

EXPLORING FINANCIAL LITERACY AND OVERCONFIDENT INVESTOR

EXPLORING FINANCIAL LITERACY AND OVERCONFIDENT INVESTOR BEHAVIOR

by

Ryan Drews

Dissertation

Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Liberty University, School of Business

May 2022

Abstract

This study examined the factors predicting overconfidence in U.S. investors and the relationship between overconfidence and seeking financial advice. This study adopted a quantitative research method using the 2018 NFCS Investor Survey data to explore the relationship between financial literacy and investor behavior in the U.S. stock market. Theories in financial literacy and overconfident behavior are combined to identify factors that predict overconfident behavior in U.S. investors. A logistic regression model was utilized to understand the relationship between financial literacy, demographics, and overconfident investor behavior. The results show a positive relationship between overconfident behavior and portfolio value, seeking financial advice, and conducting research activity. Results also showed that overconfidence is higher in male investors, younger investors, and investors with lower incomes. These findings are useful to individuals and corporations across several applications. Individuals can increase self-awareness regarding their own behaviors to identify certain biases, such as overconfidence, to help them avoid making large financial mistakes. Financial advisors can utilize these findings to become more aware of their clients that are likely to demonstrate overconfident behavior and help them mitigate these risks. Government entities can incorporate financial literacy programs that will establish baseline financial literacy competency in primary and secondary education programs.

Keywords: Overconfidence, financial literacy, investor behavior, investing.

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Approvals

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Dedication

To my wife and kids, who supported me through this journey, your unconditional love and support was the strength that held me up through this challenging endeavor. To my beautiful wife Whitney, who was always there to support me through late nights, early mornings, and long weekends, putting in just as much work through this venture to help me succeed. To my son Drake, daughter Vivian, daughter Elise, and soon-to-be-born daughter whom we have yet to name. You have always been my source of motivation and inspiration, both personally and professionally. You are the reason I can persevere through challenges, overcome adversity, and continue moving forward when things are difficult. You provided times of happiness and laughter amid the chaos, reminding me of the reasons why I should push forward. To my parents, who have provided love and support. You have influenced me throughout life in ways that you are unaware. To my friends, who have provided encouragement, support, and have always been there for me. You are appreciated and considered family to me. To everyone who made this dissertation possible, I thank you from the bottom of my heart.

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Section 1: Foundation of the Study

Technological advancement and intense competition in the financial services industry have allowed individual investors to have more control over their investments. Limited barriers to investment information and low transaction costs have added to this recent trend. With a significant decrease in corporate pensions, individuals now have the responsibility of providing for their own retirement funds. This combination has led to an increase in do-it-yourself investing among individual investors. However, financial literacy is low among U.S. investors (Lusardi & Mitchell, 2011a). Therefore, one may question why individuals take control of their own investments as opposed to seeking professional investment advice. Overconfidence may explain this phenomenon. However, it is unknown which factors predict overconfident behavior in U.S. investors. Understanding the factors that predict overconfident investment behavior can serve as beneficial to limit this cognitive bias. This section provides a background of this problem along with the underlying theories that serve as a basis for this study.

Background of the Problem

Overconfident individuals tend to overestimate their perceived financial knowledge relative to their actual financial knowledge, resulting in risky and costly financial behaviors (Asaad, 2015). It is known that financial literacy is low in the U.S. despite increasing responsibility for investing among individuals. This results in poor investor behavior and decision-making when making investment decisions. Financial literacy is particularly low among women, younger individuals, less educated individuals, Hispanics, and African Americans (Lusardi & Mitchell, 2011a). Americans do not have the basic financial skills necessary to understand investments, credit, and to take advantage of the banking system (Lusardi & Mitchell,

2014). In addition, investors demonstrate overconfidence when managing their portfolios by overestimating their own technical and financial abilities (Mihaylov et al., 2015).

Recent advances in the Internet, networking, and a decrease in asymmetric information flow to the small investor, have empowered small investors to take greater control of their personal investments (Mitchell & Smith, 2004). An increase in web-based research tools, lower brokerage costs, and easier access to financial data have fueled self-directed investing (McClintock, 2014). In addition, since 1980, individuals and their families are taking on increasing responsibility for securing their own retirement as employers have eliminated defined benefit pension plans (Lusardi & Mitchell, 2011a). Individuals are forced to utilize defined contribution plans and Individual Retirement Accounts (IRAs) to finance their retirement (Lusardi & Mitchell, 2011a). Compounding the effects of low financial literacy, psychology literature documents that individuals make systematic errors in the way they make decisions (Ritter, 2003). This paper examines the relationship between financial literacy and investor behavior by analyzing the factors that predict overconfidence in investor behavior in the United States.

Problem Statement

The general problem addressed was understanding the relationship between financial literacy and investor behavior in the U.S. stock market. It is known that financial literacy is low in the United States, resulting in poor investor behavior and decision-making. Prior studies have shown that higher knowledge levels and higher confidence levels result in more proactive decision-making behavior (Atlas et al., 2019). In addition, financial literacy and overconfidence have been shown to be positively correlated with stock market participation (Xia et al., 2014). However, investors who overestimate their perceived financial knowledge are less likely to seek

financial advice (Kramer, 2016). Overconfident individuals tend to overestimate their perceived financial knowledge resulting in risky and costly financial behaviors (Asaad, 2015). One study shows university students with low financial literacy were more overconfident and accepted larger risks (Mudzingiri et al., 2018). Other research found investors in Turkey who demonstrated overconfidence were younger investors (often male), investors with a lower portfolio value, and investors in low income and low education regions (Tekçe & Yılmaz, 2015).

The specific problem to be addressed is to examine the factors predicting overconfidence in U.S. investors. There is a difference between factual knowledge (financial literacy) and perceived financial knowledge (confidence) that can result in overconfident behavior in U.S. investors (Asaad, 2015). This research paper explores different factors that may predict overconfidence in U.S. investors. The ability to identify factors predicting overconfident behavior can help investors become self-aware of their overconfident behavior.

Purpose Statement

The purpose of this non-experimental, quantitative research study is to add to the body of knowledge that explores the relationship between financial literacy and investor behavior. This larger problem is explored by examining the factors predicting overconfidence in U.S. investors. It is known that financial literacy is low (Lusardi & Mitchell, 2011b) and that overconfidence can lead to risky behavior in U.S. investors (Asaad, 2015). However, there is a gap in the existing literature that explores what factors may predict overconfidence in U.S. investors.

This study uses a logistical regression model to examine the factors predicting overconfidence in U.S. investors. The dependent variable is overconfidence and is measured as the difference between perceived financial literacy and actual financial literacy. The independent

variables measured are the portfolio value of non-retirement accounts, financial advisor usage, and financial research activity are the independent variables.

Research Questions

The following research questions were used to examine the factors that predict overconfidence in individual investors:

1. What factors predict overconfidence in U.S. investors?
2. What is the relationship between overconfidence and seeking investment assistance?

Hypotheses

Tekçe and Yılmaz (2015) found that investors in Turkey who demonstrated overconfidence were younger investors, investors in low-income regions, investors in low education regions, and investors with a lower portfolio value. Portfolio value serves as an interesting variable in which having less wealth may be associated with an increase in overconfident behavior (Tekçe & Yılmaz, 2015). However, this is contrary to research that suggests that overconfident investors take more risks (Asaad, 2015), and taking more risks has a tendency to increase wealth (Kannadhasan, 2015). This provides the basis to determine if higher portfolio values can predict overconfident behavior (H1). Kramer (2016) found a negative relationship between seeking financial advice and an individual's confidence in their own financial literacy. In addition, this negative association is more pronounced among wealthier individuals (Kramer, 2016). This provides the foundation for hypothesis (H2) to test the negative relationship between overconfident behavior and seeking financial advice. Finally, the literature reveals that as retail investors increase the frequency of information acquisition, they are likely to trade more frequently (Abreu & Mendes, 2012). In addition, retail investors rely on heuristics or shortcuts when processing complex information for investment decision-making (Seth et al.,

2020). Therefore, this study explores the hypothesis that there is a positive relationship between doing research activity and overconfident behavior (H3). This paper tests the following hypotheses:

H1. There is no significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence.

H1a. There is a significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence.

H2. There is no significant negative relationship between seeking financial advice and the U.S. investors' overconfidence.

H2a. There is a significant negative relationship between seeking financial advice and the U.S. investors' overconfidence.

H3. There is no significant positive relationship between doing financial research and U.S. investors' overconfidence.

H3a. There is a significant positive relationship between doing financial research and U.S. investors' overconfidence.

The first and third hypotheses provide insight into the first research question by exploring factors predicting overconfidence in U.S. investors. The second hypothesis seeks to provide insight into the relationship between overconfident investment behavior and seeking investment help from a financial professional.

Nature of the Study

This study adopts a quantitative research method using the 2018 National Financial Capability Study (NFCS) Investor Survey data. The results are utilized to draw on investors' financial literacy and behavior. The Financial Industry Regulatory Authority (FINRA) Investor

Education Foundation conducted its first study of financial capability in U.S. adults (Mottola & Kieffer, 2017). The NFCS provides data to aid researchers in better understanding financial literacy in the United States (Mottola & Kieffer, 2017).

As demonstrated by Atlas et al. (2019), a quantitative approach is most appropriate for exploring the relationship between two variables. A quantitative method uses inferential analysis to describe the population and understand relationships in the data (Stangor, 2011). Quantitative research is helpful in examining relationships among variables to test a hypothesis (Creswell, 2014). This study utilizes a binary logistic regression model to examine which factors predict overconfidence. Overconfidence is the dependent variable, and the portfolio value of non-retirement accounts, financial advisor usage, and financial research activity are the independent variables. The dependent variable (Overconfidence) is dichotomous and measures whether the subject is displaying overconfidence or not displaying overconfidence. A logistic regression design is most appropriate to test the relationship between the dependent and independent variables when the dependent variable has binary outcomes (Orme & Combs-Orme, n.d.).

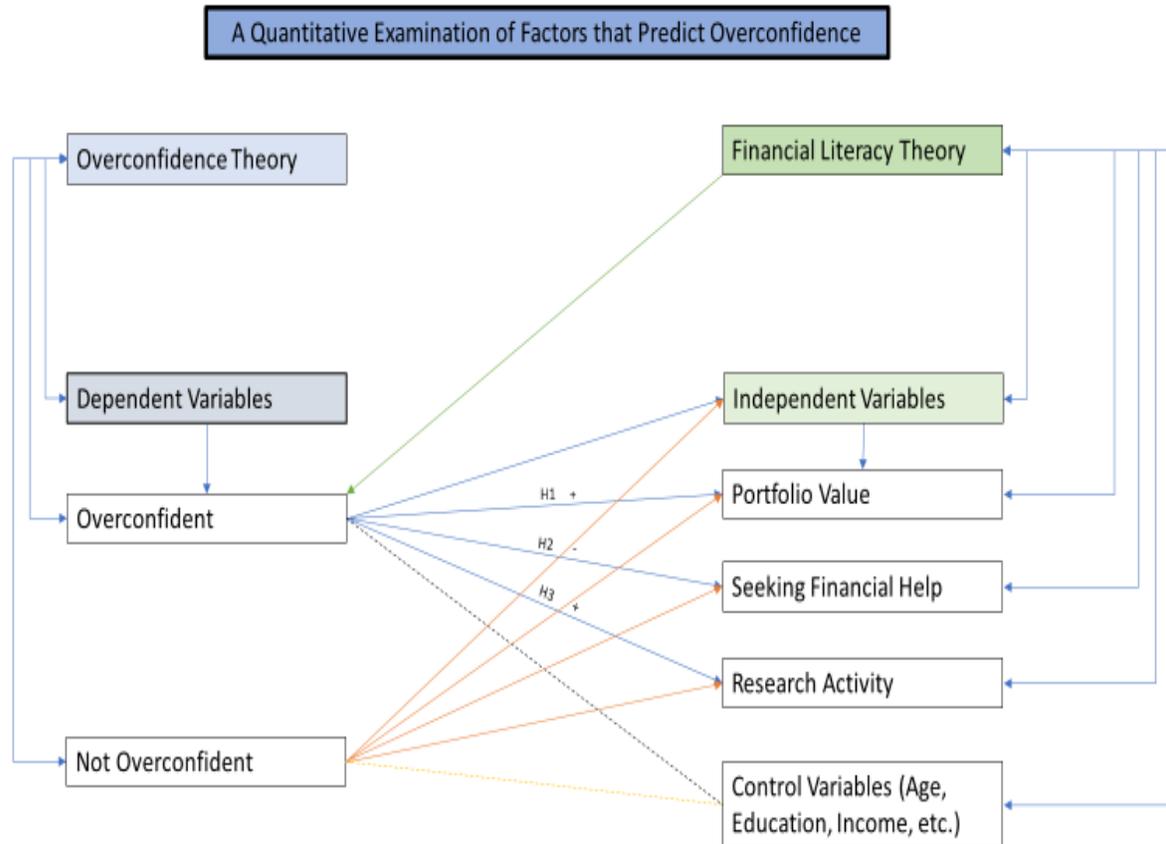
The qualitative method allows researchers to develop a theory by interpreting data collected and deriving the underlying meaning of the research problem (Stake, 2010). Qualitative research attempts to understand the experience and attitude of participants and generally produces words as opposed to numbers as data for analysis (McCusker & Gunaydin, 2015). The quantitative method attempts to generate unbiased results by testing data through closed-ended questions, while the qualitative method often utilizes open-ended questions through interviews, observations, case studies, and focus groups to conduct analysis (Hair et al., 2020). The qualitative information is interpreted by the researcher to find underlying meaning based on a particular theoretical framework (Creswell & Poth, 2018). The nature of this study was to test a

relationship between dependent and independent variables, therefore eliminating the need for a qualitative approach.

