require a deeper knowledge of that client's risk tolerance. According to Roszkowski and Grable (2005), financial advisors may not fully understand the financial risk tolerance of females because of an inability to communicate risk tolerance effectively, which could greatly mitigate and even harm the necessary level of their risk taking behavior. Based on this information, there is a need for financial professionals to better understand and assess an investor's risk tolerance, which has been difficult when profiling females in particular (Brooks et al., 2019; Charness & Gneezy, 2012; Gudmunson & Danes, 2011; Marinelli et al., 2017; Montford & Goldsmith, 2016; Wilmarth et al., 2015).

Summary – Literature Review

The study investigates if differences in financial literacy may explain the equity ownership gap between genders. Huston (2010) theorized that being able to accurately define and measure financial literacy would be essential to review the impact of programs as well as the

obstacles that hindered suitable financial decision-making. The framework is used both to provide a comprehensive definition of financial literacy, as well as indicate why gender differences in equity ownership exist.

Specifically, Huston's framework indicates that family/peer financial socialization and experiences are meaningful, with females being less likely to be exposed to financial socialization opportunities and conversations (Glenn, 2018; LeBaron et al., 2019; Shim et al., 2010). This study will define financial literacy more precisely by segmenting the term into financial knowledge, financial ability, and financial confidence, subsequently examining the mediating effects in the correlation between gender and equity ownership.

Chapter 3 - Methodology

The research utilized the National Financial Capability Study (NFCS) as well as the Survey of Consumer Finances (SCF) and focused only on respondents with non-retirement investments. By understanding how non-retirement investment accounts are managed, given significant opportunity to customize investments and make intentional financial decisions, the study clearly evaluated the mediating relationship financial literacy. Consequently, the use of two parallel datasets provided a robust investigation given slightly different available measurements evaluating the differences of equity ownership between males and females.

Survey 1: 2021 National Financial Capability Study (NFCS)

This research study utilized data from the 2021 National Financial Capability Study (NFCS) to perform structural equation modeling (SEM) on the variables of interest. The triannual dataset is completed by the FINRA Investor Education Foundation. The NFCS is representative of the U.S. with national, regional, and state weights in terms of age, gender, ethnicity, and education. The 2021 NFCS was comprised of 27,118 adults (18 years or older) with approximately 500 respondents from each state and the District of Columbia. Beginning in 2009, this survey was designed to institute standard indicators of America's financial capability. The self-administered online questionnaire ran from June 2021 to October 2021 and examined multiple financial topics. The survey utilized non-probability quote sampling and offered incentives in exchange for the respondent's contribution.

Although the original NFCS sample included 27,118 respondents, this study is focused on equity ownership, gender, and financial literacy; therefore, the sample is reduced to the 2,824 respondents that have investments outside of their retirement accounts to pinpoint particular and intentional investment decisions, such as equity ownership for the mediation model. These

respondents are also the primary or joint decision makers in their households, who have responsibility for making investment decisions for their household. This sample subset is known as the "Investors Survey" within the NFCS. These investors were asked several clarifying questions regarding their investment holdings outside of their retirement assets (Lin et al., 2022)

Survey 2: 2019 Survey of Consumer Finances (SCF)

The remaining data was comprised of the 2019 Survey of Consumer Finances (SCF) to perform structural equation modeling (SEM) on the variables of interest, which is a nationally representative sample for the U.S. This triennial survey is sponsored by the Federal Reserve Board with the cooperation of the Department of the Treasury and is a cross-sectional survey of U.S. families. The sample consisted of 5,777 respondent households, after six were removed from the public data due to potential disclosure avoidance (Federal Reserve Board, 2022). Multiple imputation techniques were utilized to account for missing data and to ensure respondent privacy. Five implicates were computed independently for a total of 28,885 observations. The SCF involves a known sampling error; however, because the sample design details cannot be released as well as the complexity of the sample design, users are unable to use standard variance estimation procedures, and bootstrap techniques are utilized independently for each replicate (Federal Reserve Board, 2022).

Although the original SCF sample included 5,777 respondents (or 28,885 observations with implicates), this study focused on equity ownership, gender, and financial literacy; therefore, the sample was reduced to 20,183 respondent observations (or 4,037 total respondents when factoring the implicates) that have brokerage accounts, public stock accounts and/or managed investment accounts outside of their retirement assets to pinpoint particular and intentional investment decisions, such as equity ownership for the mediation model.

Operationalization of Concepts: Exogenous (Predictor) Variable

Gender

This study examined gender through the lens of Huston's (2010) theoretical concept of financial literacy. Within the realm of *other influences*, Huston (2010) described family, peer, and community influences as elements that can affect financial behaviors. With this in mind, family financial socialization and gender roles will be explored throughout the study. The survey questions for the NFCS and SCF are compared below.

NFCS Question: Do you describe yourself as a man, a woman, or in some other way?

SCF Question: I am required to ask your sex.

Within the NFCS dataset, the respondent was asked their gender, and the responses were coded as dichotomous variables (0 = man, 1 = woman). Within the SCF, the surveyor was expected to record gender without asking, if possible, but if necessary to ask the respondent their sex and responses were coded dichotomously (0 = male, 1 = female).

Operationalization of Concepts: Mediating (Intervening) Variables

Mediation is the action where the effects of one variable are transmitted to another (Little, 2013). Mediation, in this study, meant that the relationship between gender and equity ownership is changed when adding financial literacy as an intervening variable. Throughout mediation analysis, an independent variable influences a dependent variable via multiple routes (Hayes, 2013).

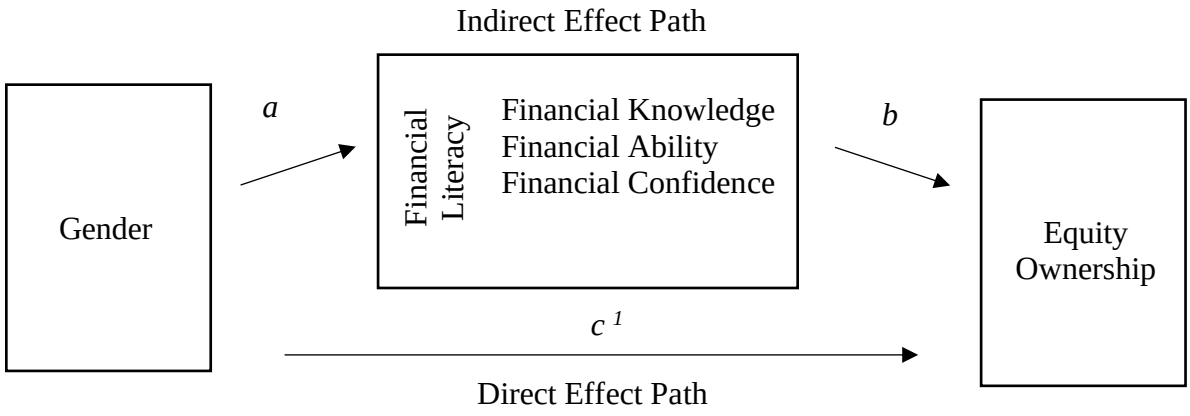
Huston's (2010) financial literacy framework suggests that full or partial mediation is possible between the given variables. For example, Figure 3.1 illustrates how financial literacy may mediate the relationship between gender and equity ownership. The *a* path represents the effect of

gender on financial literacy. The *b* path represents the effect of financial literacy on equity ownership. The c^1 path represents the direct effect of gender with equity ownership after intervening the mediating effect of financial literacy. The indirect effect of gender and equity ownership is represented with the path from *a* to *b.* Mediation occurs when the *ab* product term is significant, regardless of the significance or magnitude of the direct effect (i.e., the c^1 path) (Little, 2013). With gender adjacent to equity ownership within the financial literacy framework, it was expected that financial literacy would serve a mediating role.

To analyze this expected mediating relationship, the study utilized Structural Equation Modeling (SEM) after a complete Confirmatory Factor Analysis (CFA) was able to confirm the data's fit into the model. SEM does not describe a single statistical technique, rather it refers to a family of interrelated procedures and utilizing SEM can determine probabilistic causation (Kline, 2016).

Figure 3.1

Financial Literacy Mediation Framework



Financial Knowledge - NFCS

Financial knowledge was defined by Huston (2010) as the level of overall endowed and attained human capital pertaining specifically to personal finance. Financial knowledge (oftentimes referred to as objective financial knowledge) will be measured in the NFCS by utilizing the financial knowledge scale developed by Lusardi and Mitchell (2014) with six general financial knowledge questions (listed below) that include topics on savings interest rates, inflation, bond prices, loan interest rates, mortgage payments, and stock risk/returns. This scale, or a subset of it, has been utilized worldwide, including within many iterations of the NFCS as well as the Health and Retirement Study (HRS).

Financial Knowledge - SCF

Financial knowledge is frequently measured with questionnaires and true-false questions (Hastings et al., 2013; Lusardi & Mitchell, 2014). Financial knowledge within the SCF was measured utilizing a subset of the financial knowledge scale developed by Lusardi and Mitchell (2014) with three general financial knowledge questions, which include stock risk/returns, savings interest rates, and inflation, shown below. As previously mentioned, this scale has been utilized often throughout research as well as provided on many national datasets referring to finances in the U.S.

NFCS Questions:

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

2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

3. If interest rates rise, what will typically happen to bond prices?

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

5. Buying a single company's stock usually provides a safer return than a stock mutual fund.

6. Suppose you owe $1,000 on a loan and the interest rate you are charged is 20% per year compounded annually. If you didn't pay anything off, at this interest rate, how many years would it take for the amount you owe to double?

SCF Questions:

1. Do you think that the following statement is true or false: buying a single company's stock usually provides a safer return than a stock mutual fund?

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

3. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be

able to buy more than today, exactly the same as today, or less than today with the money in this account?

The NFCS model operationalized and measured financial knowledge as a latent variable that was comprised of the above six factors with binary response variables (0 = incorrect, 1 = correct) which combined had a range of 0-6 and a standardized Cronbach's alpha of 0.66. Respondents who did not provide an answer were coded as missing. Confirmation factor analysis was also reviewed and all six financial knowledge factors loaded well together with an Eigenvalue of 2.27 and factor pattern inputs between 0.44 – 0.72, discussed further below.

The SCF model operationalized financial knowledge as a latent variable scale with binary responses to the above questions (0 = incorrect, 1 = correct) which combined had a range of 0-3 and a standardized Cronbach's alpha of 0.40, lower than the alpha reported for the NFCS. Respondents who did not provide a response were coded as missing. Confirmation factor analysis was also reviewed, and all three financial knowledge factors loaded within acceptable measures with an Eigenvalue of 1.36 and factor pattern inputs between 0.59 – 0.73.

Financial Ability - NFCS

Financial ability was defined by Huston (2010) as the ability to apply the knowledge one has regarding personal finance. Financial ability is operationalized within the NFCS as the ability to make sound financial decisions by applying what an individual knows about finance. Financial ability will be operationalized utilizing a Likert scale question within the NFCS, asking respondents about their comfort level when making investment decisions, with one being *not comfortable at all* and ten being *extremely comfortable*. This NFCS variable has also been identified as perceived financial capability, financial responsibility, and day-to-day financial ability in past studies (Fan et al., 2022; Rothwell & Khan, 2014; Xiao, 2016).

Financial Ability - SCF

Financial ability was operationalized within the SCF as the ability to make sound financial decisions by applying what an individual knows about finance. Financial ability scales often include topics like cash management, credit/risk management, and general finance management ability (Kidwell et al., 2003). The latent variable for financial ability was operationalized utilizing three questions within the SCF, each asking respondents about their ability to deal with day-to-day financial matters. These questions ask survey participants to respond with a negative or positive answer regarding saving, budgeting, and investment abilities, shown below. Seven questions were originally reviewed for this scale, but after confirmatory factor analysis, just three were utilized within the model due to chi squared difference testing.

NFCS Question: I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses.

SCF Questions:

1. Which of the following statements comes closest to describing your (and your {husband/wife/partner}'s) saving habits?

   Positive Response: Save regularly by putting money aside each month.

2. Over the past year, would you say that your (family's) spending exceeded your (family's) income, that it was about the same as your income, or that you spent less than your income?

   Positive Response: Spending was less than income.

3. When making saving and investment decisions, some people search for the very best terms while others don’t. On a scale of

zero to ten is a great deal of searching, what number would you (and your {husband/wife/partner}'s) be on the scale?

Positive Responses: 7, 8, 9, & 10 (*A great deal of searching)

The NFCS model operationalized financial ability with an ordinal categorical scale (0 = strongly disagree, 7 = strongly agree, 98 = don't know, 99 = prefer not to say) which combined had a range of 0-7 after coding the limited 98/99 responses as missing.

The SCF model operationalized the latent variable of financial ability with a scale of binary response variables for each question; (1) when asked about savings habits, respondents who selected *saved regularly by putting money aside each month* were coded, 1 = higher financial ability, 0 = lower financial ability, (2) when asked whether spending exceeded income, respondents who answered *spending was less than income* were coded, 1 = higher financial ability, 0 = lower financial ability, and (3) when respondents were asked when making saving and investment decisions whether they searched for the very best terms with response options being -1 = *no searching* to 10 = *a great deal of searching,* responses were recoded into binary variables where responses 7-10 resulted in 1 = higher financial ability, 0 = lower financial ability. When combined, this three-question financial ability latent variable scale had a range of 0-3 and a standardized Cronbach's alpha of 0.49. Confirmation factor analysis was also reviewed, and all three financial knowledge factors loaded within acceptable measures with an Eigenvalue of 1.36 and factor pattern inputs between 0.59 – 0.73, discussed in more depth below. Originally the seven questions added ability measures like owning a checking account, adjustments to spending habits, and what would the respondent due in case of a financial

emergency, but the additional four questions did not load well with the questions that were more geared to savings activities and ultimately after a review of past literature (Marsden et al., 2011; Munnell et al., 2014; Yuh & Hanna, 2010), the study concluded the three questions and their corresponding responses listed above were sufficient in the search for an appropriate latent variable for financial ability.

Financial Confidence - NFCS

Financial confidence is expressed as having the assurance or conviction to use effectively one's financial knowledge and to act on financial decisions (Huston, 2010). There are some studies that refer to this construct as subjective financial knowledge (Henager & Cude, 2016; Riitsalu & Murakas, 2019; Tang & Baker, 2016). It was measured in the NFCS as an ordinal categorical variable utilizing a Likert scale question regarding how a respondent would self-assess their overall knowledge about finance, with 1 being *very low* and 7 being *very high*, shown below.

Financial Confidence - SCF

The SCF asked respondents to rate their knowledge about their personal finances on a scale from 0 to 10, where 0 is *not at all knowledgeable about personal finance* and 10 is *very knowledgeable about personal finance*. Previous studies have found that this measurement gives deep insights into gender differences in financial literacy and equity ownership. (Avdeenko et al., 2019; Riitsalu & Murakas, 2019; Tang & Baker, 2016).

NFCS Question:	On a scale from one to seven, where one means very low and seven means very high, how would you assess your overall financial knowledge?

SCF Questions: Some people are very knowledgeable about personal finances, while others are less knowledgeable about personal finances. On a scale from zero to ten, where zero is not at all knowledgeable about personal finance and ten is very knowledgeable about personal finance, what number would you (and your {husband/wife/partner}) be on the scale?

Confirmatory Factor Analysis (CFA): Financial Literacy - NFCS

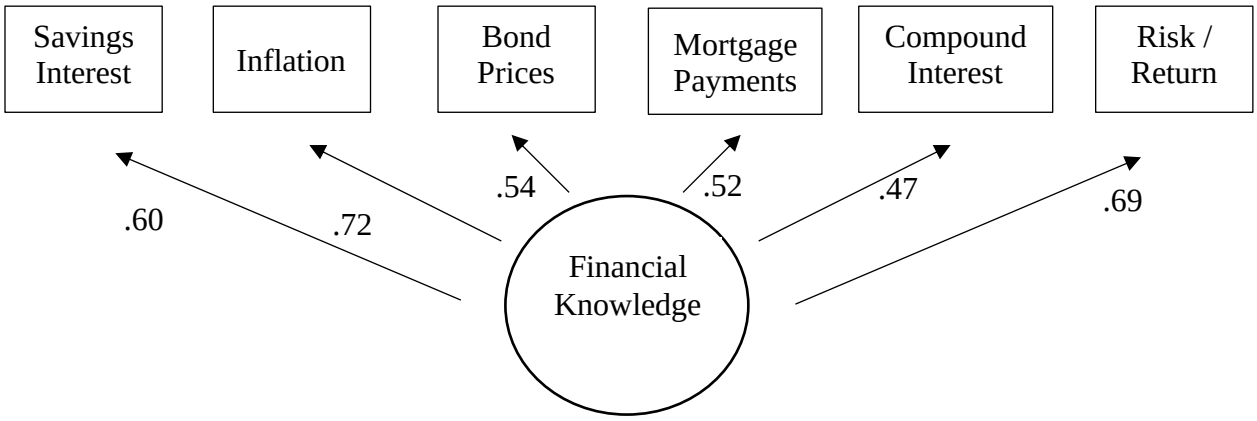
Confirmatory Factor Analysis (CFA) is used to ensure validity and reliability of a latent variable and determines how well each indicator loads with the latent variable. According to Kline (2016), CFA is a multivariate statistical procedure that is often used to test how well the measured variables represent the given constructs. To determine how well the data fits the model, the study defined the aforementioned variables as latent and observed variables.

A mediating (or intervening) variable of financial knowledge is a latent variable (denoted by a circle in Figure 3.2), which can only be inferred indirectly and is based in theoretical context. The observed variables (denoted by squares in Figure 3.2), which are actually measured in the study, include the 6 questions asked to respondents within the objective financial knowledge scale (Lusardi & Mitchell, 2014). All contributing factors for the financial knowledge construct were chosen based on the theoretical basis, the factor correlations as well as previous research within the body of knowledge (Lusardi & Mitchell, 2014; Odierna et al., 2015; Pertiwi et al., 2020). The latent variable constructs included the six financial knowledge questions concerning savings interest, inflation, bond prices, mortgage payments, compounding interest and risk/return (shown in Figure 3.2).

All six financial knowledge indicators loaded well together with an Eigenvalue of 2.14 and standardized factor loadings between 0.47 and 0.72 ($\alpha = .63$). According to Zwick and Velicer (1986), factors with an Eigenvalue greater than 1.0 should have more predictive power than any of the measured variables alone.

Figure 3.2

Financial Knowledge Confirmatory Factor Analysis – NFCS



Confirmatory Factor Analysis (CFA): Financial Literacy - SCF

A Confirmatory Factor Analysis (CFA) is included as part of the structural model to determine if the financial literacy mediation model fits the given SCF data. The CFA will ensure reliability and validity of the latent variable and is utilized to determine how well each indicator load with the latent variable. For the latent variable of financial knowledge, the study utilized three questions to respondents within the objective financial knowledge scale (Lusardi & Mitchell, 2014). For the latent variable of financial ability, the study utilized three questions to respondents within the financial ability scale (Kidwell et al., 2003).

The mediating (or intervening) variables of financial knowledge and financial ability were latent variables within the SCF, which can only be inferred indirectly and is based in

theoretical context, it is denoted by a circle in Figures 3.3 and 3.4. All contributing factors for the financial knowledge and financial ability constructs were chosen based on the theoretical basis, the factor correlations as well as previous research (Kidwell et al., 2003; Lusardi & Mitchell, 2014; Odierna et al., 2015; Pertiwi et al., 2020). The observed variables, denoted by squares in Figures 3.3 and 3.4, were specifically measured in the study and included; three questions within the objective financial knowledge scale (Lusardi & Mitchell, 2014), as well as three questions regarding the ability to deal with day-to-day financial matters (LeBaron, 2021).

All three financial knowledge indicators loaded well together with an Eigenvalue of 1.37 and standardized factor loadings between 0.59 and 0.72 ($\alpha = .40$). Also, all three financial ability factors load well together with an Eigenvalue of 1.39 and factor pattern, which utilizes standardized regression coefficients ($\alpha = .41$), that produced inputs between 0.55 and 0.74, which denoted more predictive power than any of the measured variables alone (Zwick & Velicer, 1986).

Figure 3.3

Financial Knowledge Confirmatory Factor Analysis – SCF

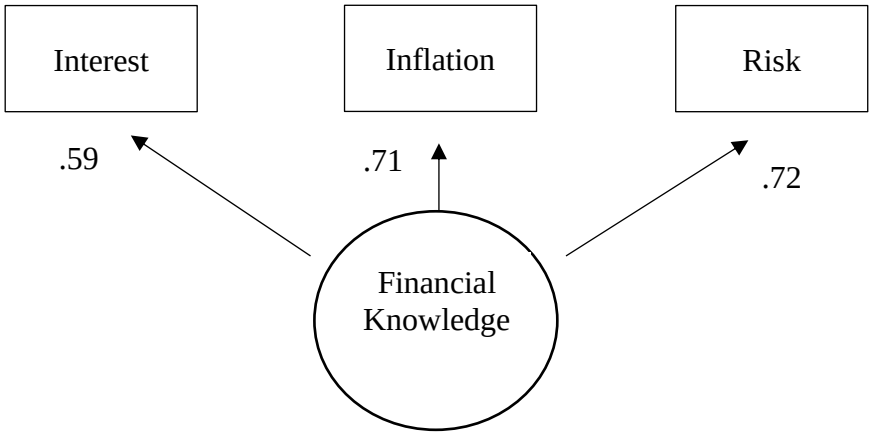
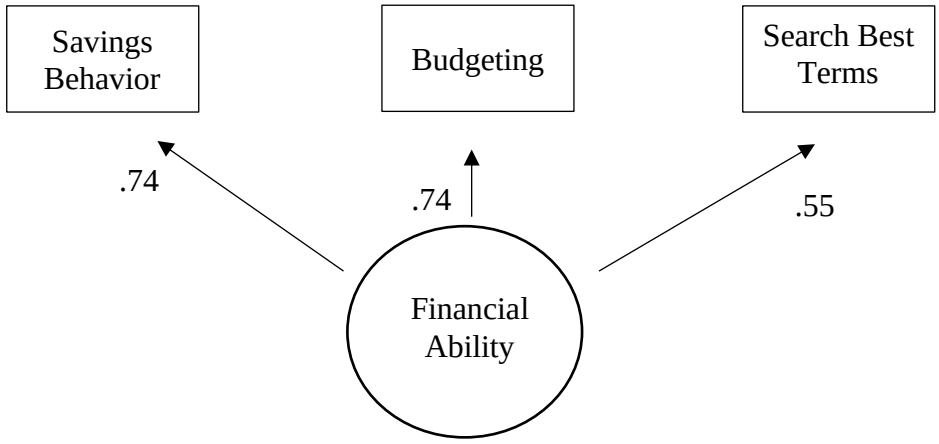


Figure 3.4

Financial Ability Confirmatory Factor Analysis – SCF



Operationalization of Concepts: Endogenous (Outcome) Variable

Equity Ownership - NFCS

Throughout the study, the endogenous variable was described as equity ownership. The National Financial Capabilities Study's (NFCS) Investor Survey includes questions around individual stock ownership and percentage of stock ownership. The outcome variable analyzed the respondent's level of stock ownership, as an ordinal categorical variable.

Equity ownership, or the respondent's level of stock ownership operationalized an ordinal variable for respondents that owned *greater the 50% stocks*, *less than 50% stocks* and those that *owned no stocks* in their non-retirement accounts. This study was interested in ownership of equity assets because it can add to overall financial success and help extend income requirements that occur with extended longevity expectations, often found in females based on their potentially prolonged lifespan.

Equity Ownership - SCF

The SCF asked respondents an array of investment behavior questions including ownership in percentage in publicly traded stock, percentage of money market funds with an allocation to equities, amount in brokerage accounts that can be used to purchase stocks, as well as percentage of stock held in mutual funds or exchange traded funds (ETFs). Based on the sample restrictions, this study only reviewed the stock ownership percentage in non-retirement accounts. This study utilized the overall percentage of equities across all non-retirement accounts, as a continuous variable, called *equity ownership*.

NFCS Question:	How much of your non-retirement portfolio is invested in stocks or mutual funds/ETFs that contain stocks? Responses: More than half, Less than half, None, Don't Know, Prefer not to say.
SCF Questions:	1a. Regarding Money Market / Savings Accounts: Do you (or anyone in your family living here) have any savings or money market accounts? 1b. What is the total value in these accounts? 1c. About what percent is in stocks? 2a. Regarding Publicly Traded Stock: Do you (or anyone in your family living here) own any stock which is publicly traded? 2b. What is the total market value of this stock? 3a. Regarding Brokerage Accounts: Do you (or anyone in your family living here) have a brokerage account that you can use for your purchase, or sale, of stocks and other securities? 3b. What is

the total dollar value of all the cash or call money accounts that you (and your family living here) have?

4a. Regarding Mutual Funds / Exchange Traded Funds (ETFs): Do you (or anyone in your family living here) have any mutual funds or hedge funds?

4b. What is the total market value of all of the mutual funds and ETFs that you (and your family living here) have?

4c. What is the total market value of all of the stock mutual funds and ETFs that you (and your family living here) have?

4d. What is the total market value of all of the combination funds and ETFs that you (and your family living here) have?

When comparing the two parallel datasets, the SCF had far more information regarding respondents' level of assets as well as their corresponding equity ownership. Within the NFCS, the equity ownership variable was coded merely as an ordinal scale, where 0 = *no stocks*, 0.25 = *less than half in stocks*, and 0.75 = *more than half in stocks*.

Within the SCF, equity ownership was able to calculate and measure the respondent's percentage of equities across their money market/savings accounts, individual publicly traded stock positions, as well as their stock allocation within mutual funds and ETFs. The study only wanted to evaluate non-retirement assets; therefore, pension, trust, IRA, and all other retirement plan values were not included and subsequently restricted from the sample.

Operationalization of Concepts: Control Variables - NFCS

There were several factors that needed to be controlled when analyzing gender and equity ownership. Previous research suggested that age (Bernheim et al., 2001), marital status (Yao & Hanna, 2005), race (Lusardi & Mitchell, 2014), education (Walstad et al., 2016), employment status (Brooks et al., 2019), net worth/income (Klein, 2007), homeownership status (Turner & Seo, 2007), and risk tolerance/risk-willingness (Deo & Sundar, 2015) were all factors that could affect the outcome variable of equity ownership (Xiao & Porto, 2017; Xiao, 2008). Within data from the 2021 NFCS, the demographic/descriptive characteristics that were controlled during the analysis are shown in Table 3.1.

Table 3.1

Descriptive Statistics – National Financial Capabilities Study (N=2,824)

	Frequency	Percent
Female	1,112	39.38%
Marital Status		
Married	1,869	66.18%
Single	521	18.45%
Divorced	284	10.06%
Widow	150	5.31%
Race		
White	2,276	80.59%
Other	548	19.41%
Age		
Age 18 - 34	294	10.41%
Age 35 - 44	356	12.61%
Age 45 - 54	364	12.89%
Age 55- 64	636	22.52%
Age 65+	1,174	41.57%
Homeowner	2,386	84.49%
Education		
High School or Less	288	10.21%
Some College	810	28.68%
Bachelor's Degree	1,076	38.10%
Graduate Degree	650	23.01%

	Frequency	Percent
Income		
Less Than $25k	153	5.42%
$25 - $50k	446	15.79%
$50k - $75k	556	19.69%
$75k - $100k	541	19.16%
$100k - $150k	654	23.16%
$150k+	474	16.79%
Employment		
Self Employed	228	8.07%
Full Time	1,057	37.43%
Part Time	196	6.94%
Other	196	6.95%
Retired	1,147	40.62%
Risk Tolerance		
Substantial	229	8.11%
Above Average	772	27.34%
Average	1,484	52.55%
No Risk	270	9.56%
No Response	69	2.44%

Operationalization of Concepts: Control Variables - SCF

The same factors mentioned above were controlled for when analyzing gender and equity ownership within the SCF. Previous research and provided theoretical framework concluded that age (Bernheim et al., 2001), marital status (Yao & Hanna, 2005), race (Lusardi & Mitchell, 2014), education (Walstad et al., 2016), employment status (Brooks et al., 2019), income (Klein, 2007), homeownership status (Turner & Seo, 2007), and risk tolerance/risk-willingness (Deo & Sundar, 2015) were all factors that could affect the outcome variable of equity ownership (Xiao & Porto, 2017; Xiao, 2008). Within data from the 2019 SCF, the demographic/descriptive characteristics that were controlled for during the analysis are shown in Table 3.2.

Table 3.2

Descriptive Statistics – Survey of Consumer Finances (N=20,183)

	Frequency	Percent
Female	7,769	38.49%
Marital Status		
Single Male	2,764	13.69%
Single Female	3,525	17.47%
Married	12,449	61.68%
Living with Partner	1,445	7.16%
Race		
White	15,873	78.65%
Black	1,716	8.50%
Hispanic	1,335	6.61%
Asian / Other	1.259	6.24%
Age		
Age 18 - 34	2,706	8.46%
Age 35 - 44	3,010	9.41%
Age 45 - 54	3,954	12.37%
Age 55- 64	4,624	14.45%
Age 65+	5,885	18.39%
Homeowner	12,744	63.14%
Education		
High School or Less	3,616	17.92 %
Some College	4,639	22.94%
Bachelor's Degree	5,964	29.55%
Graduate Degree	5,974	29.60%
Income		
Less Than $25k	6,874	34.06%
$25 - $50k	2,456	12.17%
$50k - $75k	2,155	10.68%
$75k - $100k	1,557	7.71%
$100k - $150k	2,271	11.25%
$150k+	4,870	24.13%
Employment		
Employed	14,063	69.69%
Unemployed	1,750	8.67%
Retired	4,370	21.65%
Risk Tolerance		
Low Risk	3,015	14.94%
Moderate Risk	7,569	37.40%
High Moderate Risk	7,889	39.09%
High Risk	1,710	8.47%

Analyses: Regression / Structural Equation Model

Existing literature supported the potential mediating role of financial literacy as the components of financial knowledge, financial ability, and financial confidence have been connected to gender and to equity ownership (Heo, Nobre, et al., 2016; Huston, 2010; Lusardi & Mitchell, 2014). Specifically, positive/higher financial literacy levels have been found to promote higher equity ownership allocations by helping individuals better understand their available financial options/choices (Lusardi & Mitchell, 2014; Riitsalu & Murakas, 2019). Alternately, lower financial literacy has been found to hinder one's investment behavior, thereby harming long term financial budgeting goals (Lusardi & Mitchell, 2014). However, gender is generally negatively correlated to both financial literacy measures and equity ownership (Deo & Sundar, 2015; Dwyer et al., 2002; Sachse et al., 2012); thus, Huston's (2010) financial literacy framework and empirical connections observed throughout previous literature suggests financial literacy is expected to mediate the relationship between gender and equity ownership.