A mixed method approach was not selected for this study because the qualitative method component that is part of a mixed method design is not appropriate to address the research problem. The mixed method approach can produce powerful results and has been more frequently utilized in research recently (Creswell, 2014). This approach involves the integration of both quantitative and qualitative research methods, often producing statistical analysis followed by interviews and observations to present deeper meaning to the research problem (Tashakkori & Teddlie, 2010). Considering the objective of exploring factors predicting overconfidence in U.S. investors, the mixed approach was not selected to address this research problem.

Theoretical Framework

This research investigated the relationship between financial literacy and investor overconfident behavior. The two principal theories which guided this research were the Theory of Financial Literacy (Lusardi & Mitchell, 2014) and the Theory of Overconfidence (Daniel et al., 1998). These theories were significant to this research because they provide the foundation for identifying factors of financial literacy predicting overconfident behavior in U.S. investors. The foundation of this research was based upon the relationship existing between these two prominent theories. Figure 1 depicts the theoretical framework used to guide this research.

Figure 1*Relationship Between Concepts****Financial Literacy Theory***

Financial literacy theory has been defined as financial knowledge as a form of investment in human capital (Lusardi & Mitchell, 2014). Technological advancement has permitted the “small investor” access to capital markets and sophisticated financial information and tools. Many households have invested in ways contrary to standard financial theory, thus implying these financial decisions were investment mistakes (Calvet et al., 2009). Financial literacy theory suggests increasing financial sophistication among households would decrease such mistakes (Calvet et al., 2009). Financial literacy is low among the U.S. population and particularly critical among specific demographic groups, such as those with low education, women, African

Americans, and Hispanics (Lusardi, 2008). Therefore, a growing interest in financial literacy research explores the relationship between financial knowledge and financial success.

Financial literacy research has provided many descriptive statistics regarding subgroups and characteristics of individuals demonstrating low levels of financial literacy. Some of the common descriptive statistics analyze age, race, education level, gender, and other basic individual characteristics (Lusardi & Mitchell, 2014). The foundation of financial literacy theory is understanding individual financial knowledge capability and decision making around financial savings and investments (Lusardi, 2008). The goal of this literature is to improve financial literacy programs for individual investors to provide them with tools to make better financial decisions.

A basic understanding of financial literacy research provides a foundation for this research problem. This research utilizes financial literacy to derive the definition of overconfidence by directly measuring financial literacy capability through survey questions. As seen in Figure 1, financial literacy research on individual characteristics is fundamental to understanding what factors predict overconfidence in U.S. investors. In addition, these factors can help explain the relationship between overconfidence and seeking investment assistance. Finally, these underlying characteristics drive the independent variables of portfolio value, seeking investment assistance, and doing research activity.

Overconfidence Theory

Overconfidence is a well-known cognitive bias defined in the field of psychology and has implications across many professions such as doctors, attorneys, engineers, managers, bankers, and more. It can be broadly defined as one who overestimates their own abilities (Daniel et al., 1998). However, overconfidence theory applied to securities markets is defined as one who

overestimates the precision of their private information signal, but not the information signals publicly received by all (Daniel et al., 1998). Odean (1999) defined overconfidence as slightly different from one's over-estimation of the precision of their knowledge. Most definitions provide the same basis for overconfidence theory in that an individual is over-estimating the precision of their knowledge, ability, and/or information.

It is known in finance literature that empirical studies assume rational investor behavior when determining securities pricing. However, there still exist several price anomalies occurring in the markets, such as event-based return predictability, short-term momentum, long-term reversal, high volatility of asset prices relative to fundamentals, and short-run post-earnings announcement price "drift" in the direction of the earnings surprise (Daniel et al., 1998). It is not obvious how securities market anomalies can be captured accurately in a model relying on perfect investor rationality, yet behavioral theory for these anomalies is generally not accepted (Daniel et al., 1998). However, others argue good finance theory will be grounded on psychological evidence regarding how people actually behave versus perfect investor rationality (DeBondt & Thaler, 1995). In addition, research highlights that even professional economists acting as experts display overconfidence (Angner, 2006). Overconfidence theory assumes that investors' self-perception they can value securities more accurately than they actually are able to, results in underestimating their forecast error variance (Daniel et al., 1998). Therefore, the existence of market anomalies, the underestimation of investor forecast error variance, and the underlying irrationality of investor behavior provide the foundation for overconfidence theory.

As depicted in Figure 1, overconfidence serves as the dependent variable in this study. This research examines the factors predicting overconfident behavior in U.S. investors. Many of these factors are derived from financial literacy theory. Overconfident behavior in this research

study is defined as the difference between perceived self-knowledge and actual knowledge of U.S. investors. This is measured by using the 2018 NFCS Investor Survey data. The results are utilized to draw on investors' financial literacy and behavior to help determine what factors predict overconfidence in U.S. investors and to understand the relationship between overconfidence and seeking investment assistance.

Finally, this study will examine how age, gender, income, education, and other demographic information will have an impact on financial literacy and overconfident behavior. In a review of the American population over age 50, Lusardi et al. (2014) found that older respondents were not financially sophisticated. In addition, Lusardi and Mitchell (2011a) find that women are less financially literate than men, and more educated people have higher financial literacy. These control variables will be explored as it relates to predicting financial literacy and overconfident behavior.

Definition of Terms

The following terms have been defined to provide clarity, meaning, and significance of the terminology used in this research.

Behavioral finance: The study of behavior and psychology with an application to finance, which focuses on individual-level cognitive biases in decision-making (Hirshleifer, 2015).

Behavioral Economics: A mixture of psychology and economics in which cognitive and emotional behavior factor into decision-making that is different from classic economic theory (Thaler, 2016).

Financial Literacy: A person's financial knowledge level and ability to process financial information and decision-making around financial topics (Lusardi & Mitchell, 2014).

National Financial Capability Study (NFCS): A national survey administered to Americans with the goal of understanding and measuring financial literacy and financial capability, as well as how Americans manage their resources and make financial decisions (Mottola & Kieffer, 2017).

Overconfidence: A person's over-estimation of the precision of their knowledge, ability, and/or capability (Odean, 1999). In terms of the dependent variable used in this research, this study measures overconfidence as the difference between a person's perceived financial literacy compared to their actual financial literacy.

Assumptions, Limitations, Delimitations

Assumptions

This study adopts a quantitative research method using the 2018 NFCS Investor Survey data. The NFCS provides data to aid researchers in better understanding financial literacy and investor behavior in the United States (Mottola & Kieffer, 2017). It is assumed the secondary data source is accurate and effective in measurement. The definition of financial literacy and the measurement tool used are assumed to be accurate and effective (Knoll & Houts, 2012).

Another assumption in this study is the quality of the survey represents a reliable data source without errors and biases. It is also assumed the responses are truly reflective of the U.S. population and not skewed to any group, personality behavior, or certain demographic qualities. Survey responses can be subject to social desirability, and this survey assumes respondents answered questions accurately and truthfully (Willis, 2009). The data source assumes accuracy reflecting financial literacy and investor behavior in which the questions on the survey represent factors describing financial literacy and investor behavior accurately without omitted factors. In addition, it is assumed the respondents conducted the survey without conflicting motivations,

time constraints, and influences that could reflect inaccurate results. For example, respondents may not have any incentive to answer literacy questions correctly and may not put forth the effort in doing so. If these assumptions were not true, this study risks utilizing survey data that is not completely representative of the population. In addition, survey responses would provide inaccurate data, potentially inflating illiteracy levels among survey respondents. This would have an adverse impact on this study's results and overconfidence measurements.

Finally, it is assumed that the survey design is accurate and without flaws. The survey questions are assumed to represent an accurate measurement of financial literacy for U.S. investors and are most appropriate for determining financial literacy. The dependent variable measures overconfidence by measuring the difference between self-perceived financial knowledge and actual financial knowledge. It is assumed that this is an accurate measurement and representation of overconfidence. A failure in these assumptions would lead to inaccurate representation of overconfidence in survey respondents. In addition, any inaccurate measurements in the survey questions measuring self-perceived knowledge or actual knowledge would adversely impact the results of this study.

Limitations

Quantitative research can have limitations that represent weaknesses in the research design of the study (Creswell, 2014). One limitation regarding the data source is centered on research participants who participated in the survey. The research study was limited by the willingness of individuals to participate in the survey. In addition, each participants' experience in completing the survey may vary based on individual personality and biases. Factors that may affect the responses to survey questions include the ability of participants to comprehend the questions accurately, time constraints, motivation to provide accuracy, underlying motives to

responses, and a propensity to overestimate or underestimate responses to questions. This study relies on the assumption that participants provide true and accurate responses regarding their financial literacy and investment behavior. For example, an individual without any investments may indicate they have a certain investment balance based on the feeling of embarrassment (overestimation) of their actual financial status (Willis, 2009). Therefore, control over participant responses was limited due to the survey design.

Another limitation of the study is the measurement of overconfidence. Due to inherent limitations in the survey design, responses to the self-perceived knowledge questions and the actual knowledge questions may not be completely accurate, thus producing unreliable results. In addition, the study is limited to the values chosen to measure overconfidence, and any changes in values may affect the results of this study. Finally, the study aims to understand the factors that predict overconfidence in U.S. investors but does not explain why they are overconfident. Future studies may use qualitative or mixed methods to determine why U.S. investors are overconfident.

Delimitations

The NFCS is aimed at measuring the perceptions, attitudes, experiences, and behaviors of American investors on a wide variety of topics (Financial Industry Regulatory Authority Investor Education Foundation, 2019). The State-by-State Survey is the largest component of the NFCS and is conducted across a large, diverse sample of over 25,000 Americans. The goal of this survey is to provide a comprehensive analysis of the financial capability of the national population (Financial Industry Regulatory Authority Investor Education Foundation, 2019). The breadth of subject areas covered in the State-by-State Survey limits the depth to which any individual subject can be explored. One of these subject areas which are limited is investing outside of retirement accounts. This group applies to only a minority of the population, and

therefore a separate follow-up survey of investors was conducted as part of the NFCS. This follow-up survey is called the 2018 Investor Survey and serves as the main data source of this study. The 2018 Investor Survey consists of a sample of 2,003 adults over 18 years of age who completed the 2018 State-by-State Survey and indicated they had investments outside of retirement accounts (Financial Industry Regulatory Authority Investor Education Foundation, 2019). The results of this study are within the boundaries of this data source.

Significance of the Study

Currently, there is limited research in understanding what factors predict overconfident behavior in U.S. investors. This study aims to understand the relationship between financial literacy factors that may predict overconfident behavior. The expected outcomes of this study will benefit U.S. retail investors, the financial services companies who serve them, regulators, and financial consultants within the industry.

The benefits to U.S. retail investors will help identify factors and certain characteristics that are likely to lead to overconfident behavior. This can create self-awareness for U.S. investors and allow them to take proactive steps to mitigate this behavior. Taking proactive steps to mitigate overconfident behavior may prevent investing mistakes and/or excessive risk taking by retail investors. This can benefit financial services companies by helping firms identify characteristics of their clients that will allow them to take proactive steps to help their clients. Firms can provide educational content regarding overconfident behavior to help investors avoid making investment mistakes. In addition, firms can conduct further research into product innovation that may benefit investors and the entire industry. Finally, regulators can benefit by creating awareness among the public and financial industry regarding overconfident behavior.

Regulators can create and/or amend current policies to protect investors from fraud and market manipulation.

This study aims to provide a significant research contribution bridging the relationship between financial literacy and overconfident investor behavior. First, this study establishes a research foundation investigating factors predicting overconfident behavior in U.S. investors. Second, this study extends current research exploring the relationship between financial literacy and overconfident investor behavior by identifying factors that have prediction value. Understanding variables that predict overconfident investor behavior opens additional research possibilities and potential theories that investigate predictive variables in depth.

Reduction of Gaps in the Literature

Financial literacy and overconfidence have been largely studied independently, but little research explores the relationship between these two topics. Asaad (2015) examined that two concepts of financial literacy, (1) knowledge and (2) confidence, contributed to individuals making good financial decisions. Xia et al. (2014) found that financial literacy and overconfidence have been shown to be positively correlated with stock market participation. Tekçe and Yılmaz (2015) found that overconfident investors in Turkey were typically younger male investors, investors with a lower portfolio value, and investors in low income and low education regions. However, a gap in the research fails to examine the factors that predict overconfident behavior in U.S. investors. This research contributes to the body of knowledge by examining the factors that predict overconfident behavior in U.S. investors.

Implications for Biblical Integration

There are biblical implications regarding God's purpose and significance of serving others through work and research. The design of work stems back to the beginning of the bible

with Genesis 2:1-3, 15 (English Standard Version), when God discusses making the heavens and the earth. God finished His work He had done and rested on the seventh day (Genesis 2:1-3, 15 English Standard Version). In the second chapter of Genesis, it is demonstrated that not only is God's creation beautiful, but that God goes on to care for his creation in what is called "the work of providence" (Keller & Alsdorf, 2012). Therefore, people should find beauty and purpose in the work they do. "Nevertheless, each person should live as a believer in whatever situation the Lord has assigned to them, just as God has called them" (Corinthians 7:17, English Standard Version). Work should be approached from the viewpoint of serving a purpose to society and having a plan for why people do the work they do. This research serves people by furthering knowledge around factors that predict overconfident behavior in U.S. investors.

Mitigating overconfident behavior in U.S. investors can help them avoid costly investing mistakes. Research shows excessive trading leads to investment losses (Odean, 1999). The more investors trade stocks in the market, the more money they tend to lose over time (Odean, 1999). This research study aims to serve society by mitigating investment losses for individuals. The positive implications of this research are endless such as allowing individuals to retire earlier, pay for their kids' college education, and reduce reliance on social retirement programs. In addition, the results may benefit those in the financial services industry who serve investors in the work they do. Many people view work as a necessary evil (Keller & Alsdorf, 2012). However, work of all kinds should evidence our dignity as human beings, whether the work is done with hands or the mind (Keller & Alsdorf, 2012). This exemplifies the importance of all work, including research, to further the body of knowledge around financial literacy and investor behavior.

There may be problems with work and research if not done for the right reasons. Work becomes fruitless if not done for a specific purpose to serve others or to build upon the Christian community. God warned Adam and Eve that if they ate from the forbidden tree, they would die (Keller & Alsdorf, 2012). “By the sweat of your brow you will eat your food until you return to the ground, since from it you were taken; for dust you are and to dust you will return” (Genesis 3:16-19, English Standard Version). This did not mean a physical death, but a death in every other aspect of human life (Keller & Alsdorf, 2012). The result was the paradise was lost by disobeying God. Work and research can become fruitless due to envisioning more than we can accomplish; both because of lack of ability and due to the resistance of the environment around us (Keller & Alsdorf, 2012). “So I hated life, because what is done under the sun was grievous to me, for all is vanity and striving after wind” (Ecclesiastes 2:17, English Standard Version). This biblical reference paints a picture as to how work can become pointless if not done for serving a higher purpose. People can become frustrated with unfulfilled aspirations. In addition, people also experience no satisfaction or fulfillment in their work even when they have realized their aspirations (Hardy, 1990). “Then they said, Come, let us build ourselves a city and a tower with its top in the heavens, and let us make a name for ourselves, lest we be dispersed over the face of the whole earth” (Genesis 11:4, English Standard Version). Therefore, as work becomes a way to distinguish oneself from their neighbor, selfishness takes over, making work both pointless and fruitless.

This research aims to serve a higher purpose by furthering the body of knowledge in financial literacy and investor behavior. The results may be beneficial to society by improving financial literacy and investor behavior. “So whether you eat or drink or whatever you do, do it all for the glory of God” (1 Corinthians 10:31, English Standard Version). This research takes a

Christian worldview approach to benefit society. “Whatever your hand finds to do, do it with your might, for there is no work or thought or knowledge or wisdom in Sheol, to which you are going” (Ecclesiastes 9:10, English Standard Version). A new compass for work and research should be of the Christian worldview to serve humanity through a relationship with God.

Benefit to Business Practice and Relationship to Cognate

This study examined the relationship between financial literacy and overconfident investor behavior and is therefore related to both fields of study. Both financial literacy and overconfidence are topics studied under the fields of Behavioral Finance and Behavioral Economics. Behavioral Economics is broader in general and encompasses subjects that connect human behavior with economic principles such as supply/demand, consumption/price, investments, and managerial decisions (Costa et al., 2018). It focuses on how heuristics and cognitive biases affect decision-making processes of individuals (Costa et al., 2018). Behavioral Finance is focused on the study of decision-making characteristics and the errors made regarding financial investments (Costa et al., 2018).

Financial literacy has become an increasingly popular field of study as more U.S. investors take control of their investments (Mitchell & Smith, 2004). Lower brokerage costs, easier access to financial data and information, and fee conscious investors have given rise to self-directed investors (McClintock, 2014). Research has shown that despite the increase in control of their investments, investors are not well equipped with the financial knowledge to make good decisions regarding their finances (Lusardi, 2008). Lusardi (2008) provided a foundation for financial literacy research which serves to inform Behavioral Economics for economic policy. Financial literacy serves as critical input into understanding U.S. investor

capability and overconfidence measures. This study utilizes financial literacy as a component for determining overconfident behavior in U.S. investors.

Overconfidence is a well-established cognitive bias originating in the field of psychology, which studies a person's decision-making abilities while being too confident in their own capability. The concept of overconfidence is built upon the foundation that individuals lean on heuristics and biases when using judgment in the face of uncertainty (Kahneman et al., 1982). The literature has examined overconfident behavior in many different subjects such as healthcare, law, engineering, military affairs, finance, and many other areas. Within the field of finance, Behavioral Finance is a topic that emerged in the 1980s with the works of (Kahneman et al., 1982) and has grown in popularity and importance with additional works of (Daniel et al., 1998; DeBondt & Thaler, 1985, 1995). This study examined the relationship between financial literacy and overconfident behavior in U.S. investors and has implications in the fields of Behavioral Finance, Financial Literacy, Household Finance, and Wealth Management.

A Review of the Professional and Academic Literature

The review of professional and academic literature presents key elements that provide the groundwork for exploring financial literacy and overconfident investor behavior. The literature included addressing the research problem was identified and used to compare and contrast the main elements of the underlying research problem. These main elements are financial literacy, investor behavior, and the dependent and independent variables of this study. The dependent variable discusses overconfident behavior, and the independent variables discuss financial literacy characteristics, including items such as demographics, portfolio value, seeking investment advice, and investment research activity. These key elements provide the foundation for exploring the relationship between financial literacy and overconfident investor behavior.

Financial Literacy

Defining Financial Literacy. The definition of financial literacy remains to be universally accepted among professionals and academic literature. Despite the absence of an official definition being universally accepted, there are many definitions of financial literacy that are similar in context throughout the literature (Agnew & Harrison, 2015; Allgood & Walstad, 2013; Henager & Mauldin, 2015; Hung et al., 2009; Huston, 2010; Johnson & Lamdin, 2015; Knoll & Houts, 2012; Lusardi & Tufano, 2015; OECD, 2019; Robb, 2014; Schmeiser & Seligman, 2013). However, in their review of various financial literacy concepts, Hung et al. (2009) found that the literature has proposed several definitions despite lacking a universally accepted definition. Huston (2010) surveyed 71 studies using 52 different data sets and concluded there is no standardized definition of financial literacy. The terms financial literacy and financial knowledge were used interchangeably by almost half of all studies under review (Huston, 2010). The need for a universal definition of financial literacy exists, but successfully arriving at a concise definition of an abstract concept is beyond the scope of this research. A background of the existing definitions and terminology of financial literacy is warranted to justify the definition and context used for this study.

Currently, there are several definitions used throughout the literature, and they vary slightly within their context. There are many definitions for financial literacy in which the terms “financial education” and “financial knowledge” are used interchangeably (Al-Tamimi & Kalli, 2009; Howlett et al., 2008; Huston, 2010; Yoong et al., 2012). There are many conceptual definitions that can fall into one of five categories: 1) knowledge of financial concepts, (2) ability to communicate about financial concepts, (3) aptitude in managing personal finances, (4) skill in making appropriate financial decisions, and (5) confidence in planning effectively for future

financial needs (Remund, 2010). Therefore, financial literacy can be conceptualized as a measure to which one understands key financial concepts and has the ability to make appropriate short-term and long-term decisions to manage personal finances through sound financial planning and changing economic conditions (Remund, 2010). Other definitions of financial literacy can be categorized into two sections: a conceptual definition (Servon & Kaestner, 2008) and an applied definition (Huston, 2010; Lusardi & Mitchell, 2011a). Financial literacy can also be conceptualized as having two primary dimensions: 1) personal finance knowledge (understanding) and personal finance application (usage; Huston, 2010). Other literature offers similar concepts defining financial literacy as the ability of a person to understand and make use of financial concepts (Servon & Kaestner, 2008). Other studies define financial literacy as possessing both knowledge and the ability to properly handle finances (Howlett et al., 2008). The 2018 Program for International Student Assessment (PISA) has been conducted by the Organization for Economic Cooperation and Development (OECD) and emphasizes the application domain (OECD, 2019). “PISA conceives of literacy as the capacity of students to apply knowledge and skills in key subject areas and to analyze, reason and communicate effectively as they pose, solve and interpret problems in a variety of situations” (OECD, 2019, p. 128). Finally, Hung et al. (2009) consolidated the various definitions and proposed a conceptualization defining financial literacy as having the knowledge of basic financial concepts and the skills to use these concepts to manage financial resources effectively for a lifetime of financial well-being.

In summary, there are various definitions of financial literacy, and there remains to be a universally accepted definition among professionals and academic literature. However, thematically the literature provides a general context emphasizing the importance of both

financial literacy knowledge and application to make effective financial decisions (Al-Tamimi & Kalli, 2009; Howlett et al., 2008; Hung et al., 2009; Huston, 2010; Lusardi & Mitchell, 2011a; OECD, 2019; Remund, 2010; Servon & Kaestner, 2008; Yoong et al., 2012). Financial literacy helps consumers make informed financial decisions, deploy risk mitigation strategies, and aid consumers in using financial products effectively (Lusardi & Mitchell, 2011a). Therefore, the importance of financial literacy is apparent regardless of a universally accepted definition. The background highlights the importance of understanding the definition of financial literacy as it relates to this study. The definition of financial literacy used in this study is based on responses to the NFCS Investor Survey data. The survey included a multiple-choice test to measure actual financial knowledge. This is different from self-perceived knowledge that was also measured on the survey. This study leverages the response data to measure financial literacy by measuring financial knowledge based on the NFCS Investor Survey financial knowledge test.

Measuring Financial Literacy. A review of the existing literature reveals three main methods of measuring financial literacy: (a) objective testing, (b) self-perception or self-assessed responses, and (c) measurement by proxy. Objective testing is usually conducted using household surveys that ask questions around different financial topics. These questions are typically centered around the following topics: general financial concepts such as inflation, risk mitigation, time value of money; knowledge around financial products such as stocks, bonds, mutual funds, mortgages, and other credit; and general numerical skills such as calculating interest, calculating margin, and calculating inflation (Lusardi, 2008). Self-perception or self-assessed financial literacy measurement is a process of asking survey respondents for a self-assessment of their financial knowledge and capabilities (Lusardi & Mitchell, 2014). The third

main type of financial literacy measurement is using proxies to determine financial literacy levels. A further look into the literature on these three measurements is warranted.

Objective Testing. In their review of various studies, Hung et al. (2009) highlighted that the objective test-based measurement approach has been utilized the most in measuring financial literacy. There are different levels of objective test measurements. Some studies measure financial literacy using basic techniques such as simple indicator variables (Jappelli, 2010), while others rely on more advanced techniques (Lusardi et al., 2014; Lusardi & Tufano, 2015; van Rooij et al., 2011). Various test-based measures in the literature are highly correlated with one another, especially when the questions are worded similarly (Hung et al., 2009). This results in high test reliability across different surveys (Hung et al., 2009). Three specific test questions were introduced by Lusardi and Mitchell (2008) and are used in many surveys globally. The three questions test interest compounding (numerical ability), inflation, and risk. The three questions are listed below:

- Suppose you had \$100 in a savings account, and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?
 - More than \$102
 - Exactly \$102
 - Less than \$102
 - Do not know
 - Refuse to answer

- 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 their money in this account?
 - More than today
 - Exactly the same
 - Less than today
 - Do not know
 - Refuse to answer

- Please tell me whether this statement is true or false. ‘Buying a single company’s stock usually provides a safe return than a stock mutual fund.’
 - True
 - False
 - Do not know
 - Refuse to answer

Although these three questions do not demand advanced financial knowledge, approximately only one-third of respondents in the survey were able to answer all three questions correctly (Lusardi & Mitchell, 2014). Lusardi and Mitchell (2014) added more questions measuring financial literacy knowledge. Some questions are related to asset pricing (such as bonds), and other questions test knowledge around fees, credit cards, and other debt. Most of the questions beyond the first two original questions can be more challenging for individuals. Respondents that incorrectly answered the first two questions are unlikely to make good financial decisions (Lusardi & Mitchell, 2014). Insights from the Standard & Poor's Ratings Services Global Financial Literacy Survey authored by Klapper et al. (2015) highlighted

additional test questions closely related to the original three produced by Lusardi and Mitchell (2008). The survey measures four fundamental concepts for financial decision-making: (a) risk diversification, (b) inflation, (c) numeracy (interest), and (d) compound interest (Klapper et al., 2015). The 2018 PISA Assessment administers longer tests consisting of many questions that can take hours to complete (OECD, 2019). Therefore, the different test designs, selection of questions, and wording of questions can have a significant impact on test results.