This study employed ordinary least squares (OLS) regression, as well as generalized linear model (GLM) regression prior to completing a full Structural Equation Model (SEM) for robustness in statistical analyses. The regression analyses were reviewed for the first three hypotheses, with SEM strengthening the overall statistical power for each hypothesis. Each type of regression model was prepared utilizing SAS® University Edition (SAS Institute Inc, 2023) and the outcome variable determined the type of regression method used. The SEM model was completed utilizing Mplus 8.4 (Muthén & Muthén, 2023) and was enhanced with the use of bootstrapping in order to account for measurement error associated with the social sciences constructs and to investigate the potential for the aforementioned mediating variables (Kline, 1998). The bootstrap method, or resampling, works to correct non-normality of the sampling

distribution with many new samples being created from the data by random selection of cases with replacement (Kline, 2016). A Confirmatory Factor Analysis (CFA) was included as part of the structural model to determine if the financial literacy mediation model fit the data. Huston's (2010) conceptual model provided the theoretical framework to guide the configuration for the structural component of the SEM. The main data files were prepared utilizing SAS® University Edition (SAS Institute Inc, 2023) for both datasets. Data was then be read into Mplus 8.4 (Muthén & Muthén, 2023) by transferring the SAS® data file (SAS Institute Inc, 2023) to a comma delimited file.

Compare and Contrast Analyses

The analyses are identical in structural methodology utilizing regression then SEM to determine the analyses results, but they differ based on available variables within the two abovementioned datasets. The NFCS and SCF data files were prepared using SAS® University Edition (SAS Institute Inc, 2023) and converted to an Excel comma separated values (CSV) file in order for SEM to be conducted with MPlus version 8.4 (Muthén & Muthén, 2023). Due to the use of latent constructs, SEM was deemed the appropriate final method of analysis for this study.

By utilizing the parallel datasets, given those slightly different measurements available, it was expected that this study would provide a robust investigation of equity ownership differences between males and females. For example, the mediating and outcome variables (financial literacy and equity ownership) contrasted due to the slight differences in phrasing to respondents, shown throughout the sections above.

OLS regression evaluated the first hypothesis for both the SCF and NFCS, where gender was the independent variable and financial literacy, three continuous variables, were the dependent (outcome) variables. GLM regression and OLS regression analyzed hypothesis two

for the NFCS and SCF, respectively. With the independent variables of financial literacy and the dependent variable being equity ownership, the two datasets provided differing response variables, one being categorical, or ordinal, in nature (NFCS) and the other being continuous (SCF). GLM regression and OLS regression also was used to analyze hypothesis three for the NFCS and SCF, respectively. With the independent variable of gender and the dependent variable of equity ownership once more. Finally, to test the mediating relationship, SEM was utilized for hypothesis four and then reviewed for robustness for the first three hypotheses.

Summary

Huston's (2010) theoretical framework explored associations between gender, financial literacy, and equity ownership. A difference in financial literacy has been found between genders (Bannier & Neubert, 2016; Bannier & Schwarz, 2018) often due to family financial socialization (Glenn, 2018; LeBaron et al., 2019; Shim et al., 2010) which can lead to an imbalance in equity investments (Marinelli et al., 2017; Mountain et al., 2021). Previous research has found financial literacy to be negatively associated to the female gender (Lusardi & Mitchell, 2007) and positively associated to equity ownership (Faff et al., 2011; Grable, 2000; Heo et al., 2016). The proposed research aims to assist in identifying and exploring the anticipated mediating relationship of financial literacy between gender and equity ownership. The study employed both regression analysis and SEM to help identify and expound on the abovementioned relationships.

Chapter 4 - Findings and Results

Based on Huston's (2010) financial literacy framework, the study aimed to articulate an encompassing definition for financial literacy by expanding the term to include financial knowledge, financial confidence, and financial ability. Huston's framework was used both to provide a comprehensive definition of financial literacy as well as indicate why gender differences in equity ownership exist. Specifically, Huston's framework indicates that family financial socialization and experiences matter, with females being less likely to be exposed to financial conversations and development opportunities (Glenn, 2018; LeBaron et al., 2019; Shim et al., 2010). It was expected that differences in financial literacy were a result of these socialization differences (Bannier & Neubert, 2016; Bannier & Schwarz, 2018) and that including financial literacy as a mediating variable would help explain the imbalance in equity investments (Marinelli et al., 2017; Mountain et al., 2021).

To clearly identify these factors, produce robust results, and further the existing body of knowledge, the research identified and analyzed two national datasets: the National Financial Capability Study (NFCS) and the Survey of Consumer Finances (SCF). These datasets were used to show that there was a clear difference in financial literacy when analyzing males and females that is oftentimes due to family/peer financial socialization, which can lead to a lack of equity ownership for females that have non-retirement investments. Utilizing the NFCS and the SCF, the study analyzed non-retirement investments to keep any outside influence from employers from skewing the research results and to look at intentional decisions from respondents to clearly evaluate the expected mediating relationship.

Preliminary regression analysis as well as the Sobel test, or product-of-coefficients, were reviewed prior to SEM analysis to provide evidence of mediation effects. Preacher (2010) stated

that a variable may be considered a mediator to the extent to which it carries the influence of a given independent variable to a given dependent variable and warns that the test should only be used with large samples. The Sobel test calculates the critical ratio as a test of whether the indirect effect of the independent variable on the dependent variable via the mediator is significantly different from zero, shown below in Figure 4.1. The interactive calculation tool for mediation test, which works well only in large samples, assumes multivariate normality and sampling distributions of the total and indirect effects are normal.

Figure 4.1

Sobel Test Equation

$$Z = a*b/SQRT(b^2*s_a^2 + a^2*s_b^2)$$

Within the NFCS dataset, the independent variable of gender was regressed on the mediators of financial literacy, starting with financial knowledge, producing a raw (unstandardized) regression coefficient of -0.70 for the association between gender and financial knowledge as well as its standard error of 0.06. Then the independent variable of gender and the mediator of financial knowledge was regressed on the dependent variable of equity ownership, producing a raw (unstandardized) regression coefficient of 0.03 with its standard error of 0.00. The resulting Sobel test statistic of 6.85 was significant at $p < 0.01$. The second mediator of financial confidence was then reviewed, producing a Sobel test statistic of 1.248, $p < 0.01$. The final mediator of financial ability produced a Sobel test statistic of 0.60 but was not significant. The indirect effect of the independent variable on the dependent variable via the mediators' financial knowledge and financial confidence were significantly different from zero, but the

financial ability mediator did not produce significant results. Due to the partially significant results, this portion of the study was advanced to further analyze the potential mediating effects of the factors financial literacy on equity ownership.

Within the SCF dataset, the independent variable of gender was regressed on the mediators of financial literacy, starting with financial knowledge, which produced a raw (unstandardized) regression coefficient of -0.42 for the association between gender and financial knowledge and its standard error of 0.01. Next, the independent variable of gender combined with the mediator of financial knowledge was regressed on the dependent variable of equity ownership, which produced a raw (unstandardized) regression coefficient of 0.00 and its standard error of 0.00. The resulting Sobel test statistic of 21.11 was significant at $p < 0.001$. The second mediator of financial confidence was then reviewed, which produced a Sobel test statistic of 14.41, $p < 0.001$. The final mediator of financial ability produced a Sobel test statistic of 6.97, $p < 0.001$. The indirect effect of the independent variable on the dependent variable via the mediators were also significantly different from zero, due to these significant results, the study was advanced to further analyze the potential mediating effects of the factors of financial literacy on equity allocation.

Descriptive Statistics

Tables 3.1 and 3.2 provided summary statistics for the two parallel samples from the NCFS and SCF. The NFCS sample consisted of 2,824 respondents from the 2021 triennial wave, where the participants have investments outside of their retirement accounts. The SCF sample consisted of 20,183 observations from 2,036 respondents from the 2019 triennial wave.

The majority of the NFCS sample was male (61%), White (81%), married (66%), and over the age of 65 (42%). Also, respondents were 80% homeowners, 61% held a bachelor's

degree or higher, 40% of the sample made more than $100k/year, and 41% were retired. Based on the self-reported risk tolerance of the sample, the majority stated they had average risk tolerance (53%) or above average risk tolerance (27%).

The majority of the SCF sample was male (62%), White (79%), married (62%), and over the age of 65 (36%). Also, respondents were 63% homeowners, 59% held a bachelor's degree or higher, 35% of the sample made more than $100k/year, but 34% made less than $25k/year, 62% were employed full time, and 22% were retired, which were the main differences between the two datasets. Based on the self-reported risk tolerance of the sample the majority stated they had high moderate risk tolerance (39%) or moderate risk tolerance (37%).

Descriptive statistics for the mediating and endogenous variables are shown below in Table 4.1 and Table 4.2 for the NFCS followed by Table 4.3 for the SCF. Due to the difference in operationalized measurements across the parallel analyses, there was a distinct difference in measures and in particular, the dependent (endogenous) variable equity ownership, with the NFCS recording nearly 49% of participants recording *more than half* allocation to equities across non-retirement assets and the SCF had just slightly above 30% as a mean equity ownership allocation.

Table 4.1

Descriptive Statistics: Means – National Financial Capabilities Study (N=2,824)

	Mean	Min	Max	Standard Deviation
Financial Literacy				
Financial Knowledge	5.22	1	7	1.48
Financial Confidence	5.67	1	7	0.97
Financial Ability	6.36	1	7	1.02

Table 4.2

Descriptive Statistics: Equity Ownership – National Financial Capabilities Study (N=2,824)

	Frequency	Percent
Equity Ownership		
More than Half	1303.80	48.77%
Less than Half	836.02	31.27%
No Stocks	190.27	7.12%

Table 4.3

Descriptive Statistics: Means – Survey of Consumer Finances (N=20,183)

	Mean	Min	Max	Standard Deviation
Financial Literacy				
Financial Knowledge	2.48	1	3	0.34
Financial Confidence	7.72	0	10	0.84
Financial Ability	1.77	0	3	0.45
Equity Ownership				
Stock Amount	32.34%	0	100%	0.18

Bivariate Results

Pearson correlation coefficients on all key variables of interest were run within the NFCS as well as the SCF. As shown in Table 4.4, the female gender within the NFCS was negatively correlated with education ($r = -0.09$, $p < .001$), income category ($r = -0.12$, $p < .001$), financial knowledge ($r = -0.20$, $p < .001$), financial confidence ($r = -0.14$, $p < .001$), and equity ownership ($r = -0.07$, $p < .001$). Gender was positively correlated with risk tolerance ($r = 0.04$, $p < 0.05$), employment ($r = 0.05$, $p < 0.05$), and marital status ($r = 0.16$, $p < 0.001$).

Also shown in Table 4.4, the female gender within the SCF was significant in all listed variables of interest and was negatively correlated with risk tolerance ($r = -0.27$, $p < .001$), education ($r = -0.12$, $p < .001$), income ($r = -0.08$, $p < .001$), age ($r = -0.03$, $p < .001$), marital status ($r = -0.24$, $p < 0.001$), homeownership ($r = -0.14$, $p < .001$), financial knowledge ($r =$

-0.27, p < .001), financial confidence (r = -0.14, p < .001), financial ability (r = -0.15, p < .001), and equity ownership (r = -0.23, p < .001). Gender was positively correlated with race (r = 0.06, < .001) and employment (r = 0.10, p < .001). For complete bivariate correlations to the female gender, see Table 4.4.

Table 4.4

Preliminary Correlation Coefficients among Variables of Interest and the Female Gender Within the NFCS (N = 2,824) and SCF (N = 20,183)

Variables	NFCS	SCF
Risk Tolerance	0.04*	-0.27***
Race	0.03	0.06***
Age	0.03	-0.03***
Homeownership	-0.01	-0.14***
Education	-0.09***	-0.12***
Income	-0.12***	-0.08***
Employment	0.05*	0.10***
Marital Status	0.16***	-0.24***
Financial Knowledge	-0.20***	-0.27***
Financial Confidence	-0.14***	-0.14***
Financial Ability	-0.02	-0.15***
Equity Ownership	-0.07**	-0.23***

*$p < .05$ **$p < .01$ ***$p < .001$ (two-tailed)

Measurement Model

Three latent variables were created to measure financial knowledge and financial ability across the two datasets. Prior to running the full structural model, a measurement model was employed using Mplus 8.4 (Muthén & Muthén, 2023) to test factor loadings and model fit for each dataset. Confirmatory factor analyses (CFA) conducted within both datasets with individual items to determine how those factors were correlated with the constructs they were intended to represent, by using the fixed factor method of scale setting. Setting the scale to one allows for the

relationship between latent factors to be estimated in a standardized metric, as well as for the estimates between latent constructs to be interpreted as correlations (Little, 2013). All factor loadings for both the NFCS and the SCF datasets were above 0.40, as shown in Table 4.5.

As mentioned above, within the NFCS dataset, the financial knowledge CFA found all six provided factors loaded well together with an Eigenvalue of 2.14. Within the SCF dataset, the financial knowledge CFA found all three factors loaded sufficiently with an Eigenvalue of 1.37 and the financial ability CFA showed all three factors also fit with a satisfactory Eigenvalue of 1.39. Each of the CFAs exhibited strong factor loadings and were significant ($p < 0.001$). The full structural model was then run considering that the CFAs and model fit were deemed satisfactory, further examined below (Kline, 2016).

Table 4.5

Standardized Factor Loadings for Latent Variables within the NFCS (N = 2,824) and SCF (N = 20,183)

Variables	NFCS	SCF
Financial Knowledge		
Savings Interest	0.60	0.59
Inflation	0.72	0.71
Bond Prices	0.54	-
Mortgage Payments	0.52	-
Compounding Interest	0.47	-
Risk / Return	0.69	0.72
Standardized Alpha	0.66	0.40
Financial Ability		
Savings Behavior	-	0.74
Budgeting	-	0.74
Savings Account	-	0.55
Standardized Alpha	-	0.49

Model Fit

To test model fit statistics, Mplus 8.4 was used to analyze the unconstrained model chi-square test of model fit, standardized root mean square residual (SRMR), the root mean square error of approximation (RMSEA), Tucker Lewis index (TLI), and the comparative fit index (CFI). Values of less than .05 for SRMR and RMSEA indicated excellent model fit (Kline, 2016; Kline, 1998), while values of .95 or greater for TLI and CFI were considered excellent for model fit (Kenny, 2015). This model was adequate, while only marginally fit to the data within the NFCS ($\chi 2$ [20] = 517.75, $p < .0001$; CFI = 0.70; TLI = 0.38; RMSEA = 0.09; SRMR = 0.07), whereas the SCF model was a better fit ($\chi 2$ [1] = 115.20, $p < .0001$; CFI = 0.99; TLI = 0.37; RMSEA = 0.08; SRMR = 0.01).

Regression / Structural Equation Model Results

Initial data coding was completed in SAS University Edition (SAS Institute Inc, 2023) then OLS and GLM regression was completed prior to conducting the full SEM model. Within SAS University edition, PROC REG was utilized when the dependent variable was a continuous variable (financial literacy variables in both the NFCS and SCF, equity ownership in the SCF) and PROC GLM was utilized for the categorical, or ordinal, variable (equity ownership for the NFCS). The structural equation model (SEM) was conducted via Mplus 8.4 (Muthén & Muthén, 2023) to investigate the mediating effect of financial literacy on gender and equity ownership. Mplus 8.4 was used to test the full structural equation model and to model the mediating effects of the financial literacy variables (Muthén & Muthén, 2023).