Objective test-based approaches toward measuring financial literacy have now become the predominant tool used in the literature (Hung et al., 2009). Although the majority of objective test-based measures utilize the original three questions created by Lusardi and Mitchell (2008), test designs, selection of questions, and wording of the test questions vary in nature. This variation between test-based measures introduces skepticism into the objective testing approach used to measure financial literacy levels. It is unclear if objective-based testing is a suitable method for measuring financial literacy. Assuming this method is efficient, it is unclear which questions are most effective for use on financial literacy tests (Hastings et al., 2013). In addition, one may observe that surveys might not incentivize respondents to provide thorough and accurate answers. Thus, surveys may not correctly represent a respondent's actual financial literacy level. Another argument against objective-based testing methods is regarding study designs. Respondents are usually not allowed to utilize other sources of information when taking tests. However, accessing resources such as the internet, financial advisors, friends and family, or other resources are typical shortcuts used by many individuals to compensate for their lack of financial literacy knowledge. The quality of data acquired from household surveys has declined in recent years (Agnew & Harrison, 2015). Potential problems with the quality of data pertain to two issues: (a) household non-response and (b) question non-response. For example, households

with higher levels of financial literacy may have fewer incentives to take the time necessary to complete objective-based tests (household non-response). In addition, those that take the objective-based tests may not put forth the effort to answer a particular question or may race through the test itself (question non-response; Hubrich & Wittwer, 2017). There may be greater inaccuracy of responses due to the type of participating households answering the survey questions (Hubrich & Wittwer, 2017). Also, depending on the wording of the test questions, the respondent's survey answers may differ significantly (Lusardi & Mitchell, 2011a). Therefore, survey design and question framing create variability in data quality when utilizing objective test-based approaches.

Self-Perception and Self-Assessed Measurement. The literature also examines another measure of financial literacy in which respondents utilize self-perception to self-assess their financial literacy levels (Lusardi & Mitchell, 2011a, 2014; van Rooij et al., 2011). This method attempts to measure financial literacy by assessing perceptions of a sample population and involves asking survey respondents for a self-assessment of their financial capabilities. Participants are asked to evaluate their financial knowledge generally using a scale ranging between a set of values. An example of this type of question was used by Lusardi and Mitchell (2014, p. 15):

- On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall financial knowledge?

Many individuals utilizing self-perception to assess their financial literacy levels seem to be overconfident (Asaad, 2015). This overconfident behavior is also confirmed when comparing test-based and self-assessed financial literacy (Agnew & Szykman, 2005). This overconfidence creates problems given the potential consequences of many financial decisions that may involve

large transactions. This may happen in more financial business situations since individuals are generally not aware of their overconfidence bias.

Research has shown that older people have high confidence in their financial literacy levels; however, they do rather poorly on objective test-based questions (Gamble et al., 2015; Lusardi & Mitchell, 2011a; Lusardi & Tufano, 2015). Johnson and Lamdin (2015) showed a divergence between the answers to self-assessed questions (perceived financial knowledge) and objective test-based correct answers (actual financial knowledge). Of those respondents that indicated the highest level on the self-assessment scale, approximately 34% of these respondents scored lower on the actual financial knowledge assessment questions (Johnson & Lamdin, 2015). The results indicate that individuals may often overestimate their financial knowledge. However, observations noted demographic variables such as those over age 55, those who have post-graduate education, and those who earn over \$100,000 are most confident in their financial capabilities (Johnson & Lamdin, 2015). Other research documents gender differences not only in objective test-based but also in self-assessed levels of financial literacy (Bannier & Neubert, 2016; Johnson & Lamdin, 2015; Lusardi & Mitchell, 2014). Women are more likely to self-assess themselves lower in financial knowledge, while men have rated themselves higher in financial knowledge, sometimes demonstrating overconfidence in their financial knowledge levels (Bannier & Neubert, 2016; Johnson & Lamdin, 2015; Lusardi & Mitchell, 2014). While men typically appear to be overconfident in self-assessed knowledge, women tend to be underconfident when assessing their financial knowledge (Bannier & Neubert, 2016). However, overconfidence has been shown to contribute to more proactive stock market participation, risk taking, and thus higher investment returns due to bearing higher investment risks (Atlas et al., 2019).

The relationship between objective test-based measurement and self-assessed measurement of financial knowledge is important to investigate. The literature reveals that self-assessed financial literacy measures and objective test-based measures do not always correlate strongly with financial behavior (Hastings et al., 2013). For example, Agnew and Szykman (2005) documented correlation coefficients between actual and self-assessed financial literacy scores broken down by job title, annual income, and education level. One can observe higher correlations in participants with higher education, higher income levels, and more prestigious job titles such as Professor (Agnew & Szykman, 2005). Other literature finds that both self-assessed and objective test-based measured financial literacy can predict an individuals' inclination to hold stocks (van Rooij et al., 2011). Self-assessed financial knowledge correlates with riskier investments, while objective test-based measured financial literacy correlates with less risky standard investments (Banner & Neubert, 2016). In addition, a drop in self-assessed financial knowledge is associated with a lower probability of sophisticated investment decisions (Banner & Neubert, 2016).

Measuring Financial Literacy by Proxies. The literature examines another measure of financial literacy in which certain proxies are used to measure financial knowledge. Although limited, some research studies have utilized proxies for measuring financial literacy in which factors chosen as proxies strongly correlate with financial literacy levels. Examples of factors used as proxies for financial literacy are wealth, occupation, age, and gender.

A study by Dhar and Zhu (2006) explored the correlation between financial literacy and the disposition effect. Their conclusions prove that higher financial literacy, represented by demographics, relates to a lower disposition effect (Dhar & Zhu, 2006). Demographics such as those individuals with higher income and/or those working in professional careers experience a

lower disposition effect (Dhar & Zhu, 2006). The disposition effect is a phenomenon in behavioral economics that refers to an individual's tendency to sell stocks that have appreciated in price and their hesitancy to sell stocks that are trading below their purchase price (Dhar & Zhu, 2006). Dhar and Zhu (2006) showed a difference in the disposition effect in investors with higher income and professional careers. Other research has shown similar results regarding financial literacy and income. Calvet et al. (2009) showed that financial sophistication increases with wealth and household size. However, there are many variables that could explain these differences, such as the risk tolerance of individuals, financial advice received, different financial goals, and differences in holding period timeframes. Thus, one may conclude that the disposition effect is not a good measure for financial literacy.

Other research provides evidence that proxies are not a good indication of financial literacy. Lusardi and Mitchell (2011b) found that education is highly correlated with financial knowledge, but even at the highest level of education, financial literacy remains low. Therefore, education does not serve as a good proxy for financial literacy (Lusardi & Mitchell, 2011b). Other studies support findings that education is less correlated with financial literacy (Calvet et al., 2009; Hung et al., 2009). Authors utilizing a proxy for financial literacy, such as income, should be aware of the limitations distinguishing the individual effects of financial literacy from the independent effects of the income variable. For example, an individual age 65 who is retired and has a low taxable income could have a large asset base and high levels of financial literacy. A study by Stolper and Walter (2017) attempted to minimize these effects by cross-referencing data with demographic characteristics and direct measures of financial literacy. Their findings show four potential variables that may serve as proxies for financial literacy:

- age

- gender
- education
- professional status, income, and wealth (Stolper & Walter, 2017).

Stolper and Walter (2017) found through the literature that age followed a hump-shaped distribution in which older and younger individuals tend to have lower financial literacy levels compared to middle-aged individuals. An interesting finding in the literature is the difference between test-based and self-assessed financial literacy levels among older individuals. There is a higher difference for individuals over age 60, implying higher levels of overconfidence among individuals in this age category (Stolper & Walter, 2017). A review of the literature shows cognitive abilities associated with decreasing financial literacy, although confidence in financial abilities does not decrease with age (Stolper & Walter, 2017). The idea of numerical ability declining with age but confidence not declining with age is worth further exploration.

Financial Literacy and Investor Behavior. Financial literacy is an important concept itself but is even more important in relating its effect on individual financial behaviors and decision making. Individuals are faced with many financial decisions related to savings, budgeting, debt management, education, retirement, and investments. There is an increasing amount of research on this topic, analyzing the relationship between financial literacy and investor behavior. Research papers show a positive correlation between financial literacy and good financial behavior. However, the definition of “good financial behavior” is ambiguous and difficult to measure. Time serves as an interesting variable in that some financial decisions are made at a point in time, while others are made over a longer period of time. For example, borrowing using a mortgage would be a point in time decision typically done once and does not change over a specific period of time. However, retirement planning is something that is

typically done over a period of time as an individual continuously contributes to retirement accounts and makes investment decisions. In addition, financial decisions are made both on the asset and liability side of an individual's balance sheet. The asset side of the balance sheet refers to how individuals make financial decisions on savings, investments, and retirement funds. The liability side of the balance sheet refers to how individuals make decisions regarding borrowing and debt management utilizing mortgages, credit cards, and other lending solutions. This review analyzes research according to two main categories: (a) budgeting and debt management and (b) savings, retirement planning, and investments.

Budgeting and Debt Management. It is common knowledge for individuals to start their personal financial planning by budgeting their income and expenses. The next step is to begin accumulating savings that can be used for emergency funds or any other liquidity needs in the future. However, 15% of individuals do not have a checking account, and 28% do not have a savings account, money market account, or Certificates of Deposit (Lusardi, 2011). Combining these two variables shows that 12% of the population does not have an account, therefore, they are “unbanked” (Lusardi, 2011). Not having a bank account makes managing liquidity and payments difficult, but also makes it impossible to move on to more sophisticated financial decisions such as saving for retirement and investing (Lusardi, 2011). Research shows education and income are positively correlated with having a checking and/or savings account (Lusardi, 2011). Individuals with higher financial literacy are more likely to be “banked” vs. “unbanked” (de Bassa Scheresberg, 2013). In another study using the 2012 National Financial Capability Study, Birkenmaier and Fu (2015) examined the relationship between financial literacy and alternative financial services (AFS). AFS is generally offered by non-bank providers and includes products and services such as check cashing, pawn shops, payday loans, rent-to-own,

and prepaid cards (Birkenmaier & Fu, 2015). Results of the study showed being unbanked was positively associated with AFS usage after controlling for sociodemographic variables (Birkenmaier & Fu, 2015). AFS is likely to cater to low-income individuals. Research shows financial literacy is low and low-income individuals are disproportionately unbanked (Lusardi & Mitchell, 2007). Approximately 23% of Americans used AFS within the past 5 years (Lusardi, 2011). AFS often carries higher transaction costs and fees, resulting in high-cost borrowing for this segment of the population (Lusardi, 2011).

Debt management is another important financial decision for individuals. Although there are good sources of debt (e.g., mortgages, auto loans, and student loans), there are poor sources of debt such as credit cards, “payday” loans, and other cash advance options (i.e., high-cost borrowing). Although the literature regarding individuals’ financing behavior is limited, there is literature supporting a negative correlation between financial literacy and poor financing decisions (Allgood & Walstad, 2016; de Bassa Scheresberg, 2013; Lusardi, 2008, 2011; Lusardi & Mitchell, 2011a; Lusardi & Tufano, 2015). Therefore, individuals with lower financial literacy are more likely to make poor financing decisions.

Lusardi (2011) found that an increasingly large portion of the population carries debt and engages in behaviors that generate large expenses and fees when managing their debt. A large percentage of Americans pay sizable interest payments and fees, and approximately 20% of Americans used AFS borrowing methods (e.g., payday loans, prepaid cards, pawn shops, etc.) in the past 5 years (Lusardi, 2011). Lusardi (2011) found that many people do not seem knowledgeable about borrowing, do not know the terms of their mortgages or the interest rates they pay on their loans, and the majority lack basic numeracy and knowledge of fundamental economic principles such as the relationship between prices and interest rates. A study by de

Bassa Scheresberg (2013) using 2009 NFCS data showed that only 49% of young adults (age 25 to 34) with a college education were able to correctly answer three simple questions to assess financial literacy. Individuals that show higher financial literacy are more likely to make better financial decisions and less likely to use high-cost borrowing solutions (de Bassa Scheresberg, 2013). This confirms results by Hilgert et al. (2003), which showed higher knowledge leads to better savings, debt management, and investments.

Debt literacy is a component of financial literacy that measures knowledge around borrowing and debt usage (Lusardi & Tufano, 2015). Lusardi and Tufano (2015) showed that debt literacy is low, with only one-third of the population understanding the basic principles of interest compounding. Individuals with lower debt literacy are more likely to participate in high-cost borrowing, have excessive debt loads, and are unable to judge their debt position (Lusardi & Tufano, 2015). Both actual and perceived financial literacy can help create better financial behavior regarding credit card borrowing, debt management, investments, and seeking financial advice (Allgood & Walstad, 2016). Perceived financial literacy is found to be a stronger predictor of less costly credit card use compared to actual financial literacy (Allgood & Walstad, 2013). Allgood and Walstad (2013) showed that the combination of a subjective assessment of financial literacy (perceived financial literacy) and an objective assessment of financial literacy (actual financial literacy) provides a more comprehensive analysis of financial literacy on credit card behavior. Allgood and Walstad (2013) analyzed five different credit card behaviors: (a) always paying a credit card balance in full, (b) carrying over a credit card balance and being charged interest, (c) making only a minimum payment on a credit card balance, (d) being charged a fee for a late payment, and (e) being charged a fee for exceeding a credit limit. These results held consistent for all age groups analyzed during the study (Allgood & Walstad, 2013).