Full information maximum likelihood (FIML) was used to estimate missing data within the NFCS data, rather than deleting cases with missing data. FIML is different from multiple imputation, used within the SCF dataset, in that missing values are not imputed but rather FIML

considers all available information (e.g., variances, covariances and means) in order to provide maximum likelihood estimates of the parameters (Acock, 2005). FIML has been shown to provide more reliable and less biased information via the obtained parameter estimates, when compared to listwise or pairwise deletion (Acock, 2005). Bootstrapping using standard errors is the most highly recommended method of testing mediation, which is the method this research utilized (Briggs, 2006; Preacher & Hayes, 2004; Shrout & Bolger, 2002).

Results: Summarized Hypotheses

As mentioned above, the following summarized hypotheses were tested throughout the study. The comparative results between the NFCS and the SCF are also summarized below in Table 4.6.

H_1 Females have lower levels of financial literacy (*a*. knowledge, *b*. confidence and *c*. ability)

H_2 Financial literacy (*a*. knowledge, *b*. confidence and *c*. ability) is positively associated to equity ownership

H_3 Females are less likely to exhibit equity ownership

H_4 Financial literacy (*a*. knowledge, *b*. confidence and *c*. ability) mediates the relationship between gender and equity ownership.

Table 4.6

Summarized Hypothesized Conclusions NFCS (N = 2,824) and SCF (N = 20,183)

Hypothesis	NFCS	SCF
H_1	Partially Supported	Supported
H_{1a}	Supported – Negative Relationship	Supported – Negative Relationship
H_{1b}	Supported – Negative Relationship	Supported – Negative Relationship
H_{1c}	Not Supported	Supported – Negative Relationship
H_2	Partially Supported	Partially Supported
H_{2a}	Supported – Positive Relationship	Not Supported
H_{2b}	Not Supported	Supported – Positive Relationship
H_{2c}	Not supported	Supported – Positive Relationship
H_3	Supported Supported – Negative Relationship	Supported Supported – Negative Relationship
H_4	Partially Supported	Partially Supported
H_{4a}	Supported – Mediated Relationship	Supported – Mediated Relationship
H_{4b}	Not Supported	Supported – Mediated Relationship
H_{4c}	Not Supported	Supported – Mediated Relationship

H1 – Univariate / OLS Regression Analysis

Hypothesis one compared the financial literacy of two independent groups, males and females. An unpaired sample T-Test for the NFCS found that the null hypothesis could be rejected, with significance of $p < 0.001$ for two of the three financial literacy variables: financial knowledge and financial confidence but found that financial ability was not significantly different between males and females. This test assumed the sample was representative and randomly sampled from the population and that the data is normally distributed with equal variance when the standard deviations are approximately equal. The unpaired sample T-Test for

the SCF found that the null hypothesis could be rejected, with significance of $p < 0.001$ for all three financial literacy variables: financial knowledge, financial confidence, and financial ability.

While testing via OLS regression for the NFCS, when compared to male respondents, female respondents had significantly lower levels of financial knowledge. When comparing females to males regarding financial confidence, females also had significantly lower levels of financial confidence, $p < 0.0001$ and holding all else constant. Gender was not significant in determining financial ability within the NFCS, as shown in Table 4.7.

While testing via OLS regression for the SCF, female respondents, when compared to male respondents, had significantly lower levels of financial knowledge. Females also had lower levels of financial confidence when compared to males, at $p < 0.01$ significance level, holding all else constant. Finally, unlike the NFCS, females within the SCF had lower levels of financial ability when compared to males at a significance level of $p < 0.001$, also shown in Table 4.7.

Table 4.7

H1 - OLS Regression Model in NFCS (N = 2,824) and SCF (N = 20,183)

Parameter Estimate	NFCS		SCF	
	β	SE	β	SE
Control Variables				
Financial Knowledge				
Race	-0.24**	.06	-.10***	.01
Age	0.23***	.02	.00***	.00
Education	0.16***	.02	.18***	.00
Marital Status	.02	.02	-.06***	.01
Work Status	.02	.01	-.02***	.01
Home Ownership	-.00	.00	.17***	.01
Income	.08***	.02	.00**	.00
Risk Tolerance	-.01***	.00	.09***	.01

Parameter Estimate	NFCS		SCF	
	β	SE	β	SE
Financial Ability				
Race	-.22***	.05	-.03**	.01
Age	.11***	.02	.00	.00
Education	.03*	.01	.07***	.01
Marital Status	.02	.02	-.05***	.01
Work Status	.01	.00	-.08***	.01
Home Ownership	-.00	.00	.12***	.02
Income	.07***	.01	.01***	.00
Risk Tolerance	-.00	.00	.22***	.01
Financial Confidence				
Race	-.11*	.05	-.12***	.01
Age	.04*	.02	.02***	.00
Education	.02	.01	.15***	.01
Marital Status	.02	.02	-.29***	.01
Work Status	.01	.01	.02	.01
Home Ownership	-.00	.00	.39***	.03
Income	.08***	.01	-.01**	.00
Risk Tolerance	-.00*	.00	.46***	.02
Model Variables				
Gender				
Financial Knowledge	-.64***	.05	-.25***	.01
Financial Ability	-.02	.04	-.10***	.01
Financial Confidence	-.25***	.04	-.08**	.03

*$p < .05$ **$p < .01$ ***$p < .0001$

H2 – OLS Regression Analysis / GLM Regression Analysis

To test hypothesis two, the study employed generalized linear regression (GLM) for the NFCS dataset and OLS regression for the SCF dataset to find whether the components of

financial literacy predicted equity ownership across the two samples. Within the NFCS sample, the dependent variable (*stock amount*) was considered an ordinal variable with three levels (*no stocks, less than half, and more than half*), which assumed the following: the sample had independent observations, did not have multicollinearity among independent variables, and showed no influential outlier observations. For the NFCS, respondents with higher financial knowledge were significantly more likely to own equities, at $p < 0.001$; but financial confidence and financial ability were not significant, as shown in Table 4.8.

For the SCF sample, the dependent variable (*overall non-retirement stock percentage*) was a continuous variable, which called for OLS regression to test the financial literacy independent variables (*financial knowledge, financial confidence and financial ability*). All three financial literacy variables were significant at $p < 0.001$ within the SCF including financial knowledge, financial confidence and financial ability. When compared to respondents with lower financial knowledge, those with higher financial knowledge were significantly more likely to own equities. Similarly, those with higher financial confidence, when compared to those with lower financial confidence were also more likely to own equities. Finally, in line with the other findings, respondents with higher financial ability, when compared to respondents with lower financial ability, were more likely to own equities at a $p < 0.001$ significance level, holding all else equal.

Table 4.8

H2 - GLM Regression Model in NFCS (N = 2,824) and OLS Regression Model in SCF (N = 20,183)

Parameter Estimate	NFCS		SCF	
	Type III SS	F Value	β	SE
Control Variables				
Equity Ownership				
Gender	.03	0.41	-.09***	.01
Race	.12	1.68	-.01**	.00
Age	.35*	4.79	.00***	.00
Education	.50**	6.69	.05***	.00
Marital Status	.03	.41	-.01**	.00
Work Status	.14	1.95	.01*	.00
Home Ownership	.02	.23	.02*	.00
Income	.48*	6.41	.01*	.00
Risk Tolerance	.22	3.04	.08***	.00
Model Variables				
Equity Ownership				
Financial Knowledge	5.09***	11.46	.04***	.00
Financial Ability	.14	.32	.01***	.00
Financial Confidence	.37	.08	.01***	.00

*$p < .05$ **$p < .01$ ***$p < .0001$

H3* – Univariate / *OLS Regression Analysis / GLM Regression Analysis

Hypothesis three compared females and males with regards to equity ownership. An unpaired sample T-Test for the NFCS found that the null hypothesis could be rejected, or that the two groups were significantly different ($p < 0.001$) regarding their responses for equity ownership. This test assumed that the sample was representative and randomly sampled from the

population and that the data was normally distributed with equal variance when the standard deviations were approximately equal. The unpaired sample T-Test for the SCF also found that males and females were significantly different ($p < 0.001$) in regard to equity ownership responses.

To test hypothesis three, the study first employed generalized linear regression (GLM) for the NFCS dataset and OLS regression for the SCF dataset to find whether gender predicted equity ownership across the two samples. For the NFCS, females held significantly less allocation to equities, when compared to males at $p < 0.01$, holding all else constant. Similarly, and as expected, across the SCF, gender was also significant at $p < 0.0001$ in determining equity ownership, as shown in Table 4.9.

Table 4.9

H3 - GLM Regression Model in NFCS (N = 2,824) and OLS Regression Model in SCF (N = 20,183)

Parameter Estimate	NFCS		SCF	
	Type III SS	F Value	β	SE
Control Variables				
Equity Ownership				
Race	.23	3.06	-.02***	.00
Age	.06	.77	.00***	.00
Education	1.24***	16.28	.06***	.00
Marital Status	.03	.38	-.02***	.00
Work Status	.05	.64	.01*	.00
Home Ownership	.01	.10	.03***	.01
Income	.74**	9.73	.00**	.00
Risk Tolerance	.39*	5.19	.10***	.00

Parameter Estimate	NFCS		SCF	
	Type III SS	F Value	β	SE
Model Variables				
Equity Ownership				
Gender	.51**	6.73	-.00***	.01

*$p < .05$ **$p < .01$ ***$p < .0001$

Direct Effects

When a mediator is hypothesized, the total effect is broken into two parts: the direct and indirect effect. The direct effect is the effect of exposure on the outcome absent the mediator; in this study, this was the association between gender and equity ownership. Hypothesis three tested this relationship and was supported in both the NFCS and SCF analyses, females were shown to significantly exhibit less equity ownership than their male counterparts.

Indirect (Mediating) Effects

The second part of the total effect, oftentimes referred to as the indirect effect, is the effect of exposure on the outcome that works through the mediator. Mediating variables establish *how* or *why* one variable predicts an outcome variable as well as how external physical events take on internal psychological significance (Baron & Kenny, 1986). The mediating function of the additional variable represents the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest. According to Shadish and Sweeney (1991), an independent variable causes the mediator, which then causes the outcome.

H4 – SEM Analysis Across the NFCS Dataset

Results for the NFCS did not provide complete support for hypothesis four, which stated that financial literacy mediated the relationship between gender and equity ownership. This finding was not expected, as existing literature provided empirical evidence supporting the

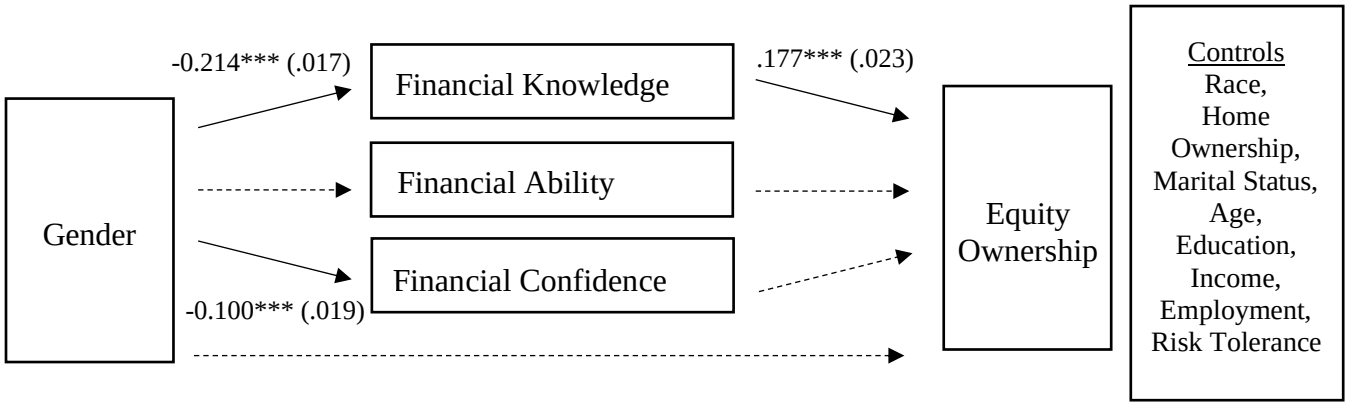
hypothesized direct relationship between gender and equity ownership (Bernasek & Shwiff, 2001; Grable & Lytton, 1999; Olsen & Cox, 2001) and the indirect relationship between gender and equity ownership when controlling financial literacy variables (Bannier & Neubert, 2016; Cupák et al., 2021).

Although the hypothesis was not completely supported for the NFCS, the study did provide interesting findings, as the significance of the financial literacy factor within the NFCS (*financial knowledge*) provided an indirect effect on the relationship between gender and equity ownership, meaning it should continually be included in future models and should not be omitted when looking at the relationship between gender and equity ownership. Also, because the significant relationship between gender and equity ownership became insignificant when factoring in financial knowledge, that literacy variable provided full mediation. Within the NFCS dataset, although financial ability and/or financial confidence were not significant, as previously suggested and hypothesized while employing Huston's (2010) framework, financial knowledge fully mediated the relationship between gender and equity ownership, providing meaningful results across the model.

Figure 4.2 depicts the full structural model for the NFCS study, with financial knowledge, financial confidence, and financial ability all regressed on the control variables. The NFCS model fit statistics indicated acceptable model fit ($\chi 2$ [20] = 517.75, $p < .0001$; CFI = 0.70; TLI = 0.38; RMSEA = 0.09; SRMR = 0.07). The SEM financial literacy model explained 7.8% of the variance in equity ownership ($R^2 = 0.078$, $SE = 0.01$, $p < 0.001$).

Figure 4.2

Full Structural Model for the Effects of Gender on Equity Ownership Across NFCS (n = 2,824) Respondents



Note: Standardized estimates. For clarity, the paths from the control variables are not shown, but were included in the analysis. Solid lines = significant paths; dashed lines = non-significant paths.
Model Fit Indices: $\chi^2(20) = 517.75$, $p < .0001$; CFI = .70; TLI = .38; RMSEA = .09 (confidence interval [.08, .10]); SRMR = .07).
*$p < .05$ **$p < .01$ ***p < .001 (two-tailed)

Table 4.10 reports the standardized and unstandardized results of the full structural model. The standardized results are discussed herein. Among the control variables, only risk (β = -0.19, $p < 0.001$) and education ($\beta = 0.05$, $p = 0.03$) were significantly related to equity ownership.