Other research supports the notion that perceived financial knowledge is important for positive financial behaviors such as paying off credit card balances, having an emergency fund, and saving for retirement (Henager & Mauldin, 2015). The importance of financial literacy cannot be understated. Individuals with higher financial literacy are twice as likely to have lower costs of debt on credit cards and mortgage loans (Huston, 2012). Similar results have been found across the world. A study by Yoong et al. (2012) found that financial literacy helps Malaysians prepare better for retirement by accumulating more savings and having less debt. The literature supports substantial evidence that higher financial literacy contributes to lower-cost borrowing and less debt for individuals.

Savings, Retirement Planning, and Investments. A review of the literature widely supports a positive correlation between financial literacy, savings, retirement planning, investing, portfolio choice, and wealth accumulation (Allgood & Walstad, 2016; de Bassa Scheresberg, 2013; Hastings & Mitchell, 2018; Hilgert et al., 2003; Jappelli & Padula, 2014; Lusardi, 2008, 2011; Lusardi & Mitchell, 2007; Lusardi & Mitchell, 2011a; Lusardi & Mitchell, 2014; Lusardi & Tufano, 2015). An individual's adult life cycle generally begins with the opportunity to save money and earn compound interest. However, the time at which an adult begins their career varies as some choose to work immediately upon graduating high school while others continue their studies at a college or university. Nonetheless, the theory of compound interest logically outlines that more time investing and saving should yield larger wealth. However, financial literacy is low among U.S. investors, and therefore, many people fail to take advantage of compound interest as they should (Lusardi & Mitchell, 2011a).

Since 1980 individuals are taking on increasing responsibility for securing their own retirement as employers have eliminated defined benefit pension plans and reduced benefits

altogether (Lusardi & Mitchell, 2011a). Individuals now rely on defined contribution plans and IRAs to save for their retirement (Lusardi & Mitchell, 2011a). In addition, the Internet and a decrease in asymmetric information flow to the small investor have empowered small investors to take greater control of their personal investments (Mitchell & Smith, 2004). An increase in web-based research tools, lower brokerage costs, and easier access to financial data have led to an increase in do-it-yourself investing among individual investors (McClintock, 2014). However, financial literacy is low and therefore results in a lack of retirement planning and reluctance to get financial advice among Americans (Lusardi, 2008). Most Americans fail to plan for retirement, fail to plan for their children's college education, do not have enough savings for emergencies, and carry large amounts of debt (Lusardi, 2011).

Among those with lower financial literacy levels, research shows that low-income individuals are disproportionately unbanked, and many are not able to save for retirement (Lusardi & Mitchell, 2007). Lower financial literacy contributes to larger wealth inequality (Lusardi et al., 2017). Based on how social insurance programs work in the United States, individuals with higher education have the most to gain from investing in financial literacy (Lusardi et al., 2017). Lusardi et al. (2017) estimated that approximately 30 to 40% of wealth inequality could be explained by financial literacy. Wealthier and more educated households generally make fewer financial mistakes (Calvet et al., 2009). Calvet et al. (2009) analyzed individuals in Sweden over a 4-year period to investigate diversification (more precisely, lack of diversification), inertia in risk taking, and the disposition effect indirect stock holdings. Results show that financial wealth, education, and family size have a negative correlation on the three investment mistakes: (a) diversification, (b) risk taking, and (c) the disposition effect (Calvet et al., 2009). These results are consistent with previous research showing individuals with higher

financial literacy, measured through proxies of wealth and education, experience a lower disposition effect (Dhar & Zhu, 2006). One may conclude that higher financial literacy results in better investment behavior, although these studies are not without their limitations. A study by Schmeiser and Seligman (2013) found no significant relationship between financial literacy and change in wealth over time. This study highlights limitations in measuring financial literacy and its ability to predict wealth accumulation (Schmeiser & Seligman, 2013). Schmeiser and Seligman (2013) investigated the accuracy of objective test-based questions used to measure financial literacy and their relationship to financial well-being. The results show that individuals do not consistently answer questions across survey waves (Schmeiser & Seligman, 2013). In addition, the context in which the questions are worded or asked can have a significant effect on whether the question is answered correctly (Schmeiser & Seligman, 2013). Other research suggests investing in financial literacy may not be the correct answer, and instead, introducing more regulatory measures (Hastings et al., 2013).

Despite certain limitations, the literature highlights the importance of financial literacy and how it affects individual behavior. Hastings and Mitchell (2018) showed that higher financial literacy is correlated with better retirement savings. Not only is there significance in understanding basic economic concepts such as inflation and compound interest, but there also exists significance in other biases relating to suboptimal financial decisions (Hastings & Mitchell, 2018). Hastings and Mitchell (2018) found that impatience and present-bias is a strong predictor of wealth and optimal financial decision-making. These results build on existing literature supporting a positive correlation between financial literacy and retirement savings (Allgood & Walstad, 2016; de Bassa Scheresberg, 2013; Hastings & Mitchell, 2018; Hilgert et al., 2003; Jappelli & Padula, 2014; Lusardi, 2008, 2011; Lusardi & Mitchell, 2007; Lusardi &

Mitchell, 2011a; Lusardi & Mitchell, 2014; Lusardi & Tufano, 2015). Jappelli and Padula (2014) constructed an intertemporal choice model showing a positive correlation between early adoption of financial literacy and wealth accumulation later in life. Results showed a negative correlation between financial literacy and social security programs (Jappelli & Padula, 2014).

The support for financial literacy programs is found all over the world and for specific demographic groups. Lusardi and Mitchell (2011b) found that financial literacy is low around the world, which has a negative effect on retirement planning and wealth accumulation. Yoong et al. (2012) found that financial literacy helps Malaysians prepare better for retirement by accumulating more savings and having less debt. Financial literacy affects investing behavior in the United Arab Emirates (UAE), and more financial literacy is needed (Al-Tamimi & Kalli, 2009). Al-Tamimi and Kalli (2009) showed financial literacy is affected by income level, education, workplace activity, and specifically gender. Results show women have a lower level of financial literacy than men (Al-Tamimi & Kalli, 2009). Other research supports these results indicating women generally have low financial literacy levels (Lusardi, 2008, 2011; Lusardi & Mitchell, 2007, 2011a, 2011b, 2014; Lusardi et al., 2014). Gender differences in investing result in women accumulating less wealth due to lower financial literacy (Bannier & Neubert, 2016). Agnew and Harrison (2015) found that men score better on financial literacy quizzes than women. Lusardi et al. (2014) observed that women, the least educated, and minority individuals are most affected. In addition, the older population over the age of 75 is not financially literate (Lusardi et al., 2014). Other research suggests financial literacy decays over time, just as all education does (Fernandes et al., 2014). A study by Xiao et al. (2015) using 2012 NFCS data shows financial capability increases with age, and younger adults scored the lowest on objective financial literacy, subjective financial literacy, and perceived financial capability. Overall

research regarding age suggests financial literacy may follow a bell-shaped curve in which financial literacy peaks for middle-aged adults. Fernandes et al. (2014) recommended just in time financial literacy programs to address low financial capability issues. The literature presents strong evidence of the importance of financial literacy around the world and for certain demographic groups in promoting positive financial behaviors.

Another noteworthy finding in the literature is a positive correlation between financial literacy and stock market participation (Agnew & Szykman, 2005; Allgood & Walstad, 2016; Bellofatto et al., 2018; Dhar & Zhu, 2006; Jappelli & Padula, 2014; Lusardi, 2011; van Rooij et al., 2011). Financial sophistication is positively related to stock market participation in retail investors (van Rooij et al., 2011). Financial literacy helps create better financial behavior with investments and seeking financial advice (Allgood & Walstad, 2016). Along with financial knowledge, individuals that express higher levels of future orientation are more likely to invest and contribute to retirement savings (Howlett et al., 2008). Jappelli and Padula (2014) found a positive correlation between financial literacy, portfolio choice, and wealth accumulation using intertemporal evidence. The authors analyze cross-country data and find empirical support that stock market participation and financial literacy are positively correlated (Jappelli & Padula, 2014). Higher financial literacy, measured through proxies of wealth and education, experiences lower disposition effects, thus resulting in better investment behavior (Dhar & Zhu, 2006). Financial literacy helps individuals make better investment decisions, better trading results, and investment returns (Bellofatto et al., 2018). Results show that individuals who report higher levels of subjective financial literacy are less prone to the disposition effect, concentrate their portfolios on a smaller set of stocks, and achieve their diversification through investment funds

(Bellofatto et al., 2018). Overall, the research suggests a positive correlation between financial literacy and stock market participation.

In summary, financial literacy is explored through definition, measurement, and application through financial behaviors. The definition of financial literacy is not universally accepted among professionals in academic literature. A broad definition of financial literacy is for one to use knowledge and skills to manage financial resources effectively for future well-being. Financial literacy is often measured using three main methods: (a) objective testing, (b) self-perception or self-assessed responses, and (c) measurement by proxy. There does not exist a universally accepted measurement method of financial literacy, considering the different measurement methods that have been used throughout the literature. It is important to understand financial literacy and its effect on individual financial behaviors and decision-making. Individuals are faced with many financial decisions regarding savings, budgeting, debt management, retirement, and investments. A review of the literature supports a positive relationship between financial literacy levels and good financial behavior.

Overconfidence

Overconfidence is a developed psychological theory that gained attention during the mid-twentieth century within the fields of psychology, sociology, neurology, and economics. Research in these fields presents several definitions, measurements, and applications of the theory. The depth of research in these distinct fields creates difficulty in maintaining the full picture of overconfidence without oversimplifying the concept or creating shortcuts that result in misrepresentation of the topic. The literature reveals a vast array of definitions, measurements, and applications within the fields of finance and economics. Although overconfidence is a well-defined psychological concept, researchers continue to analyze definitions, measurements, and

applications in several academic disciplines. Some definitions and measurements of overconfidence found in finance literature may not be practiced by psychologists or other academic researchers. Finance and economics literature applies the concept of overconfidence to explain several phenomena in finance that cannot be explained by standard theory. Some of these phenomena such as security valuations, excessive trading, underperformance, and unfavorable mergers and acquisitions undertaken by companies, are often explained by overconfident behavior in the literature.

The field of behavioral finance is investigated further regarding overconfidence to provide a more focused approach to defining, measuring, and analyzing overconfident behavior. The first generation of behavioral finance largely accepted the traditional notion of people's wants as "rational" wants, referring to the expectation of high returns and low risk (Statman, 2019). This first generation of behavioral finance research adopted traditional finance definitions, which often described people as "irrational," referring to people who were misled by cognitive and emotional driven errors in their behavior (Statman, 2019). However, this new generation of behavioral finance, or the second generation of behavioral finance, describes people as "normal," which means people are neither "rational" nor "irrational" (Statman, 2019). This description refers to the fact that it is normal for people to use cognitive shortcuts in everyday decision-making responsibilities and choices. Research on overconfident behavior is further explored with both behavioral finance generation constructs offering structure to the literature.

Defining Overconfidence. Literature has presented several definitions for overconfidence over the past several decades. Overconfidence has recently been defined in the literature within three different constructs: (a) overestimation, (b) overplacement, and (c)

overprecision (Moore & Healy, 2008). Overestimation refers to the estimation of one's actual ability, performance, level of control, or chance of success; overplacement is when one believes their performance is better than others; and overprecision refers to the excessive certainty of the accuracy in one's beliefs (Moore & Healy, 2008). Moore and Schatz (2017) also leveraged the three different constructs when defining overconfidence. Simplifying the three constructs of overconfidence, Moore and Schatz (2017) discussed overestimation as thinking that one is better than they are, overplacement believes that one is better than others, and overprecision as excessive certainty one knows the truth. Additional literature has leveraged this construct when defining overconfidence. Merkle (2017) defined overconfidence under the three constructs as slightly different by stating that overprecision is the overestimation of unknown values, overplacement is when one places more self-value than others in a group, and overestimation is when one overestimates their abilities and performance.

Not all literature utilizes all three constructs, and some studies may only utilize one construct or not define it at all. A search of the PsycINFO database using the word overconfidence returned approximately 263 empirical studies, of which approximately 64% defined overconfidence as overestimation, five percent defined it as overplacement, and approximately 31% defined it as overprecision (Moore & Healy, 2008). The literature also reveals slight variations in the definition of overconfidence for each construct. For example, Ehrlinger et al. (2016) defined overconfidence as one's overly positive perceptions compared to others. This construct most likely resembles overplacement. Overplacement has also been defined as an overestimation of one's rank in a population on some positive dimension (Daniel et al., 1998). Other literature often replaces the definition with a measurement of overconfidence. For example, Levy and Tasoff (2017) defined overconfidence as the difference in optimal

willingness to pay (WTP) and actual WTP where optimal WTP is defined as the earnings-maximizing WTP. Although no clear definition is provided, Levy and Tasoff (2017) referenced literature discussing “illusory superiority,” most closely reflecting overplacement. Another example in which overplacement may be implied is having participants rank their abilities compared to other participants (Murphy et al., 2017).