Table 4.10

Unstandardized, Standardized, and Significance Levels for NFCS Model in Figure 4.2

Parameter Estimate	B (SE B)	β (SE β)
Structural Model		
Gender → Equity Ownership	.00 (.01)	.00 (.02)
Gender → Financial Knowledge	-.65 (.05)	-.21 (.02)***
Gender → Financial Confidence	-.20 (.02)	-.10 (.02)***
Gender → Financial Ability	-.01 (.04)	-.01 (.02)
Financial Knowledge → Equity Ownership	.03 (.00)	.18 (.02)***
Financial Confidence → Equity Ownership	-.01 (.01)	-.02 (.02)
Financial Ability → Equity Ownership	.00 (.01)	.00 (.02)
Significant Controls		
Risk → Equity Ownership	-.07 (.01)	-.19 (.02)***
Education → Equity Ownership	.01 (.00)	.05 (.03)*
Age → Financial Knowledge	.26 (.02)	.25 (.02)***
Education → Financial Knowledge	.17 (.02)	.17 (.02)***
Race → Financial Knowledge	-.27 (.07)	-.07 (.02)***
Income → Financial Knowledge	.07 (.02)	.09 (.02)***
Age → Financial Confidence	.10 (.01)	.14 (.02)***
Race → Financial Confidence	-.10 (.05)	-.04 (.02)*
Income → Financial Confidence	.07 (.01)	.14 (.02)***
Age → Financial Ability	.13 (.01)	.01 (.02)***

Parameter Estimate		
	B (SE B)	β (SE β)
Education → Financial Ability	.03 (.02)	.04 (.02)*
Race → Financial Ability	-.22 (.05)	-.09 (.02)***
Income → Financial Ability	.06 (.01)	.11 (.02)***

Note: $\chi^2(20) = 517.75$, $p < .0001$; CFI = .70; TLI = .38; RMSEA = .09; SRMR = .07;
*$p < .05$ **$p < .01$ ***$p < .001$ (two-tailed)

Table 4.11 depicts the mediating effects of financial literacy from gender to equity ownership. Based on the findings from H3, shown above in Table 4.9 (where females were significantly different than males when predicting equity ownership), full mediation was supported for the financial knowledge mediating variable in the relationship between gender and equity ownership. Alternatively, financial confidence and financial abilities were not significant in the relationship between gender and equity ownership.

Table 4.11

H4 - Mediating Effects for NFCS Financial Literacy Model with Gender as Exogenous Variable, Financial Literacy as Mediators and Equity Ownership as Endogenous Variables. Bootstrap Analysis of the Magnitude and Significance of Mediating Pathways (Standardized Solution; N = 2,824)

Predictor	Mediator(s)	Outcome	β	CI	t-value
Gender →	Financial Knowledge →	Equity Ownership	-.04	-.03, -.02	-6.51***
Gender →	Financial Confidence →	Equity Ownership	.00	-.00, .00	0.95
Gender →	Financial Ability →	Equity Ownership	.00	-.00, .00	-0.05

Note: ** $p < .01$, *** $p < .001$ (two-tailed). Indirect paths tested with 2,000 bootstraps.
CI=95% confidence interval.

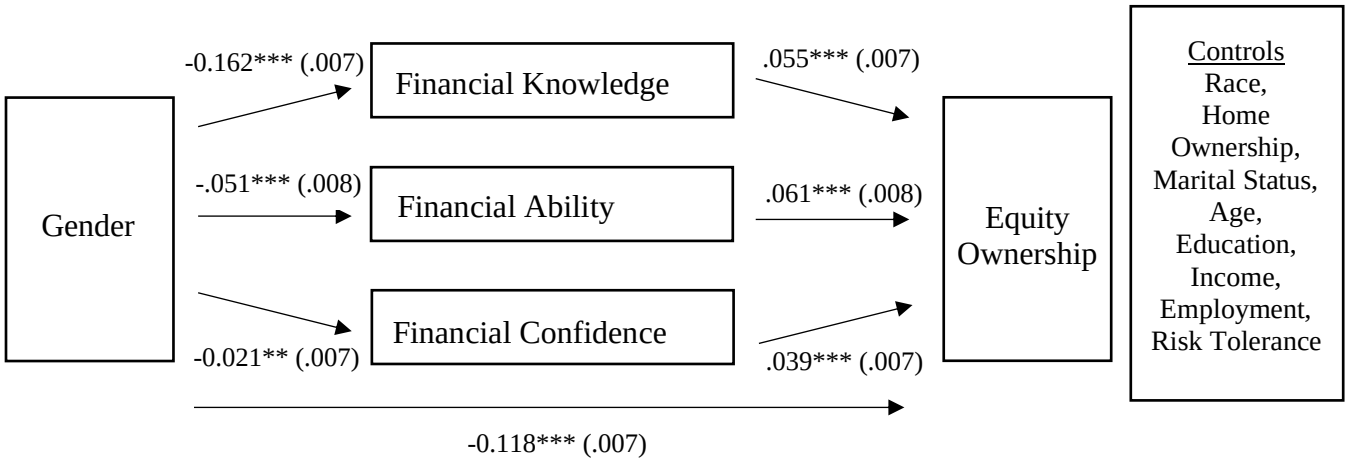
H4 – SEM Analysis Across the SCF Dataset

Within the SCF, all three financial literacy variables were significant to equity ownership (direct paths). Also, female to financial knowledge, financial ability and financial confidence were also signification (direct paths). As found in the NFCS, these variables should all be taken into consideration when evaluating gender and equity ownership, but additionally within the SCF dataset, each path from female to all three financial literacy variables (*financial knowledge, financial ability* and *financial confidence*) to equity ownership also provided significant mediation paths (indirect paths).

Within the SCF dataset, financial knowledge, financial confidence and financial ability all found partial mediation relationships as previously suggested and hypothesized while employing Huston's (2010) framework, as shown in Figure 4.3. Figure 4.3 depicts the full structural model for the SCF study, with financial knowledge, financial confidence, and financial ability all regressed on the control variables. The SCF model fit statistics indicated acceptable model fit ($\chi^2[1] = 115.20$, $p < .0001$; CFI = .99; TLI = .37; RMSEA = .08; SRMR = .009) and the SEM financial literacy model explained 14.4% of the variance in equity ownership ($R^2 = 0.144$, $SE = 0.00$, $p < 0.001$).

Figure 4.3

Full Structural Model for the Effects of Gender on Equity Ownership Across SCF (n = 20,183) Respondents



Note: Standardized estimates. For clarity, the paths from the control variables are not shown, but were included in the analysis. Solid lines = significant paths; dashed lines = non-significant paths.
Model Fit Indices: $\chi^2(1) = 115.20$, $p < .0001$; CFI = .99; TLI = .37; RMSEA = .08 (confidence interval [.06, .09]); SRMR = .009.
*$p < .05$ **$p < .01$ ***p < .001 (two-tailed)

Table 4.12 reports the standardized and unstandardized results of the full structural model. The standardized results are discussed herein. Among the control variables, risk (β = .13, p < 0.001), education (β = .14, p < 0. 001), age (β = .10, p < 0. 001), marital status (β = -.03, p < 0. 001), home ownership (β = .03, p < 0. 001), race (β = -.02, p < 0. 01), and income (β = .02, p < 0. 05), were all significantly related to equity ownership.

Table 4.12

Unstandardized, Standardized, and Significance Levels for SCF Model in Figure 4.2

Parameter Estimate	B (SE B)	β (SE β)
Structural Model		
Gender → Equity Ownership	-.12 (.09)	-.12 (.01)***
Gender → Financial Knowledge	-.25 (.01)	-.11 (.01)***
Gender → Financial Confidence	-.08 (.03)	-.06 (.01)**
Gender → Financial Ability	-.11 (.01)	-.05 (.01)***
Financial Knowledge → Equity Ownership	.01 (.00)	.06 (.01)***
Financial Confidence → Equity Ownership	.04 (.00)	.04 (.01)***
Financial Ability → Equity Ownership	.03 (.00)	.06 (.01)***
Significant Controls		
Risk → Equity Ownership	.07 (.00)	.13 (01)***
Education → Equity Ownership	.06 (.00)	.14 (.01)***
Age → Equity Ownership	.00 (.00)	.10 (.01)***
Marital Status → Equity Ownership	-.02 (.00)	-.03 (.01)***
Home Ownership → Equity Ownership	.02 (.01)	.03 (.01)***
Income → Equity Ownership	.00 (.00)	.02 (.01)*
Race → Equity Ownership	-.01 (.00)	-.02 (.01)**
Age → Financial Knowledge	.00 (.00)	.05 (.01)***
Home Ownership → Financial Knowledge	.17 (.01)	.11 (.01)***

Parameter Estimate		
	B (SE B)	β (SE β)
Race → Financial Knowledge	-.10 (.01)	-.03 (.01)***
Income → Financial Knowledge	.00 (.00)	.02 (.01)***
Risk Tolerance → Financial Knowledge	.09 (.01)	.10 (.01)***
Education → Financial Knowledge	.18 (.01)	.26 (.01)***
Marital Status → Financial Knowledge	-.06 (.01)	-.08 (.00)***
Work Status → Financial Knowledge	-.02 (.01)	-.03 (.00)***
Age → Financial Confidence	.02 (.00)	.13 (.01)***
Race → Financial Confidence	-.12 (.02)	-.06 (.01)***
Income → Financial Confidence	-.01 (.00)	-.03 (01)***
Education → Financial Confidence	.15 (.01)	.09 (.01)***
Marital Status → Financial Confidence	-.29 (.02)	-.14 (.01)***
Home Ownership → Financial Confidence	.39 (.03)	.10 (.01)***
Risk Tolerance → Financial Confidence	.46 (.02)	.10 (.01)***
Race → Financial Ability	-.03 (.01)	-.03 (.01)***
Education → Financial Ability	.08 (.01)	.08 (.01)***
Marital Status → Financial Ability	-.05 (.01)	-.04 (.01)***
Home Ownership → Financial Ability	.14 (.02)	.06 (.01)***
Risk Tolerance → Financial Ability	.25 (.01)	.20 (.01)***
Work Status → Financial Ability	-.08 (.01)	-.08 (.01)***
Income → Financial Ability	.02 (.00)	.08 (.01)***

Note: $\chi^2(1) = 115.20$, $p < .0001$; CFI = .99; TLI = .37; RMSEA = .08; SRMR = .009;
*$p < .05$ **$p < .01$ ***$p < .001$ (two-tailed)

Table 4.13 depicts the mediating effects of financial literacy from gender to equity ownership within the SCF dataset. Based on the findings from H3, shown above in Table 4.9 (where females were significantly different than males when predicting equity ownership), partial mediation was supported for all three financial literacy variables within the mediation model (financial knowledge, financial confidence and financial ability) for the relationship between gender and equity ownership.

Table 4.13

H4 - Mediating Effects for SCF Financial Literacy Model with Gender as Independent Variable, Financial Literacy as Mediators and Equity Ownership as Outcome Variables. Bootstrap Analysis of the Magnitude and Significance of Mediating Pathways (Standardized Solution; N = 20,183)

Predictor	Mediator(s)	Outcome	β	CI	t-value
Gender →	Financial Knowledge →	Equity Ownership	-.01	-.01, -.12	-7.99***
Gender →	Financial Confidence →	Equity Ownership	-.00	-.00, .00	-2.53*
Gender →	Financial Ability →	Equity Ownership	-.00	-.00, -.00	-4.99***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed). Indirect paths tested with 2,000 bootstraps. CI=95% confidence interval.

Chapter 5 - Discussions and Conclusions

Gender, Financial Literacy and Equity Ownership

From the lens of Huston's (2010) financial literacy framework, family financial socialization and experiences are substantial in a respondent's life, and therefore, affect behavioral outcomes for finance as well as other areas in life. Within this framework and ultimately the previously presented study, females were assumed to be less exposed to financial conversations and development opportunities (Glenn, 2018; LeBaron et al., 2019; Shim et al., 2010) resulting in potentially lower equity ownership behavior.

The current study tested whether financial literacy factors such as financial knowledge, financial confidence, and/or financial ability mediated the relationship between gender and equity ownership with U.S. respondents. This study was in line with research across other areas of the globe including Faff et al. (2011) where, in Australia, strong evidence was found that females differ from males in their attitude to financial risk taking behavior. Also, shadowing similar findings from Bannier and Schwarz (2018) where, in Germany, it was found that females with greater financial literacy (defined as actual and perceived financial knowledge) lead to higher wealth; whereas, males in Germany were due to higher confidence versus knowledge. Throughout studies in the U.S., females have been found to have lower equity allocations (Byrnes et al., 1999; Deo & Sundar, 2015; Hanna & Lindamood, 2008) as well as lower financial literacy levels (Bellofatto et al., 2018; Knoll & Houts, 2012; Marinelli et al., 2017).

Across the NFCS, being female was negatively related to whether a respondent had higher levels of financial knowledge (β = -.21, p < 0. 001), and higher levels of financial confidence (β = -.10, p < 0. 001), whereas higher levels of financial ability was not significantly different for genders. Also, having higher financial knowledge levels were positively related to

equity ownership (β = .18, p < 0. 001), but financial confidence or financial ability were not significantly related to equity ownership.

Across the SCF, being female was negatively related to whether a respondent had higher levels of financial knowledge (β = -.16, p < 0. 001), higher levels of financial confidence (β = -.02, p < 0. 01), and higher levels of financial ability (β = -.05, p < 0. 001). Also, having higher financial knowledge levels (β = .06, p < 0. 001), higher financial confidence levels (β = .04, p < 0. 001), and higher financial ability levels (β = .06, p < 0. 001) were all significantly and positively related to equity ownership.

As discussed in Chapter 4, in summary, full mediation was found from gender to financial knowledge to equity ownership (β = -.02, p < 0. 001), within the NFCS dataset and the overall model accounted for 7.8% of the variance. Partial mediation was found among all three financial literacy paths within the SCF; gender to financial knowledge to equity ownership (β = -.01, p < 0. 001), gender to financial confidence to equity ownership (β = -.00, p < 0. 05), and gender to financial ability to equity ownership (β = -.00, p < 0. 001), and the overall model accounted for 14.4% of the variance.

There were a number of control variables that afforded significant discussion, including the preliminary correlation coefficients among all control variables of interest. All of the variables included in the SCF model were significantly correlated with gender; whereas, in the NFCS only risk, education, income, employment, marital status, financial knowledge, financial confidence, and equity ownership were significant (leaving race, age, homeownership, and financial ability as insignificantly correlated with gender).

Also interesting, control variables were more significant when regressed on financial knowledge more so than financial ability or financial confidence in both the NFCS and the SCF.

When the independent variable is gender and the dependent variable is financial knowledge, five total control variables were significant across both the NFCS and SCF: race, age, education, income, and risk. Compared to just three control variables when gender was regressed on financial ability: race, education, and income.

Additionally, the regression for financial confidence that had four significant control variables: race, age, income, and risk, as shown in Table 4.3. When control variables were regression on equity ownership as the dependent variable, most intriguingly, the SCF produced much higher significance with all but one control variable (income) producing significant relationships, as shown in Table 4.4.

Contributions / Implications

Although direct paths and relationships were found between all variables of interest, the indirect (mediating) relationships could not be confirmed completely for both parallel datasets, as previous research expected. Based on prior literature, the study expected to further explain the relationship between gender and equity ownership by incorporating the mediating variable of financial literacy. The research was designed to build on the body of knowledge and add to the past literature by better defining the roles of financial literacy as well as comparing and contrasting two well-known national datasets with an array of investor insights. The results provide a great measure of relevant findings and adds a number of propositions for improvement. This analyses have potential implications for financial professionals, educators, policy makers, as well as any person(s) involved in the family or peer financial socialization of emergent adolescents.

Financial professionals should have a deeper understanding, particularly for female clients, of enhancing key components of financial literacy and evaluating the disparity the overall

perception of equity ownership. Financial knowledge was supported to be the most consistent factor of financial literacy in explaining the relationship between gender and equity ownership within the aforementioned model. Based on these statistically significant results, financial advisors and professionals have an urgent and immediate need to enhance their financial literacy involvement for those who are lacking, which based on the analysis includes a large subset of females, in order to great provide substantial advice and guidance. Without the involvement of enhancing financial literacy, the application of equity ownership may lack the needed allocation. Additionally, the proper profiling and intake information is important, where just taking surface-level profile information may not be sufficient, but rather drilling down to what a client knows of finance is imperative to future financial behaviors.

Educators, across both secondary and post-secondary professions, have an overwhelming need to increase general financial literacy, specifically in areas of financial knowledge. The findings of this study have strong explanatory power and vast coverage based on the parallel dataset analysis, nationally representative datasets, robust literature review, related theory, and vastness of significant relationships presented. As discussed, school-based financial literacy efforts should not only be performed via a formal educational context but also during relevant occupational searches, job training, college planning, soft skills and overall socialization education efforts.

Due to the aforementioned call for enhancements in national financial literacy within the U.S. as well as low scores when compared to our international counterparts, policy makers should continuously review a potential expansion of financial literacy. Outreach efforts and national financial literacy policy is in desperate need of development and improvement, based on the probabilistic causation of the study's findings, where the significant full mediating path (or

indirect path) exists from female to financial knowledge to equity ownership as well as partial mediation paths from female to overall financial literacy (knowledge, confidence, and ability) to equity ownership.

Those involved in the financial socialization of families and/or peers are also charged with these implications. This type of relationship may pertain to a parent, grandparent, aunt, uncle, friend, neighbor, colleague, mentor or just a friendly barber. When financial conversations are limited to a specific gender, race, age band, region, socioeconomic status, etc. those who are not part of the conversation suffer. Parents should teach both male and female children the importance of financial literacy; discussing budgeting, savings, interest, investment, assets/liabilities and instill the confidence to ask financial questions and seek the best information available.

The study provided multiple statistical methods and built on each test throughout the research; from univariate to correlations to regression to structural equation modeling. Although the statistical tests differed throughout the study, the results consistently told the same story and there is power within this consistency.

Limitations

Potential limitations for the proposed study include the cross-sectional nature of the dataset and therefore the lack of longitudinal data. While investment behavior is calculated based on the current survey findings, maintaining the data and following participants within a longitudinal study would provide for greater insights on whether incremental changes in the mediating variables of financial literacy exist. Additionally, experimental design and the use of primary data could be found valuable in future studies. Due to the cost of primary data, this study relied on the use of secondary data via nationally representative datasets.

Another potential limitation includes the potentially minimal overall utilization of equity ownership among the total samples. As noted in Tables 4.1 and 4.2, only a sub-set of the total sample reported the financial behavior of the equity ownership outlined in the study, further expanding on the need for heightened financial literacy across the nation. Within the NFCS, due to the actual values of equity ownership being unavailable, the dependent (endogenous) variable was limited to an ordinal categorical variable with three levels (*no stocks, less than half, and more than half*). Because of that limitation, the majority response of "*more than half*" consisted of 48.77% of the responses, which may have be inflated rather than if actual values were available/requested from participants. For the SCF sample, the dependent variable (*overall non-retirement stock percentage*) was a continuous variable with a number of excluded values (pensions, retirement plans, IRAs, Trusts) and reported a mean of 32.35%, which is likely closer to the actual target endogenous variable. Due to this discrepancy, the results for the SCF (which were more significant in terms of mediation across all financial literacy variables) are likely more appropriate than the results of the NFCS analysis due to limits on available variables within the dataset.

The model fit is also listed as a limitation with the study. As mentioned above, values of less than .05 for SRMR and RMSEA indicate excellent model fit (Kenny, 2015; Kline, 2016; Kline, 1998), while values of .95 or greater for TLI and CFI are considered exceptional for model fit (Kenny, 2015). This data was only a marginal fit to the model within the NFCS ($\chi 2$ [20] = 517.75, $p < .001$; CFI = 0.70; TLI = 0.38; RMSEA = 0.09; SRMR = 0.07), whereas the SCF model was a much better fit ($\chi 2$ [1] = 115.20, $p < .001$; CFI = 0.99; TLI = 0.37; RMSEA = 0.08; SRMR = 0.009). Chi-square difference tests were implemented to investigate the model

indices to attempt a better fit of the data to the model, but due to only marginally or insignificant changes, the presented model was the most appropriate available for the study.

Enhanced review of the effect of assets that are anticipated to pass from husband to wife in joint financial planning and the expectation of using those funds for longevity discrepancies could be pertinent and advantageous in future research. This type of research may require experimental design and primary data as noted above or potentially a longitudinal dataset where researchers could observe the change in variables to further relay findings.

Additional variables of interest that were not available were expected longevity and anticipation of inheritance, both of which would be of interest as control variables within an experimental model with primary data. Both expected longevity and inheritance expectations have been found to effect financial behaviors in past literature (Browning et al., 2016; Faff et al., 2011) and the review of those variables would be of interest and are therefore a limitation of the research.

Future Research

As mentioned in the limitations section, primary experimental data would be the next step in determining a causal relationship between gender and equity ownership. The creation of directed measurement scales/questions aimed at a higher standardized Cronbach coefficient alpha results for financial literacy factors would be the crucial goal of a primary data collection and analysis.

Also mentioned above, the addition of variables of interest would be possible with primary data (expected longevity and inheritance expectations) and would add to the analysis. Future research should also utilize longitudinal data, where available, to better factor a change in

financial knowledge, financial ability, and financial confidence over time. As with all cross-sectional analyses, the research is limited to the respondent's literacy at just one point in time.

Another factor that was listed as a limitation included the lack of continuous data for the dependent variable within the NFCS dataset. Future research with a defined retail net worth amount and therefore detailed equity exposure allocation would be helpful to employ. The given national surveys, although obtaining a lot of useful data, had generalized questions regarding each of the required variables in the study and a primary data driven analysis would generate more detailed conclusions.

Finally, due to a change in societal expectations/expressions of the term *gender*, the review and analysis of same-sex couples, gender identity, and transgender responses would also be of interest in future studies. There is much debate on whether utilizing the term *gender* as a binary variable (male/female) is still appropriate with the changing societal views on gender and gender identity (Eagly, 2009). As a result of this variation in society and cultural views, a detailed review and meta-analysis of changing societal definitions of gender would be relevant in future studies as well.

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Appendix A - SAS Code

NATIONAL FINANCIAL CAPABILITY SURVEY – SAS CODE

```
libname Diss"/home/u41073348/Dissertation";
run;

data Diss.NFCSInvest;
set NFCSINVEST;

data Diss.NFCSstate;
set NFCSSTATE;

run;

data diss.NFCScom;
merge diss.nfcsinvest diss.nfcsstate;
by NFCSID;

/*Investment Survey*/
if b14=1 then Investor=1; else Investor=0;

/*Investment Survey - Individual Stocks*/
if b2_1=1 then Stocks=1; else Stocks=0;
```

```
/*Investment Survey - Mutual Funds*/
if b2_3=1 then Funds=1; else Funds=0;

/*Investment Survey - ETFs*/
if b2_4=1 then ETFs=1; else ETFs=0;

/*Investor Survey - Stocks or MFs w/ Stocks*/
/* 98 and 99 is 0 since we do not know the correct answer */
StockAllocation=b11;
if StockAllocation=1 then MoreThanHalf=1; else MoreThanHalf=0;
if StockAllocation=2 then LessThanHalf=1; else LessThanHalf=0;
if StockAllocation=3 then NoStocks=1; else NoStocks=0;

/*DV - Investor Survey - Stocks or MFs w/ Stocks*/
/*Changing to ordinal*/
if nostocks=1 then stockamount=0;
if lessthanhalf=1 then stockamount=0.25;
if morethanhalf=1 then stockamount=0.75;

/*Investor Survey - RiskWillingNess*/
/* 98 and 99 is 0 since we do not know the correct answer */
risk=b10;
```

```
if risk=1 then SubstantialRisk=1; else SubstantialRisk=0;

if risk=2 then AboveAverageRisk=1; else AboveAverageRisk=0;

if risk=3 then AverageRisk=1; else AverageRisk=0;

if risk=4 then NoRisk=1; else NoRisk=0;


/* Objective Financial Knowledge */

/* 98 and 99 is 0 since cannot express they know the correct answer */

if m6=1 then compint=1; else compint=0;

if m7=3 then infl=1; else infl=0;

if m8=2 then bonds=1; else bonds=0;

if m9=1 then mort=1; else mort=0;

if m10=2 then stock=1; else stock=0;

if m31=2 then compound=1; else compound=0;


finknow = (compint +infl +bonds +mort +stock +compound);


/*Financial Knowledge*/

IF finknow=0 THEN objfinknow=1;

IF finknow=1 THEN objfinknow=2;

IF finknow=2 THEN objfinknow=3;

IF finknow=3 THEN objfinknow=4;

IF finknow=4 THEN objfinknow=5;

IF finknow=5 THEN objfinknow=6;
```

```
IF finknow=6 THEN objfinknow=7;

/* Financial Confidence */

if 1<= M4<=7 then subfinknow= M4;

/* Financial Ability */

if 1<= M1_1<=7 then finabl= M1_1;

/* Control Variables */

/* Gender */

if a50A=1 then female=0;

if a50A=2 then female=1;

/* Race- 99 treated as non-white */

race=a4a_new_w;

if race=1 then white=1; else white=0;

if race=2 then black=1; else black=0;

If race=3 then hispanic=1; else hispanic=0;

If race=4 then asian=1; else asian=0;

If race in (7,5,6,99) then other=1; else other=0;

/*Homeownership*/
```

```
home=ea_1;
If home=1 then homeownership=1; else homeownership=0;

/*Marital Status*/
marital=a6;
If marital=1 then married=1; else married=0;
If marital=2 then single=1; else single=0;
If marital in (3,4) then divorced=1; else divorced=0;
If marital=5 then widow=1; else widow=0;
If martial=99 then married='.' and single='.' and divorced='.' and widow='.';
/*99 is missing*/

/*Age*/
age=A3Ar_w;
if age in (1,2) then age1834=1; else age1834=0;
if age=3 then age3544=1; else age3544=0;
if age=4 then age4554=1; else age4554=0;
if age=5 then age5564=1; else age5564=0;
if age=6 then age65orOlder=1; else age65orOlder=0;
if age=99 or age='.' then age1834='.' and age3544='.' and age4554='.' and age5564='.' and
age65orOlder='.';
/*99 is missing*/
```

```
/* Education Level- 99 is missing */
education=A5_2015;
if education in (1,2,3) then lessthanhstohighschool=1; else lessthanhstohighschool=0;
if education in (4,5) then somecollege=1; else somecollege=0;
if education in (6) then college=1; else college=0;
if education in (7) then grad=1; else grad=0;
if education=99 or education='.' then lessthanhstohighschool='.' and somecollege='.' and college='.' and grad='.';

/*Education Level to a Categorical Variable, educationlevel, ranging from 1-5 */
IF lessthanhstohighschool=1 THEN educationlevel=1;
IF somecollege=1 THEN educationlevel=3;
IF college=1 THEN educationlevel=4;
IF grad=1 THEN educationlevel=5;

/* Income Ranges- 98 and 99 is missing*/
incomecat=A8_2021;
if incomecat in (1,2) then inc025=1; else inc025=0;
if incomecat in (3,4) then inc2550=1; else inc2550=0;
if incomecat in (5) then inc5075=1; else inc5075=0;
if incomecat in (6) then inc75100=1; else inc75100=0;
if incomecat in (7) then inc100150=1; else inc100150=0;
if incomecat in (8) then inc150=1; else inc150=0;
```

```
if incomecat=98 or incomecat=99 or incomecat='.' then inc025='.' and inc2550='.' and
inc5075='.' and inc75100='.' and inc100150='.' and inc150='.';

/*Income Ranges to a Categorical Variable, incomerange, ranging from 1-8 */
IF inc025=1 THEN incomerange=1;
IF inc2550=1 THEN incomerange=2;
IF inc5075=1 THEN incomerange=3;
IF inc75100=1 THEN incomerange=4;
IF inc100150=1 THEN incomerange=5;
IF inc150=1 THEN incomerange=6;

/* Employment Status 99 is missing */
employment=A9;
if employment in (2) then fulltime=1; else fulltime=0;
if employment in (3) then parttime=1; else parttime=0;
if employment in (1) then selfemployed=1; else selfemployed=0;
if employment in (8) then retired=1; else retired=0;
if employment in (4,5,6,7) then other=1; else other=0;
if employment=99 or employment='.' then fulltime='.' and parttime='.' and
selfemployed='.' and retired='.' and other='.';

/*Employment Status to a Categorical Variable, employmentstatus, ranging from 1-3 */
IF fulltime=1 THEN employmentstatus=1;
```

```
IF parttime=1 THEN employmentstatus=2;
IF selfemployed=1 THEN employmentstatus=3;

/*Weight*/
weight=wgt_n2;

run;

data diss.NFCScom;
set diss.nfcscom;
run;

PROC FREQ data=Diss.NFCSCom;
tables investor stocks funds StockAllocation
risk finknow subfinknow
female race age home education incomecat employment marital;
run;

*RESTRICT SAMPLE**************************************************;

data diss.NFCScom;
set diss.nfcscom;
WHERE b2_1 In (1,2,98,99);
```

```
run;

***DESCRIPTIVE TABLES**********************************************;

PROC FREQ data=Diss.NFCSCom;
TABLE Investor risk female race age home education incomecat employment marital;
TITLE 'Project Variables - Binary/Categorical – INVESTOR';
*WEIGHT wgt_n2;
run;

proc freq data=diss.NFCScom;
tables stocks funds StockAllocation
risk objfinknow subfinknow finabl stockamount
female race age home education incomecat employment marital;
TITLE 'Project Variables - Binary/Categorical - INVESTOR Weighted';
WEIGHT wgt_n2;
run;

proc corr data=diss.nfcscom alpha nomiss;
var investor risk female race age home education incomecat employment marital
objfinknow subfinknow finabl stockamount;
run;
```

```
*H1**********************************************;

proc means data=diss.NFCScom N MEDIAN MEAN STD MIN MAX;
where female=1;
var objfinknow subfinknow finabl;
run;

proc means data=diss.NFCScom N MEDIAN MEAN STD MIN MAX;
where female=0;
var objfinknow subfinknow finabl;
run;

PROC TTEST DATA=diss.NFCScom;
class female;
var objfinknow subfinknow finabl;
run;

proc reg data=diss.NFCScom;
model finknow subfinknow finabl = female
RACE AGE education
Marital employment
Home Incomecat risk;
run;
```

```
*H2**********************************************;

proc corr data=diss.NFCScom alpha nomiss;
var objfinknow subfinknow finabl;
with stockamount;
run;

proc corr data=diss.NFCScom alpha nomiss;
var objfinknow subfinknow finabl female marital race age home education incomecat
employment risk;
with objfinknow subfinknow finabl female marital race age home education incomecat
employment risk;
run;

proc univariate data=diss.NFCScom;
var stockamount;
histogram stockamount;
run;

proc glm data=diss.nfcscom;
class finknow subfinknow finabl;
model stockamount = finknow subfinknow finabl
```

```
female RACE AGE education

Marital employment

Home Incomecat risk;

run;

*H3**********************************************;


proc means data=diss.NFCScom N MEDIAN MEAN STD MIN MAX;

where female=1;

var stockamount;

run;


proc means data=diss.NFCScom N MEDIAN MEAN STD MIN MAX;

where female=0;

var stockamount;

run;


PROC TTEST DATA=diss.NFCScom;

class female;

var stockamount;

run;


proc glm data=diss.nfcscom;

class female;
```

```
model stockamount = female
marital race age home education incomecat employment risk;
run;
***H4/SOBEL TEST**********************************************************;

proc reg data=diss.nfcscom;
model finabl OBJfinknow subfinknow = female;
run;

proc glm data=diss.nfcscom;
class female;
model stockamount = female
finabl OBJfinknow subfinknow;
means female;
run;

*CFA*********************************************;

proc corr data=diss.nfcscom alpha nomiss;
var compint infl bonds mort stock compound subfinknow finabl;
run;

proc factor data=diss.nfcscom;
```

```
var compint infl bonds mort stock compound subfinknow finabl;
run;

proc corr data=diss.nfcscom alpha nomiss;
var finabl OBJfinknow subfinknow;
run;

proc factor data=diss.nfcscom;
var finabl OBJfinknow subfinknow;
run;

*TRANSFER TO
MPLUS**************************************************;

proc print data=diss.nfcscom;
var female marital race age home education incomecat employment risk
objfinknow subfinknow finabl
compint infl bonds mort stock compound
stockamount;
run;

data diss.nfcscom;
set diss.nfcscom;
```

```
keep female marital race age home education incomecat employment risk
objfinknow subfinknow finabl
compint infl bonds mort stock compound
stockamount;
run;

proc export data=DISS.nfcscom
outfile="/home/u41073348/Dissertation/nfcscom.sas7bdat"
dbms=xlsx;
sheet="NFCSCOM_XLSX";
RUN;
```

SURVEY OF CONSUMER FINANCES – SAS CODE

```
libname Diss "/home/u41073348/Dissertation";
run;

data SCF2019;
set Diss.SCF2019;

*Weight;
wt5=0.2;
nwgt=x42001/(22268.03*5);

*Age of Respondent / AgeSq of Respondent*****************************;
AGE1=X8022;
        If x8000=1 then respage=x19;else respage=x14;
        respagesq=respage*respage;

*Education of Respondent*********************************
X5931(#1)       What is the highest level of school completed or the highest
X6111(#2)       degree you have received?

            I'd like to ask you some questions about your (husband/wife/
            partner/spouse)'s background. What is the highest level of
```

school or the highest degree (he/she/he or she) completed?