Overestimation is another construct that offers variations in definition. Overestimation is defined as overconfident individuals who tend to believe that their information or their estimates are more accurate than they actually are (Ancarani et al., 2016). However, Ancarani et al. (2016) also added to the definition by stating individuals hold superior skills and abilities than average. This most resembles overplacement as opposed to overestimation. Overestimation has also been defined as the psychological tendency of individuals to overestimate their own knowledge and abilities (Mihaylov et al., 2015). Another definition of overestimation used in the literature is the disproportional confidence in the accuracy of one’s own forecasts (Cieslik et al., 2018). In addition, Cieslik et al. (2018) also added to the definition as the difference of entrepreneur ambitions and actual realizations. Lewis (2018) defined overestimation as an individual’s tendency to overestimate their performance and knowledge. Other literature defines overconfidence through the overestimation construct as both precision and forecasting (Parhi & Pal, 2021). The forecasting aspect is most closely related to overestimation, while the precision aspect is more closely related to the overprecision construct.

Overprecision is another construct of overconfidence defined as a belief that one knows more than one actually does (Barber & Odean, 2013). Another definition used in the literature is an excess of confidence in one’s abilities or judgment or confidence that is not justified (Brunzel, 2021). Abreu and Mendes (2012) defined overconfident investors as those who believe they

know more than they actually do. Other literature offers similar definitions of overconfidence within the overprecision construct as the combination of high perceived and low actual knowledge (Cude et al., 2021). Barber et al. (2020) also referenced literature pointing to overprecision as the definition of overconfidence. Daniel et al. (1998) added to the definition as overestimating the accuracy of one's beliefs. Other literature may not directly define overconfidence through the overprecision construct but instead imply the construct. Humphery-Jenner et al. (2016) implied overprecision based on their measurement of the difference in option valuations. Kumar and Goyal (2016) did not offer a direct definition but implied overprecision as the definition of overconfidence through the literature. Other literature points to the overprecision of one's financial literacy and/or illusion of control (D'Hondt et al., 2021).

Other literature, often presented by psychologists and economists, describes the definition of overconfidence differently. Research has defined overconfidence in the context of illusion of control, miscalibration, and the better-than-average effect. These definitions appear to be similar to the three constructs already presented but offer slight differences within the literature. Phan et al. (2018) discussed overconfidence with regard to the miscalibration, self-attribution, and illusion of control cognitive biases. Miscalibration is defined as the overestimation of the precision of one's private information signals (Phan et al., 2018). Psychologists have often defined and measured calibration on the basis of general knowledge questions generated by researchers in which participants answer a set of questions and then assess the probability that the given answer was correct. Therefore, miscalibration is the difference between the accuracy rate and probability assigned that the specific question is correct. Calibration is defined as the degree of correspondence between stated probabilities and observed frequencies (Angner, 2006). Defining overconfidence with respect to precision and forecasting is a form of miscalibration

(Parhi & Pal, 2021). Barber et al. (2020) defined overconfidence as a belief that one knows more than one actually does, referring to this as miscalibration. Gupta (2020) defined miscalibration as the belief that an investor's information is more precise than it actually is. Other literature implies miscalibration as the definition of overconfidence. Lewis (2018) discussed overestimating one's performance and knowledge, while Pikulina et al. (2017) defined overconfidence as the difference between a person's belief about their competence in financial knowledge and their actual competence. The literature offers similar definitions of the miscalibration and overprecision constructs.

One may correlate miscalibration with overprecision, better-than-average effect with overplacement, and overestimation as the illusion of control. It is known in psychological research that people tend to have an unrealistically positive view of themselves. When comparing oneself to a close group, an individual is likely to believe they are superior to an average representative of that group (Ehrlinger et al., 2016). Overconfident individuals tend to believe they hold superior skills than average individuals, also known as the better-than-average effect (Ancarani et al., 2016). This construct of overconfidence most closely aligns with overplacement. Similarly, one might correlate overestimation with the illusion of control, although they are quite different. Psychological research has demonstrated that individuals believe they are able to influence events that are governed purely by chance, often referring to this phenomenon as the illusion of control. This is different from overestimation, which refers to an individual overestimating one's performance or abilities (Lewis, 2018). However, each construct can have overlapping characteristics. For example, in an experiment in which individuals are tasked with guessing the outcome of a coin flip, although the coin flip is due to pure chance (illusion of control), individuals feel they can guess the outcome of the flip more

than they actually can (overestimation). Each of these is a construct to the definition of overconfidence but has slight variations in definition. Often the literature accepts the definition of overconfidence without defining a construct or fails to define it at all (Kumar & Goyal, 2016; Mudzingiri et al., 2018; Spiwoks & Bizer, 2018). Other definitions may not be clear as to the construct being used. For example, Chandra et al. (2017) defined overconfidence as a measure of self-perceived confidence in retail investors. This definition does not specifically point to a construct and may include all of them at once. Other literature may use measurement as the definition of overconfidence, such as the number of correct answers to a range of questions (Kim et al., 2021). Finally, overconfidence is sometimes defined by proxy or previous literature built upon multiple constructs that imply overconfidence, as opposed to just one (Foo et al., 2020). Research has not provided a standardized definition of overconfidence but has shown multiple constructs that make up the definition. One can see how the definition of overconfidence is still being developed through the literature. There is no universally accepted definition.

Measuring Overconfidence. Similar to the definition of overconfidence, there is no standardized measure of overconfidence. The concept of overconfidence being a mental, emotional, and intangible behavior introduces challenges in defining and measuring the phenomenon. This behavior is very subjective and potentially unique to everyone creating variations in interpretations. However, just as research has presented literature to define overconfidence through different constructs, the literature has attempted to provide measures of overconfidence.

The most common measure of overconfidence leverages the difference between actual and perceived knowledge and/or abilities (Abreu & Mendes, 2012; Ancarani et al., 2016; Barber et al., 2020; Barber & Odean, 2013; Brunzel, 2021; Cieslik et al., 2018; Cude et al., 2021;

D'Hondt et al., 2021; Ehrlinger et al., 2016; Gupta, 2020; Lewis, 2018; Mihaylov et al., 2015; Moore & Healy, 2008; Mudzingiri et al., 2018). Although there are variations of measurement demonstrated in the literature, the majority of measurements tend to fall under the difference between a self-assessed measurement and an actual measurement. For example, Abreu and Mendes (2012) measured overconfidence as the difference, if positive, between self-reported and actual financial knowledge, whereas Ancarani et al. (2016) measured overconfidence as the difference between expected results and actual results. This most likely resembles a measurement of the overestimation construct. However, overconfidence was also measured as the difference between an individual's expected results and their ability to finish above their peers (Ancarani et al., 2016). This measurement focuses on the overplacement and/or better-than-average construct. Overestimation is measured by the difference between a participant's actual score on a test from their reported estimated score, and overplacement is measured by the difference between an individual's belief of their own expected performance and the expected performance of others, corrected by the difference of that individual's actual performance and the performance of others (Moore & Healy, 2008). One can see that measurements can vary depending on which definition of overconfidence is used. Overconfidence has been measured as the difference between self-assessed knowledge and tested knowledge using a respondent's percentile rank of self-assessed investment less the percentile achieved on an investment quiz (Barber et al., 2020). Lewis (2018) also measured overconfidence by utilizing a test that measured objective knowledge and subjective knowledge. Cude et al. (2021) measured overconfidence as the combination of high perceived and low actual knowledge. This measurement requires both high levels of perception and low actual knowledge levels as opposed to a different measurement which technically could result in higher or normal actual knowledge

levels. Other measurements are very specific to a particular study. Cieslik et al. (2018) measured overconfidence as the difference between predicted results and actual results using macro level measurements such as the Global Entrepreneurship Model (GEM) data over a long period of time. Other measures use Graduate Record Examinations (GRE) multiple choice test questions asking how a participant compares to their peers (Ehrlinger et al., 2016). This basis of comparison falls under the overplacement construct. Measurements of overconfidence have used a seven-point Likert scale with a neutral score being in the middle and three points on each side, measuring overconfidence and underconfidence (Mihaylov et al., 2015). This measurement invites more subjectivity in results and can be misinterpreted. It is argued that Likert scales are misleading because the measures are unincentivized and cannot quantify magnitude due to the arbitrary scale of the Likert measures (Levy & Tasoff, 2017). The measures are ambiguous on whether people are overconfident about their estimation ability or about other features of financial decision-making (Levy & Tasoff, 2017). A more robust measure of overconfidence is taking the difference between actual knowledge or abilities and self-perceived knowledge and abilities (Barber & Odean, 2013; Brunzel, 2021; D'Hondt et al., 2021; Gupta, 2020; Mudzingiri et al., 2018). This measurement is the most used within the literature, whether it is directly or indirectly applied through previous studies.

There are other methods used to measure overconfidence, such as theoretical mathematical models, measurement by proxy, and other unique methods. Daniel et al. (1998) measured overconfidence through a mathematical model assigning overconfidence as a private information signal. Another method compared a sequence of models of investor trading activity and security prices to rational agent asset-pricing theories, such as excessive trading volumes and predictable security returns (Daniel & Hirshleifer, 2015). Kim et al. (2021) estimated

overconfidence by utilizing the residuals from the regression of the self-evaluation on objective investment literacy. Structural equation modeling using both qualitative and quantitative data has been used to measure overconfidence (Parhi & Pal, 2021). Measuring the better-than-average effect often requires a participant to assess their ability, knowledge, and achievements and assign a probability of success to their outcome (Pikulina et al., 2017). Confidence intervals are often used to measure overconfidence under all three constructs (Phan et al., 2018). Measurement by proxy is sometimes used to assess overconfidence. Overconfidence is measured by proxy using gender, education, trading frequency, and other variables that have demonstrated a positive correlation in assessing overconfidence. Humphery-Jenner et al. (2016) measured overconfidence by proxy using the value of options and their execution. Considering overconfidence is largely demonstrated through stock market activity, the literature leverages several measurement variations to assess overconfident behavior. Merkle (2017) measured overconfidence as the difference between portfolio return expectations and market return expectations. Angner (2006) measured overconfidence through the difference between an assigned probability of success and actual results. For example, a given number of stock analysts estimate a stock price moving up over a specific period and will demonstrate a specific level of success for their predictions (Angner, 2006). Phan et al. (2018) measured overconfidence through the miscalibration construct by asking participants to state their 90% confidence intervals for forecasting a stock index for 1 year. This measurement offers similar comparisons to the overestimation construct in which overconfidence is measured as the difference between expected returns and realized returns in the stock market (Merkle, 2017). Other unique approaches measured overconfidence as the difference in a subject's willingness to pay for a spreadsheet to obtain correct answers to a problem (Levy & Tasoff, 2017) and by getting self-

perceptions on intelligence and athletic ability and comparing them to actual results (Murphy et al., 2017). Chandra et al. (2017) measured self-confidence as a direct measure of self-perceived confidence in retail investors. Sometimes overconfidence is not directly measured at all, or the measurement is unclear (Gamble et al., 2015; Kumar & Goyal, 2016; Moore & Schatz, 2017; Spiwoks & Bizer, 2018). It remains that no universal method is used to measure overconfidence, although the majority of research utilizes an approach that captures the difference between actual results and an estimated or self-perceived result by an individual.

Overconfidence and Investor Behavior

Overconfidence has been examined in many aspects of business in different industries. All people are capable of being overconfident, and therefore all professions are likely to have overconfident individuals. Since overconfidence has three constructs that are slightly different from each other, they are likely to be demonstrated with variation in different conditions. There is not a unifying personality characteristic that explains the variation in overconfidence. Overestimation and overplacement respond in opposite ways to task difficulty, while overprecision is generally not affected by it (Moore & Schatz, 2017). Overprecision appears to be more persistent than the other two constructs but reduces the magnitude of both overestimation and overplacement (Moore & Healy, 2008). People will overestimate their actual performance on difficult tasks while believing they are worse than others and underestimate their actual performances on non-difficult tasks while mistakenly believing they are better than others (Moore & Healy, 2008). These differences result in several variations of overconfidence contributing to the subjectivity of the concept. Traditional methods of measuring overconfidence can lead to misjudgment of overconfidence, and researchers are susceptible to overestimating overconfidence and demonstrating overconfidence themselves (Spiwoks & Bizer, 2018). A

review of the literature mostly focuses on overconfident investors as it relates to the stock market in which investors demonstrate excessive trading and underperformance of major benchmarks. In addition, overconfidence plays a role in seeking help or financial advice from a professional. The literature reveals overconfidence in executives managing a business, different levels of overconfidence in gender, geographical differences in overconfidence, and other unique situations. Overconfidence under these various situations is explored further.

Daniel et al. (1998) developed a theory based on changes in confidence resulting from biased self-attribution, implying that investors overreact to private information signals and underreact to public information signals. The overreaction to private information signals demonstrates heightened confidence levels from self-attribution bias. However, advice individuals receive from friends and family results in less trading, while advice received from financial professionals and specialized sources tends to cause individuals to trade more frequently (Abreu & Mendes, 2012). This increase in trading is a result of a public information signal as opposed to a private information signal which is contrary to the overconfidence theory. Individuals who invest in information tend to trade more in financial products (Abreau & Mendes, 2012). Therefore, one may assume as individuals invest more in information, they tend to be more confident. It is known that individual investors underperform standard benchmarks, sell winning investments while holding losing investments (disposition effect), are heavily influenced by past performance, engage in reinforcement learning by repeating past behaviors that coincide with a positive experience while avoiding behaviors associated with a negative experience, and tend to hold undiversified stock portfolios (Barber & Odean, 2013). These characteristics and individual biases show how overconfidence leads to excessive trading activity, higher risk taking, and less diversification of investment portfolios (Merkle, 2017).