1. *1st, 2nd, 3rd, or 4th grade
2. *5th or 6th grade
3. *7th and 8th grade
4. *9th grade
5. *10th grade
6. *11th grade
7. *12th grade, no diploma
8. *High school graduate - high school diploma or equivalent
9. *Some college but no degree
10. *Associate degree in college - occupation/vocation program
11. *Associate degree in college - academic program
12. *Bachelor's degree (for example: BA, AB, BS)
13. *Master's degree (for exmaple: MA, MS, MENG, MED, MSW, MBA)
14. *Professional school degree (for example: MD, DDS, DVM, LLB, JD)
15. *Doctorate degree (for example: PHD, EDD)

-1. *Less than 1st grade

0. Inap. (no spouse/partner);

if x8000=1 then respED=X6111; else respED=X5931;

if respED In (8,7,6,5,4,3,2,1,-1) then respHSorLess=1; else respHSorLess=0;

if respED in (9,10,11) then respSC=1; else respSC=0;

if respED=12 then respBS=1; else respBS=0;

if respED in (13,14,15) then respGRAD=1; else respGRAD=0;

If respHsorLess=1 then Edu=1;

If respsc=1 then edu=2;

If respbs=1 then edu=3;

If respgrad=1 then edu=4;

*Sex & Marital Status**********

*X8021(#1) CODE SEX WITHOUT ASKING. IF NECESSARY, SAY:

X103(#2) I am required to ask your sex.

X109(#3)

X115(#4) What is (your spouse's/your partner's/that person's) sex?

X121(#5)

X127(#6) 1. *MALE

X133(#7) 2. *FEMALE

X203(#8) 0. Inap. (/no further persons);

if x8000=1 then respsex=x103;else respsex=x8021;

respfemale=respsex-1;

if x8000=5 then relation=x8023; else if x8000=1 then relation=x105;

```
if respsex=1 and (relation in (3 4 5 6)) then singlemale=1; else singlemale=0;  *single
male;
if respsex=2 and (relation in (3 4 5 6)) then singlefemale=1; else singlefemale=0;  *single
female;

if relation=1 then married=1; else married=0; *married;
if relation=2 then partner=1; else partner=0; *partner;
If relation In (3, 4, 5, 6) then single=1; else single=0; *single;

if relation=1 then MaritalStatus=1;
if relation=2 then MaritalStatus=2;
If relation In (3, 4, 5, 6) then MaritalStatus=3;

*Dummy variables for race of respondent;
RACE=X6809;
  if race=-7 THEN RACE=4;
  if race=1 then white=1; else white=0;            *white;
  if race=2 then black=1; else black=0;           *black;
  if race=3 then hispanic=1; else hispanic=0;      *hispanic;
  if race=4 then asianother=1; else asianother=0;  *asianother;

***RISKWILLINGNESS**************************************************
*******
```

X7557 (SHOW CARD 2)

Some people are fully prepared to take financial risks when they save or make investments, while others try to avoid taking financial risks.

On a scale from zero to ten, where zero is not at all willing to take risks and ten is very willing to take risks, what number would you (and your {husband/wife/partner}) be on the scale?

-1. *NOT AT ALL WILLING TO TAKE FINANCIAL RISKS

1.

2.

3.

4.

5.

6.

7.

8.

9.

10. *VERY WILLING TO TAKE RISKS;

Recode the -1 response to 0;

IF x7557>0 THEN riskwillingness=x7557; ELSE riskwillingness=0;

```
if riskwillingness in (0,1,2) then lowriskwillingness=1; else lowriskwillingness=0;
if riskwillingness in (3,4,5) then modriskwillingness=1; else modriskwillingness=0;
if riskwillingness in (6,7,8) then highmodriskwillingness=1; else
highmodriskwillingness=0;
if riskwillingness in (9,10) then highriskwillingness=1; else highriskwillingness=0;

If lowriskwillingness=1 then riskscale=1;
If modriskwillingness=1 then riskscale=2;
If highmodriskwillingness=1 then riskscale=3;
If highriskwillingness=1 then riskscale=4;

/*Working status of respondent. Categories are Unemployed, Part-time, Full-Time, and
Retired*/
if x8000=1 then respworking=x5111; else respworking=x4511;
if respworking=1 then respft=1; else respft=0; *respondent full-time;
if respworking=2 then resppt=1; else resppt=0; *respondent part-time;

if x8000=1 then do;
        if x6678=7 then respretired=1; else respretired=0; *respondent retired;
        end;
if x8000=5 then do;
        if x6670=7 then respretired=1; else respretired=0;
```

end;

if respworking=0 and respretired=0 then respunemployed=1; else respunemployed=0; *respondent unemployed;

If respft=1 then workstatus=1;

If resppt=1 then workstatus=2;

If respretired=1 then workstatus=3;

If respunemployed=1 then workstatus=4;

Homeownership*******

X7052 NON-HOMEOWNERS:

Did you (or your husband/wife/partner) ever own your home in the past?

HOMEOWNERS:

Have you (or your [husband/wife/partner]) ever owned a home before this one?

1. *YES
5. *NO;

```
IF x7052=1 THEN HomeOwnership=1; else HomeOwnership=0;

***Income
In total, what was your (family's) annual income from
wages and salaries in 2018, before deductions for taxes and
anything else?
WE WANT TOTAL INCOME FOR THE YEAR, NOT MONTHLY INCOME;

income=X5702;

*Natural log of income;
if income > 0 then loginc=log(income);
else if income=0 then loginc=log(1);
else if income<0 then loginc=log(.01);

*Natural log of networth;
if networth > 0 then logNW=log(networth);
else if networth=0 then logNW=log(1);
else if networth<0 then logNW=log(.01);

*Imputation Variable for PROC MIANALYZE;
_Imputation_=Implic;
```

*****FINANCIAL CONFIDENCE******

*X7556 Some people are very knowledgeable about personal finances, while others are less knowledgeable about personal finances.

On a scale from zero to ten, where zero is not at all knowledgeable about personal finance and ten is very knowledgeable about personal finance, what number would you (and your {husband/wife/partner}) be on the scale?

-1. *NOT AT ALL KNOWLEDGEABLE ABOUT PERSONAL FINANCE

1.

2.

3.

4.

5.

6.

7.

8.

9.

10. *VERY KNOWLEDGEABLE ABOUT PERSONAL FINANCE;

Recode the -1 response to 0;

IF x7556>0 THEN FINCON=x7556; ELSE FINCON=0;

*****FINANCIAL KNOWLEDGE*****

The next three questions are about your opinion on money and investments.

X7558 Do you think that the following statement is true or false: buying a single company's stock usually provides a safer return than a stock mutual fund?

1. *TRUE
5. *FALSE
-2. Don't know
-3. Refused;

IF X7558=5 THEN SaferReturn=1; else SaferReturn=0;

*X7559 Suppose you had $100 in a savings account and the interest rate was 2% per year.

After 5 years, how much do you think you would have in the account if you left the money to grow: more than $102, exactly $102, or less than $102?

1. *MORE THAN $102
3. *EXACTLY $102
5. *LESS THAN $102
-2. Don't know
-3. Refused;

IF X7559=1 THEN Interest=1; else Interest=0;

*X7560 Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than today, exactly the same as today, or less than today with the money in this account?

1. *MORE THAN TODAY
3. *EXACTLY THE SAME AS TODAY
5. *LESS THAN TODAY
-2. Don't know
-3. Refused;

IF X7560=5 THEN Inflation=1; else Inflation=0;

NUMCORRECT= SaferReturn + Interest + Inflation;

FINANCIAL ABILITY**

X3015 X3016 X3017 X3018 X3019 X3020

Which of the following statements on this page comes closest
to describing your (and your {husband/wife/partner}'s) saving
habits?
X3015: *Don't save - usually spend more than income
X3016: *Don't save - usually spend about as much as income
X3017: *Save whatever is left over at the end of the month -no regular plan
X3018: *Save income of one family member, spend the other
X3019: *Spend regular income, save other income
X3020: *Save regularly by putting money aside each month
1. Checked
5. Not checked;

if X3020=1 then SaveOne=1; else SaveOne=0;

*X7510 Over the past year, would you say that your (family's)
spending exceeded your (family's) income, that it was about
the same as your income, or that you spent less than your income?

(Spending should not include any investments you have made.)

IF DEBTS ARE BEING REPAID ON NET, TREAT THIS AS SPENDING LESS THAN INCOME.

1. *SPENDING EXCEEDED INCOME

2. *SPENDING SAME AS INCOME

3. *SPENDING WAS LESS THAN INCOME;

If x7510=3 then SaveTwo=1; else SaveTwo=0;

*X7775 If tomorrow you experienced a financial emergency that left you unable to pay all of your bills, how would you deal with it? Would you borrow money, would you spend out of savings or investments, would you postpone paying bills, work more or get an extra job, or would you do something else?

1. *BORROW MONEY

2. *SPEND OUT OF SAVINGS/INVESTMENTS

3. *POSTPONE PAYMENTS

4. *CUT BACK

5. *WORK MORE/GET EXTRA JOB

-7. *OTHER

0. Inap. (spending exceeded income: X7510=1);

If x7775=4 then SaveFour=1; else SaveFour=0;

If x7775=5 then SaveThree=1; else SaveThree=0;

*X3502 Have you (or anyone in your family living here) ever had a checking account?

1. *YES

5. *NO

0. Inap. (R has a checking account: X3501=1;

If X3502=1 then Checking=1; else Checking=0;

*X6789 For the following two statements, please say whether you

agree strongly, agree somewhat, neither agree nor disagree,

disagree somewhat, or disagree strongly:

First, when the things that (I/my husband and I/my wife

and I/my partner and I) own *increase* in value, (I am/we

are) *more* likely to spend money.

1. *AGREE STRONGLY

2. *AGREE SOMEWHAT

3. *NEITHER AGREE NOR DISAGREE

4. *DISAGREE SOMEWHAT

5. *DISAGREE STRONGLY;

if x6789 in (4,5) then FinAbl1=1; else FinAbl1=0;

*X7492 Second, when the things that (I/my husband and I/my wife
and I/my partner and I) own *decrease* in value, (I am/we
are) *less* likely to spend money.

1. *AGREE STRONGLY

2. *AGREE SOMEWHAT

3. *NEITHER AGREE NOR DISAGREE

4. *DISAGREE SOMEWHAT

5. *DISAGREE STRONGLY;

if x7492 in (1,2) then FinAbl2=1; else FinAbl2=0;

*X7562 (SHOW CARD 3)
When making saving and investment decisions, some
people search for the very best terms while others don't.
On a scale from zero to ten, where zero is no
searching and ten is a great deal of searching, what number would you
(and your {husband/wife/partner}) be on the scale?

-1. *NO SEARCHING

1.

2.

3.

4.

5.

6.

7.

8.

9.

10. *A GREAT DEAL OF SEARCHING;

If X7562 In (7,8,9,10) then FinAbl=1; else FinAbl=0;

FinancialAbility = SaveOne + SaveTwo + FinAbl;

*******DV QUESTION OPTIONS**********

MONEY MARKET / SAVINGS ACCOUNTS

---

*X3727 Do you (or anyone in your family living here) have any savings or money market accounts? These could be traditional savings accounts, Coverdell or 529 education accounts, Christmas Club accounts, or any type of savings or money market account I have not already recorded.

1. *YES

5. *NO;

If X3727=1 then MMK=1; else MMK=0;

*<MMT HOW INVESTED X7074=1,3 How is the money in this account invested? Is it all

in stocks, all in interest-earning assets, is it split between these, or something else?

PERCENT STOCKS X7075 X7078 X7081 X7084 X7087 X7090

HOW MUCH X3765>;

IF x3730>0 THEN MMKTOTALAMT1=x3730; ELSE MMKTOTALAMT1=0;

IF X3736>0 THEN MMKTOTALAMT2=X3736; ELSE MMKTOTALAMT2=0;

IF X3742>0 THEN MMKTOTALAMT3=X3742; ELSE MMKTOTALAMT3=0;

IF X3748>0 THEN MMKTOTALAMT4=X3748; ELSE MMKTOTALAMT4=0;

IF X3754>0 THEN MMKTOTALAMT5=X3754; ELSE MMKTOTALAMT5=0;

IF X3760>0 THEN MMKTOTALAMT6=X3760; ELSE MMKTOTALAMT6=0;

MMKSTKPCT1=X7075;

MMKSTKPCT2=X7078;

MMKSTKPCT3=X7081;

MMKSTKPCT4=X7084;

MMKSTKPCT5=X7087;

MMKSTKPCT6=X7090;

*MONEY MARKET STOCK DOLLAR AMOUNT;

MMKSTKAMT1=MMKTOTALAMT1*((MMKSTKPCT1/100)*0.01);

MMKSTKAMT2=MMKTOTALAMT2*((MMKSTKPCT2/100)*0.01);

MMKSTKAMT3=MMKTOTALAMT3*((MMKSTKPCT3/100)*0.01);

MMKSTKAMT4=MMKTOTALAMT4*((MMKSTKPCT4/100)*0.01);

MMKSTKAMT5=MMKTOTALAMT5*((MMKSTKPCT5/100)*0.01);

MMKSTKAMT6=MMKTOTALAMT6*((MMKSTKPCT6/100)*0.01);

*MONEY MARKET DOLLAR AMOUNT;

MMKTOTALAMT=MMKTOTALAMT1+MMKTOTALAMT2+MMKTOTALAMT3+ MMKTOTALAMT4+MMKTOTALAMT5+MMKTOTALAMT6;

*MONEY MARKET STOCK DOLLAR AMOUNT;

MMKSTKTOTALAMT=MMKSTKAMT1+MMKSTKAMT2+MMKSTKAMT3+MMK STKAMT4+MMKSTKAMT5+MMKSTKAMT6;

*----------

PUBLICALLY TRADED STOCK

X3913 Do you (or anyone in your family living here) own any stock which is publicly traded?