There is a moderate impact of overconfidence among investors in normal life and their decision-making with respect to trading, analysis, overreaction, and forecasting (Parhi & Pal, 2021).

Merkle (2017) found an influence of overprecision and overestimation on diversification decisions, overplacement on trading activity, and overplacement on risk taking in investment portfolios. Self-perceived confidence levels and self-reported portfolio sizes are positively correlated, implying overconfident retail investors believe their investment skills are superior and that their portfolios will perform better than standard benchmarks (Chandra et al., 2017).

Investors' self-perceived confidence is a function of both expected and unexpected changes in the market and personal factors, which largely determine trading behaviors (Chandra et al., 2017). Therefore, overconfident investors typically hold larger than average investment portfolios (Chandra et al., 2017). Pikulina et al. (2017) showed that investment risk levels chosen by individuals are positively correlated with their overconfidence levels and that individuals with overconfidence in their financial knowledge tend to overinvest, thus choosing higher investment risk levels compared to their peers. This may explain why overconfident investors use margin, have low security selection ability, trade more frequently, use more leverage, are speculative in nature, and perform worse than standard benchmarks (Barber et al., 2020). Overconfident retail investors use leveraged exchange-traded fund (ETF) products, often resulting in trading too frequently and suboptimal returns (D'Hondt et al., 2021). It has been proposed that overconfidence should be added as a component to asset pricing models to describe reasons for anomalies such as excessive trading, suboptimal performance, and patterns of return predictability (Daniel & Hirshleifer, 2015). Investors with higher financial literacy are less likely to buy on margin, trade less frequently, and have more diversified portfolios (Kim et al., 2021). Foo et al. (2020) proposed that the recently increased role of index investing is a result of lower

overconfidence levels in the market. However, one may propose a theory that increased reliance on index investing demonstrates overconfidence that index investing is superior to all other strategies and not subject to inefficiencies.

When it comes to seeking financial advice, one may hypothesize that overconfident investors are less likely to seek advice while underconfident investors are likely to seek advice. Literature supports the hypothesis that overconfident investors are less likely to seek professional advice (Lewis, 2018; Mihaylov et al., 2015), and those overconfident investors make poor investment decisions resulting in potential negative long-term consequences (Lewis, 2018). Individuals showing higher levels of exponential-growth bias demonstrate high overconfidence (Levy & Tasoff, 2017). Levy and Tasoff (2017) showed that individuals with overconfidence would benefit the most from advice but have lower demand for it, while those that exhibit too much demand for advice may not need it as much. Individuals experiencing decreases in cognition show an increased likelihood of getting help with financial decisions, although many people experiencing significant drops in cognition still do not get help (Gamble et al., 2015). Gamble et al. (2015) found that a decrease in cognition is associated with a decrease in financial literacy, a decrease in episodic memory and visuospatial ability are associated with a decrease in numeracy, and a decrease in semantic memory is associated with a decrease in financial knowledge. A decrease in cognition predicts a drop in self-confidence in general, but surprisingly it is not associated with a drop in confidence in one managing their own finances (Gamble et al., 2015). People with higher confidence in their own financial literacy are less likely to seek financial advice, but there is no relation between objective measures of literacy and seeking financial advice (Kramer, 2016). This implies that self-perception of financial literacy plays a larger role than actual financial literacy levels when seeking professional advice. In

addition, overconfident consumers are less likely to seek professional financial advice in saving and investment decisions but are more likely to exhibit demand for advice related to debt counseling and tax planning (Porto & Xiao, 2016). Seeking financial advice may come in different forms, such as utilizing a professional, utilizing an online tool or software program, and or using third-party research and content. Bellofatto et al. (2018) found that the majority of individuals looking for an advice tool for choosing stocks felt they had good knowledge around risk and investing. This potentially contradicts the notion that overconfident investors do not seek financial advice, assuming those self-confident individuals were indeed overconfident. When it comes to seeking professional financial advice, most literature supports the hypothesis that overconfident investors do not seek financial advice, although more research is needed to confirm this relationship.

Overconfident behavior is found in many businesses, industries, professions, and countries around the world. A review of the literature finds that demography, training, investment knowledge and skills, past experiences, successes and failures, and information are key drivers of overconfidence under different situations (Gupta, 2020). Overconfidence can either rise or fall with objectively measured financial knowledge (Cude et al., 2021). Professionals with higher status titles, such as doctors, attorneys, economists, and other experts, are the victim of overconfidence and their own environment, which helps exacerbate their behavior (Angner, 2006). Ehrlinger et al. (2016) found that people with a fixed theory of intelligence who mostly avoided negative information were more overconfident than those who were more open-minded to all information. One area of focus on overconfident behavior examines executives and high-level managers and their likeliness to be overconfident in their decision-making abilities. Narcissism is a characteristic that is considered “extreme self-

confidence” and is likely to be highly correlated with overconfident behavior (Brunzel, 2021). There is extensive research on Chief Executive Officers (CEOs) and overconfident behavior by analyzing their cognitive decision-making process (Brunzel, 2021). Firms offer incentive-heavy compensation to overconfident CEOs to exploit their positively biased views of firm opportunities (Humphery-Jenner et al., 2016). Overconfident CEOs often receive more stock option compensation, and this method of compensation increases with CEO bargaining power (Humphery-Jenner et al., 2016). Overconfident decision-making can result in both good and bad outcomes if executives are able to take larger risks that provide excellent returns to shareholders (Brunzel, 2021). These good decisions are likely to be rewarded with higher compensation. However, poor decisions made by overconfident CEOs are likely to result in a change in leadership. The majority of CEOs in the United States are male, and perhaps gender plays a role in overconfident behavior.

Literature reveals men are generally overconfident, are more overconfident than women, and that women are generally underconfident (Spiwoks & Bizer, 2018). Kumar and Goyal (2016) found that male investors are more prone to overconfidence and herding bias in India. Male active traders are generally more aggressive regarding taking risks, and their risk-taking abilities are more overconfident than their female counterparts, subject to their age (Gupta, 2020). Overconfidence is also found all around the world and at all different ages. Mudzingiri et al. (2018) found that university students with low financial literacy levels are more overconfident, risk loving, and impatient. Murphy et al. (2017) found evidence that overconfidence in high school boys in their sporting ability predicted increased effort but did not predict improvements in ability over time. In addition, overconfidence in sporting ability is associated with increased social success over time in several domains, however, intellectual

overconfidence did not show improvement over time (Murphy et al., 2017). Overconfidence is a human characteristic and therefore has no boundaries. Entrepreneurial overconfidence is found in all European countries, and new member countries experienced higher levels of overconfident behavior (Cieslik et al., 2018). Behavioral biases found in Western countries are also apparent in Vietnamese investors, who have higher trading frequency and slightly better diversification compared to European, United Kingdom, and American investors (Phan et al., 2018). Self-attribution bias, dependence on advice from social networks, risk tolerance, and time horizon are associated with excessive trading, while diversification is correlated with educational background (Phan et al., 2018). Overconfident investors are more likely to invest a higher proportion of their wealth in individual stocks (Phan et al., 2018). Overall, overconfident behavior is found all over the world and in many environments applicable to both personal and professional aspects of life. Further research within specific constructs has the potential to uncover analysis and predictability that can benefit individuals in recognizing overconfident behavior and its potential consequences.

In summary, overconfidence is explored through definition, measurement, and application to financial behaviors. The definition of overconfidence is not universally accepted among professionals in academic literature. A more recent and broad definition of overconfidence includes three different constructs: (a) overestimation, (b) overplacement, and (c) overprecision (Moore & Healy, 2008). These constructs correspond to the miscalibration, better-than-average effect, and illusion of control constructs known in psychological research. Although there is no standard measurement of overconfidence, it most often is measured as the difference between actual and perceived knowledge and/or abilities (Abreu & Mendes, 2012; Ancarani et al., 2016; Barber et al., 2020; Barber & Odean, 2013; Brunzel, 2021; Cieslik et al.,

2018; Cude et al., 2021; D'Hondt et al., 2021; Ehrlinger et al., 2016; Gupta, 2020; Lewis, 2018; Mihaylov et al., 2015; Moore & Healy, 2008; Mudzingiri et al., 2018). There does not exist a universally accepted measurement of overconfidence. It is important to understand overconfidence and its effect on individual financial behaviors and decision-making. Individuals are faced with many financial decisions regarding savings, budgeting, debt management, retirement, and investments. Overconfidence has been found in individual investors trading their portfolios, executives managing a business, and all over the world in many different environments. A review of the literature supports the idea that overconfidence leads to excessive risk taking, poor performance, excessive trading, lack of diversification, and poor decision-making. However, literature also supports the benefits of overconfidence, such as higher risk investments leading to larger investment portfolios and better stock market participation. Further research is warranted to better understand the relationship between overconfidence and certain financial behaviors.

Summary of Section 1 and Transition

The review of the professional and academic literature provided a detailed foundation for the underlying elements associated with the research problem. Financial literacy is low in the United States, and individuals demonstrate overconfident behavior when making investment decisions. The literature review addressed the underlying elements of this problem, the history of financial literacy and overconfidence, and the impact of comparing relevant research findings. Definitions, measurements, and application to individual behavior were explored for both financial literacy and overconfidence. The literature revealed that financial literacy is low, and individuals demonstrate overconfident behavior. The relationship between financial literacy and overconfident behavior is further explored. The next section provides information about the

details of the analysis. The role of the researcher, the participants, and the specific research methodologies will be discussed. Data collection and analysis details are discussed to provide background around the methodology and procedures of this study.

Section 2: The Project

This research was designed to provide further insight into understanding the relationship between financial literacy and factors that predict overconfidence in U.S. investors. The quantitative research method and logistic regression analysis were utilized to test factors that may predict overconfident behavior in U.S. investors. The contributions of this research are intended to identify factors that predict overconfidence in U.S. investors to help create self-awareness and prevention of overconfident behavior. This section provides information on the role of the researcher, research participants, research method and design, population and sampling, data collection, data analysis, and the reliability and validity of the survey results.

Purpose Statement

The purpose of this non-experimental, quantitative research study is to add to the body of knowledge that explores the relationship between financial literacy and investor behavior. This larger problem is explored by examining the factors predicting overconfident behavior in U.S. investors. It is known that financial literacy is low (Lusardi & Mitchell, 2011a) and that overconfidence can lead to risky behavior in U.S. investors (Asaad, 2015). However, there is a gap in the existing literature that explores what factors may predict overconfidence in U.S. investors.

This study uses a logistical regression model to examine the factors predicting overconfidence in U.S. investors. The dependent variable is overconfidence and is measured as the difference between perceived financial literacy and actual financial literacy. The independent variables measured are the portfolio value of non-retirement accounts, financial advisor usage, and financial research activity are the independent variables.

Role of the Researcher

The role of the researcher in a quantitative study is to collect data and implement analysis (Creswell, 2014). This study utilizes secondary research data compiled by the NFCS, which is funded by the FINRA Investor Education Foundation. This survey data are nationally representative of the people's financial knowledge, attitudes, and behaviors. Therefore, the role of the researcher for this study is primarily focused on data analysis since the data collection has already been completed. The researcher did not have to contact any participants, conduct any interviews, merge databases, or administer any surveys.

The researcher obtained permission to use data from the 2018 NFCS study. The researcher focused on the data from the 2018 NFCS Investor Survey, which focuses on investment behavior and is a sub-survey from the larger 2018 State-by-State Survey. The researcher utilized the statistical package STATA to implement data analysis. The researcher is responsible for utilizing applicable data to test the hypothesis and answer the research questions. The researcher first had to analyze the data and eliminate survey responses, which indicated "I don't know" and "Prefer not to say" in order to properly analyze proper survey responses. Additional analysis was completed to determine the total number of correct answers on the actual financial knowledge quiz (determined from items 88 through 97). Analysis was then conducted to add an additional binary variable titled "Overconfident." This variable was derived based on responses to two different questions in the 2018 NFCS Investor Survey. The researcher then performed analysis to test the hypotheses and answer the research questions.

Research Methodology and Design

The quantitative method was chosen for this research because it tests hypotheses to examine relationships among variables (Creswell, 2014). A quantitative approach should be used

when a research problem needs to be measured, and two or more variables are examined through analysis to determine their relationship (Atlas et al., 2019). A common data collection method used in quantitative research is the survey. This methodology is appropriate to collect data to represent population responses for analyzing and measuring statistical patterns found in numeric data (McCusker & Gunaydin, 2015). This research was most appropriate for the quantitative method because hypotheses were tested using data from the 2018 NFCS Investor Survey. The quantitative method protects against research bias and allows the research findings to be replicated by others for consistency (Creswell, 2014). The 2018 NFCS Investor Survey covers a range of data from demographic information to behavioral responses regarding finances. This data collection provides exceptional data that can be used for quantitative analysis.