IF YES: Please do not include stock held through pension accounts, or assets that I have already recorded.

1. *YES
5. *NO;

IF x3913=1 then stock=1; else stock=0;

***TOTAL MARKET VALUE OF STOCK

X3915 What is the total market value of this stock?

X3922 What is the total market value of your stock in the company?

$ AMOUNT:

0. Inap. (no stocks: X3913^=1 no stock in company where work: X3921^=1)

X7641 What is the total market value in dollars of this stock?;

STKTOTALAMT=X3915;

*--

BROKERAGE ACCOUNTS

X3923 Do you (or anyone in your family living here) have a brokerage account that you can use for your purchase, or sale, of stocks and other securities?

1. *YES
5. *NO;

IF X3923=1 THEN Brokerage=1; else Brokerage=0;

*<BROKERAGE X3923=16 / AMOUNT X3930>;

IF X3930>0 THEN BKGTOTALAMT=X3930; ELSE BKGTOTALAMT=0;

*----------

MUTUAL FUNDS / ETFS

X3819 Do you (or anyone in your family living here) have any mutual funds or hedge funds?

IF YES: Please do not include assets you have already told me about or any pension or 401(k) accounts.

1. *YES

5. *NO

X3821 I need to know what types of funds you have. Do you have. . .

stock mutual funds or ETFs?

1. *YES

5. *NO

0. Inap. (no mutual funds or hedge funds: X3819^=1)

X3822 What is the total market value of all of the stock mutual

funds and ETFs that you (and your family living here) have?

$ AMOUNT:

0. Inap.;

*X3829 Do you have. . .

combination funds or ETFs?

COMBINATION FUNDS ('BALANCED FUNDS') HOLD BOTH STOCK AND BONDS.

1. *YES

5. *NO

0. Inap. (no mutual funds or hedge funds: X3819^=1)

X3830 What is the total market value of all of the combination

funds and ETFs that you (and your family living here) have?

$ AMOUNT:

0. Inap. (no mutual funds or hedge funds:funds: X3819^=1

no combination mutual funds: X3829^=1)

USE 50% EQUITY ALLOCATION ESTIMATE;

IF x3821=1 THEN StockMFETFs=1; ELSE StockMFETFs=0;

MFETFTOTALAMT=X3822+X3824+X3826+X3828+X3830+X7787+X6704;

MFETFSTKAMT=X3822+(X3830*0.50);

****

*TOTAL NON-RETIREMENT DOLLAR AMOUNT;

TOTALNRAMT=MMKTOTALAMT+STKTOTALAMT+BKGTOTALAMT+MFETFTOTALAMT;

*STOCK NON-RETIREMENT DOLLAR AMOUNT;

STKNRAMT=MFETFSTKAMT+MMKSTKTOTALAMT+STKTOTALAMT;

*OVERALL NON-RETIREMENT STOCK PERCENTAGE;

```
OVERALLNRSTKPCT=(STKNRAMT/TOTALNRAMT);

*DID NOT INCLUDE:
<CURRENT PENSION X6934 X6938 X6942 X6946>
<FUTURE PENSION X6963 X6969 X6975 X6981>
<IRA X6556 X6564 X6572> *
<MANAGED INVEST ACCOUNT X6829>
<TRUSTS / MANAGED INV ACCOUNTS>
MGDSTKAMT=MGDTOTALAMT*MGDSTKPCT
*If X6829=1 then ManagedInvestAcct=1 else ManagedInvestAcct=0;

***Restrict Sample****************************************;

If X3923=1 then BrokerageAcct=1; else BrokerageAcct=0;
If X3913=1 then PublicStock=1; else PublicStock=0;
IF X3819=1 then MFETFs=1; else MFETFs=0;
If X3727=1 then MMK=1; else MMK=0;

run;

data rs_scf2019;
set SCF2019;
where BrokerageAcct=1 or PublicStock=1 or MFETFs=1 or MMK=1;
```

```
run;

proc freq data=rs_scf2019;
table BrokerageAcct PublicStock MFETFs MMK;
run;

***DESCRIPTIVE TABLES*****************************************;

proc freq data=rs_scf2019;
table respFemale RACE WHITE BLACK HISPANIC ASIANOTHER AGE1
edu respHSorLess respSC respBS respGRAD
singlemale singlefemale married partner MaritalStatus
workstatus respft resppt respretired respunemployed
Homeownership INCOME
lowriskwillingness modriskwillingness highmodriskwillingness highriskwillingness
riskscale
Inflation Interest SaferReturn NUMCORRECT
SAVEONE SAVETWO FINABL FinancialAbility
FINCON;
run;

proc means data=rs_scf2019  N MEDIAN MEAN STD MIN MAX;
var OVERALLNRSTKPCT;
```

```
run;

proc means data=rs_scf2019  N MEDIAN MEAN STD MIN MAX;
var riskwillingness INCOME LOGINC riskscale edu
FINCON FinancialAbility NUMCORRECT OVERALLNRSTKPCT;
weight wt5;
TITLE 'Dissertation Variables - Continuous - UNWEIGTHED';
run;

proc univariate data=rs_scf2019;
var OVERALLNRSTKPCT;
run;

proc corr data=rs_scf2019 alpha nomiss;
var respFemale RACE AGE1 edu
MaritalStatus workstatus riskscale
Homeownership INCOME
NUMCORRECT FinancialAbility FINCON
OVERALLNRSTKPCT;
run;

*H1**********************************************;
```

```
proc means data=rs_scf2019 N MEDIAN MEAN STD MIN MAX;
where respfemale=1;
var NUMCORRECT FINCON FinancialAbility ;
weight wt5;
run;

proc means data=rs_scf2019 N MEDIAN MEAN STD MIN MAX;
where respfemale=0;
var NUMCORRECT FINCON FinancialAbility;
weight wt5;
run;

PROC TTEST DATA=RS_SCF2019;
class respsex;
var NUMCORRECT FINCON FinancialAbility;
run;

PROC REG DATA=RS_SCF2019;
MODEL NUMCORRECT FINCON FinancialAbility = RESPFEMALE
RACE AGE1 edu
MaritalStatus workstatus
Homeownership LOGINC riskscale;
RUN;
```

```
*H2************************************************;

proc corr data=rs_scf2019 alpha nomiss;
var NUMCORRECT FINCON FinancialAbility;
with OVERALLNRSTKPCT;
run;

PROC REG DATA=RS_SCF2019;
MODEL OVERALLNRSTKPCT = NUMCORRECT FINCON FinancialAbility
RESPFEMALE
RACE AGE1 edu
MaritalStatus workstatus
Homeownership LOGINC riskscale;
RUN;

*H3************************************************;

proc means data=rs_scf2019 N MEDIAN MEAN STD MIN MAX;
where respfemale=1;
var OVERALLNRSTKPCT;
weight wt5;
run;
```

```
proc means data=rs_scf2019 N MEDIAN MEAN STD MIN MAX;
where respfemale=0;
var OVERALLNRSTKPCT;
weight wt5;
run;

PROC TTEST DATA=RS_SCF2019;
class respfemale;
var OVERALLNRSTKPCT;
run;

PROC REG DATA=RS_SCF2019;
MODEL OVERALLNRSTKPCT = respFemale
RACE AGE1 edu
MaritalStatus workstatus
Homeownership LOGINC riskscale;
RUN;

***H4/SOBEL TEST**********************************************************;

proc reg data=rs_scf2019;
model NUMCORRECT FINCON FinancialAbility = respFemale;
```

```
run;

proc glm data=RS_SCF2019;
class respFemale;
model OVERALLNRSTKPCT = respFemale
NUMCORRECT FINCON FinancialAbility;
means respFemale;
run;

*CFA**********************************************;

proc freq data=rs_scf2019;
table SaferReturn Interest Inflation;
weight wt5;
run;

proc corr data=rs_scf2019 alpha nomiss;
var SaferReturn Interest Inflation;
run;

proc factor data=rs_scf2019;
var SaferReturn Interest Inflation;
run;
```

```
proc corr data=rs_scf2019 alpha nomiss;
var SaveOne SaveTwo FinAbl;
run;

proc factor data=rs_scf2019;
var SaveOne SaveTwo FinAbl;
run;

proc freq data=rs_scf2019;
table SaveOne SaveTwo FinAbl;
weight wt5;
run;

*DV_ANALYSIS**********************************************;

*MONEY MARKET PERCENT/AMOUNTS;
proc means data=rs_scf2019  N MEDIAN MEAN STD MIN MAX;
var MMKSTKPCT1 MMKTOTALAMT1 MMKSTKAMT1;
weight wt5;
run;

PROC FREQ data=rs_scf2019;
```

```
TABLE MMKSTKPCT1 MMKTOTALAMT1 MMKSTKAMT1;
WEIGHT WT5;
RUN;

*TOTAL NON-RETIREMENT DOLLAR AMOUNT;
proc means data=rs_scf2019  N MEDIAN MEAN STD MIN MAX;
var MMKTOTALAMT STKTOTALAMT MFETFTOTALAMT BKGTOTALAMT;
weight wt5;
TITLE 'Dissertation NR Amount - Continuous - UNWEIGTHED';
run;

*STOCK NON-RETIREMENT DOLLAR AMOUNT;
proc means data=rs_scf2019 N MEDIAN MEAN STD MIN MAX;
var MMKSTKTOTALAMT STKTOTALAMT MFETFSTKAMT;
weight wt5;
TITLE 'Dissertation NR Stock Amount - Continuous - UNWEIGTHED';
run;

*OVERALL NON-RETIREMENT STOCK PERCENTAGE;
proc means data=rs_scf2019  N MEDIAN MEAN STD MIN MAX;
var OVERALLNRSTKPCT STKNRAMT TOTALNRAMT;
weight wt5;
TITLE 'Dissertation NR Stock Percentage - Continuous - UNWEIGTHED';
```

```
run;

*OVERALL NON-RETIREMENT STOCK PERCENTAGE - WEIGHTED;
proc means data=rs_scf2019  N MEDIAN MEAN STD MIN MAX;
var OVERALLNRSTKPCT;
weight nwgt;
TITLE 'Dissertation DV - OVERALL NONRETIREMENT STOCK PERCENT -
WEIGTHED';
run;

proc means data=rs_scf2019  N MEDIAN MEAN STD MIN MAX;
var OVERALLNRSTKPCT;
weight wt5;
TITLE 'Dissertation DV - OVERALL NONRETIREMENT STOCK PERCENT -
UNWEIGTHED';
run;

**************************
Convert Missing to -99 for MPLUS file
**************************;

DATA rs_scf2019m;
  SET rs_scf2019;
```

```
  ARRAY change _NUMERIC_;
      DO OVER change;
         IF change=. THEN change=99;
      END;
 RUN;

 PROC MEANS DATA=rs_scf2019m NMISS N; RUN;

*TRANSFER TO
MPLUS**************************************************;
proc print data=rs_scf2019m;
var respFemale RACE WHITE BLACK HISPANIC ASIANOTHER AGE1 edu
respHSorLess respSC respBS respGRAD
singlemale singlefemale married partner
MaritalStatus workstatus
respft resppt respretired respunemployed
Homeownership INCOME LOGINC
Inflation Interest SaferReturn
SAVEONE SAVETWO FINABL
lowriskwillingness modriskwillingness highmodriskwillingness highriskwillingness
riskscale;
run;
```

```
data rs_scf2019k;
set rs_scf2019m;
keep RESPSEX respFemale RACE AGE1 edu
MaritalStatus workstatus
Homeownership LOGINC riskscale
NUMCORRECT FINCON FinancialAbility
STOCK OVERALLNRSTKPCT;
run;

proc export data=rs_scf2019k
outfile="/home/u41073348/Dissertation/FINALscf2019.sas7bdat"
REPLACE
dbms=xlsx;
sheet="NEWFINALSCF_XLSX";
RUN;
```

Appendix B - Mplus Code

```
TITLE: A PATH MODEL OF FINACIAL LITERACY MEDIATION - NFCS

DATA: FILE IS "/Users/gina/Desktop/KSU/
Dissertation/DATA/nfcscom.OUTPUT.99.csv"
TYPE IS COVARIANCE;

VARIABLE: NAMES ARE
STOCKAMT RISK
COMPINT INFL BONDS MORT STOCK COMPD
FINKNOW FINCON FINABL
FEMALE RACE HOME MARITAL
AGE EDU INCCAT EMPLOY;

USEVARIABLES ARE
STOCKAMT FINKOW FINCON FINABL RISK
FEMALE RACE HOME MARITAL
AGE EDU INCCAT EMPLOY;
MISSING ARE ALL (98 99);

ANALYSIS: TYPE IS GENERAL;
ESTIMATOR IS ML;
ITERATIONS = 1000;
```

```
CONVERGENCE = .00005;

BOOTSTRAP = 2000;


MODEL: STOCKAMT ON FEMALE

RISK RACE HOME MARTIAL AGE EDU INCCAT EMPLOY;

STOCKAMT ON FINKNOW FINCON FINABL;

FINKNOW FINCON FINABL ON FEMALE AGE EDU RACE INCCAT;

FINCON with FINABL;

FINABL with FINKNOW;

FINCON with RISK;


MODEL INDIRECT:

STOCKAMT IND FEMALE;


OUTPUT: SAMPSTAT RESIDUAL MODINDICES (3.84) STDYX

CINTERVAL (BCBOOTSTRAP);
```

```
TITLE: A PATH MODEL OF FINACIAL LITERACY MEDIATION - SCF

DATA: FILE IS "/Users/gina/Desktop/KSU/
Dissertation/DATA/scfdata.csv"
TYPE;

VARIABLE: NAMES ARE
AGE EDU RFEMALE MARITAL
RACE RISKS WORKSTAT HOME LOGINC
FINCON FINKNOW FINABL
ONRSPCT;

USEVARIABLES ARE
AGE EDU RFEMALE MARITAL
RACE RISKS WORKSTAT HOME LOGINC
FINCON FINKNOW FINABL
ONRSPCT;
CATEGORICAL ARE FINABL;
MISSING ARE ALL (98 99);

ANALYSIS:
TYPE IS GENERAL;
ESTIMATOR IS WLSMV;
```

```
ITERATIONS = 1000;
CONVERGENCE = .00005;
BOOTSTRAP = 2000;

MODEL:
ONRSPCT ON RACE AGE EDU RFEMALE
MARITAL HOME RISKS WORKSTAT LOGINC;
ONRSPCT ON FINCON FINKNOW FINABL;
FINCON ON RFEMALE RACE AGE EDU RFEMALE
MARITAL HOME RISKS WORKSTAT LOGINC;
FINKNOW ON RFEMALE RACE AGE EDU RFEMALE
MARITAL HOME RISKS WORKSTAT LOGINC;
FINABL ON RFEMALE RACE AGE EDU RFEMALE
MARITAL HOME RISKS WORKSTAT LOGINC;

FINABL WITH FINCON;
FINKNOW WITH FINCON;

MODEL INDIRECT:
ONRSPCT IND RFEMALE;

OUTPUT: SAMPSTAT RESIDUAL MODINDICES (3.84) STDYX
CINTERVAL (BCBOOTSTRAP);
```