The research design utilizes logistic regression analysis to measure factors that may predict overconfidence in U.S. investors. This study utilizes a binary logistic regression model where overconfidence is the dependent variable and portfolio value of non-retirement accounts, financial advisor usage, and financial research activity are the independent variables. The dependent variable (overconfidence) is dichotomous and measures whether the subject is displaying overconfidence or not displaying overconfidence. A logistic regression design is most appropriate to test the relationship between the dependent and independent variables when the dependent variable has binary outcomes (Orme & Combs-Orme, n.d.). Therefore, logistic regression analysis is most appropriate for this research study since the dependent variable is binary. The logistic regression will also be supported by additional data analysis, including descriptive statistics, correlation analysis, and frequency distributions. This research design is best positioned to add to the body of knowledge exploring the relationship between financial literacy and investor behavior.

Participants

This study utilizes secondary research data compiled by the NFCS and therefore did not require the researcher to directly utilize participants, contact participants, or come in contact with participants in any form of communication.

The participants in the NFCS data used for this research first started with the 2018 State-by-State Methodology Survey (The National Financial Capability Study [NFCS] is a project of the FINRA Investor Education Foundation [FINRA Foundation]). The survey was self-administered by the participants on a website and consisted of over 27,000 adults in the United States (FINRA Foundation NFCS). The participants for the 2018 NFCS Investor Survey consisted of a subset of participants who completed the State-by-State Survey (FINRA Foundation NFCS). These individuals were recontacted for the 2018 Investor Survey and consisted of just over 2,000 adults who indicated they had investments outside of retirement accounts (FINRA Foundation NFCS). Respondents were unaware that the State-by-State Survey and the Investor Survey were related (FINRA Foundation NFCS). This research focused on the 2018 Investor Survey and did not require the researcher to have any contact or communication with the participants.

Population and Sampling

This study utilizes secondary research data compiled by the NFCS, which was funded by the FINRA Investor Education Foundation and conducted by ARC Research (FINRA Foundation NFCS). The participants in the NFCS data used for this research first started with the 2018 State-by-State Methodology Survey (FINRA Foundation NFCS). The population from which the sample was drawn consisted of the entire United States. A sample of over 27,000 adults (over 18 years of age) was obtained through a self-administered survey by the participants

on a website (FINRA Foundation NFCS). The sample consisted of approximately 500 respondents per state (plus the District of Columbia) and included oversamples in two states (OR and WA) for a total of 1,250 respondents in each of those states (FINRA Foundation NFCS).

Respondents to the 2018 State-by-State Survey were drawn using non-probability quota sampling from established online panels consisting of millions of individuals who were recruited to join in online surveys (FINRA Foundation NFCS). These individuals were offered incentives in exchange for participating in the online surveys (FINRA Foundation NFCS). The panels used for this survey were provided by Survey Sampling International (SSI), EMI online Research Solutions, and Research Now. Each uses industry-standard techniques to verify the identities of their panel members to ensure their demographic characteristics are valid and current (FINRA Foundation NFCS). “Within each state, quotas were set to approximate Census distributions for age by gender, ethnicity, education level, and income based on data from the Census Bureau’s American Community Survey” (FINRA Foundation NFCS). The survey did not target the head of households or primary financial decision-makers as this was consistent with previous NFCS State-by-State surveys (FINRA Foundation NFCS). “A pure probability sample of over 25,000 observations would have an estimated margin of error of half a percentage point (i.e., plus or minus 0.5%), and the margin of error would increase somewhat for sub-groupings of the sample” (FINRA Foundation NFCS). There are possible sources of error that could affect the results, such as coverage, nonresponse, and measurement error (FINRA Foundation NFCS). Fielding for this survey was conducted between June and October of 2018.

The findings from the survey were weighted to represent Census distributions based on data from the American Community Survey (FINRA Foundation NFCS). National, regional, and state figures were weighted to represent their respective populations in terms of age, gender,

ethnicity, and education, while regional figures were also weighted to represent each Census Division in terms of state (FINRA Foundation NFCS). The weighting is intended to produce a reliable representation of the respective population (national, regional, or state), but no additional weighting was used to account for potential non-response bias (FINRA Foundation NFCS). In addition, a breakdown of sub-populations within these geographic levels may not be representative of their respective population (FINRA Foundation NFCS).

This research utilizes the 2018 NFCS Investor Survey, which consisted of a subset of participants who completed the State-by-State Survey (FINRA Foundation NFCS). These individuals were recontacted for the 2018 Investor Survey but were not told that the survey was related to the State-by-State Survey. The sample consisted of 2,003 adults (over 18 years of age) who indicated they had investments outside of retirement accounts by answering “yes” to question B14 on the State-by-State Survey (FINRA Foundation NFCS). “Potential respondents were screened to confirm that they had investments in non-retirement accounts and to be the primary or shared decision-maker regarding investments for their household” (FINRA Foundation NFCS). A total of 598 respondents were dropped because they did not meet these criteria, and another 162 dropped out of the survey before finishing (FINRA Foundation NFCS). Respondents in the 2018 Investor Survey were drawn from the same three online panels used in the State-by-State Survey (SSI, EMI Online Research Solutions, and Research Now) (FINRA Foundation NFCS). “A pure probability sample of 2,000 observations would have an estimated margin of error of plus or minus 2.2 percent, and the margin of error would increase for sub-groupings of the sample” (FINRA Foundation NFCS). Similar to the State-by-State Survey and other survey research, there are possible sources of error such as coverage, nonresponse, and measurement error that could affect results (FINRA Foundation NFCS). The 2018 Investor

Survey was self-administered on a website, and fielding was conducted in July 2018 (FINRA Foundation NFCS).

The 2018 Investor Survey was weighted to approximate the investor population in terms of age and education (FINRA Foundation NFCS). Regarding this survey, the investor population is defined as individuals with investments in non-retirement accounts. These individuals may also have retirement accounts, but these accounts were not specifically addressed in the 2018 Investor Survey (FINRA Foundation NFCS). The weighting was based on the 2018 State-by-State Survey (FINRA Foundation NFCS).

Data Collection and Organization

Instruments

This research utilizes archival data in which the instrument used to collect the primary data was a survey. The original NFCS survey was developed in 2009 and was designed to capture key measures of financial capability, financial literacy measures, financial behaviors, and financial attitudes (FINRA Foundation NFCS). The survey was designed to measure nominal data through a combination of dichotomous and multiple-choice questions. The original survey instrument was piloted in two separate phases consisting of in-person interviews and Computer Aided Telephone Interview (CATI) software (FINRA Foundation NFCS). The pilot testing allowed the creators to identify questions that were unclear or confusing and adjust the questions accordingly (FINRA Foundation NFCS). The survey was updated in 2012, 2015, and 2018 through input provided from academics, policymakers, and researchers who have used previous years' data (FINRA Foundation NFCS). The 2018 NFCS consists of 105 questions, including questions regarding demographic information. The 2018 NFCS Investor Survey consisted of a subset of participants who completed the State-by-State Survey but were not told that the survey

was related to the State-by-State Survey. The instrument was self-administered via electronic format, was completely voluntary, and all survey results were strictly confidential.

Data Collection Technique

An electronic survey was sent out to participants via email for the State-by-State Survey. A voluntary web-based survey provided a more efficient way to deliver the questions to participants while minimizing time and costs associated with traditional phone interviews or paper and pencil surveys. Non-probability quota sampling was used by online panels consisting of millions of individuals who were recruited to join online surveys (FINRA Foundation NFCS). The survey was delivered through three online panels (SSI, EMI, and Research Now) for a total of 1,410,923 email invitations. A total of 100,611 individuals began to take the survey in which 14,313 dropped out before completion. Another 59,207 were terminated due to quotas or because they did not qualify by failing to provide demographic information. A total of 27,091 completed surveys were available for the State-by-State Survey (FINRA Foundation NFCS).

To obtain data for the 2018 Investor Survey, another 3,750 email invitations were sent to potential respondents that completed the State-by-State Survey and indicated that they have non-retirement investment accounts (FINRA Foundation NFCS). A total of 2,763 began the survey, of which 162 dropped out of the survey before finishing, and another 598 were terminated due to quotas, not having non-retirement investment accounts, or not being involved in the investment decisions in their household. Therefore, a total of 2,003 qualified, completed surveys were used for the 2018 NFCS Investor Survey (FINRA Foundation NFCS).

Data Organization Plan

This research uses archival data which has been made publicly available on the NFCS website. The primary data were collected and scrubbed to remove personally identifying

information. The voluntary web-based survey provided ease of data storage and protection of private information. The researcher for this study downloaded the public dataset and saved it on a computer for data analysis.

Data Analysis

This research attempts to examine the factors that predict overconfidence in individual investors and answer two main questions:

1. What factors predict overconfidence in U.S. investors?
2. What is the relationship between overconfidence and seeking investment assistance?

Research shows that overconfident investors take more risks (Asaad, 2015), and taking more risks has a tendency to increase wealth (Kannadhasan, 2015). Therefore, the first hypothesis was developed to determine if higher portfolio values can predict overconfident behavior (H1). Kramer (2016) found a negative relationship between seeking financial advice and an individual's confidence in their own financial literacy. Therefore, the second hypothesis (H2) was formed to test the negative relationship between overconfident behavior and seeking financial advice. Finally, the literature reveals that as retail investors increase the frequency of information acquisition, they are likely to trade more frequently (Abreu & Mendes, 2012). Therefore, this study explored the third hypothesis that there is a positive relationship between doing research activity and overconfident behavior (H3). Table 1 shows the independent variables and analytical tests with respect to the dependent variable.

Table 1*Hypothesis and Variables*

Hypothesis	Dependent Variable	Independent Variable	Test
Hypothesis 1	Overconfidence	Portfolio Value	Logistic Regression
Hypothesis 2	Overconfidence	Seeking Financial Advice	Logistic Regression
Hypothesis 3	Overconfidence	Conducting Research Activity	Logistic Regression

The dependent variable (Overconfidence) is dichotomous and measures whether the subject is displaying overconfidence or not displaying overconfidence. A binary logistic regression analysis is most appropriate to test the relationship between dependent and independent variables when the dependent variable has binary outcomes (Orme & Combs-Orme, n.d.). The researcher first had to analyze the data and eliminate survey responses that indicated “I don’t know” and “Prefer not to say” in order to properly analyze survey responses. Second, the dependent variable (Overconfident) was constructed from this data and was given values of one or zero, with one meaning the participant was overconfident and zero meaning the participant was not overconfident. The dependent variable was derived from several other variables in the data. First, the data were filtered to only include participants that rated themselves a six or seven on question G2 (item 86) on the 2018 Investor Survey. This question measures perceived financial literacy by allowing participants to rate their own financial knowledge on a scale of one to seven. A self-rating of six or seven indicates a participant believes that they have extremely high financial literacy knowledge. Second, an analysis was completed to determine the total number of correct answers out of the 10 questions on the actual financial knowledge quiz. This quiz is determined from items 88 through 97 on the 2018 Investor Survey (see Appendix A). Participants that scored at least seven out of 10 questions correctly (70% or higher) were given a

value of zero for the dependent variable Overconfident. This implies these participants are not overconfident, as demonstrated by their actual quiz results. Participants that scored less than seven out of 10 questions were given a value of 1 for the dependent variable, overconfident. This implies that these participants are overconfident. This is supported by participants rating themselves a score of 6 or 7 (extremely high) on their self-assessment but failing to score more than six correct questions on the actual financial literacy quiz.

Reliability and Validity

Reliability and validity are important aspects of research that give the study credibility and trustworthiness of the data (Stake, 2010). Reliability often comes before validity as it is possible to have reliable measurements that are not valid, but to have a valid measure, it must also be reliable (Creswell, 2014). Validity contributes to the overall validity of the study and often is presented within the dimensions of internal validity or external validity (Creswell & Poth, 2018). Internal validity refers to experimental procedures, treatments, conditions, or experiences that limit the researcher's ability to make correct inferences from the data (Creswell, 2014). External validity is mostly concerned with the researcher drawing incorrect inferences from the sample data or finding results that cannot be applied to real-world scenarios beyond the controlled research environment (Creswell, 2014).

Reliability of the archival data set used in this study was tested in several ways. An important component of the reliability of data on the 2018 Investor Survey was that respondents from the survey self-reported their responses to survey questions which removed any researcher or observation bias. This provided data set consistency in responses representative of the population. The initial survey in 2009 was pilot tested utilizing in-person interviews and CATI software. In-person interviews helped identify questions that were unclear or confusing to

improve survey response consistency. The CATI software also identified wording issues to improve respondent interpretation and limitation of errors due to misinterpretation. The primary sample was representative of the adult U.S. population according to Census distributions by gender, income, ethnicity, education level, and region (FINRA Foundation NFCS). The raw data sample was weighted to represent further represent the Census data more accurately (FINRA Foundation NFCS). Finally, the data demonstrate consistency over time, as can be observed from the different surveys conducted from the year 2009 to the most recent 2018 survey (Mottola & Kieffer, 2017).

The validity of this study was tested through quantitative measures to ensure the results correspond to established theories and other measures of the same model. This study utilized the logistic regression model and, therefore, must satisfy the assumptions of logistic regression analysis. Quantitative testing checks for potential problems such as biased coefficient estimates, large standard errors, model fit, specification error, and multicollinearity. Common tests for validity regarding logistic regression analysis often measure the strength of the relationship between the dependent and independent variables (Creswell, 2014). This is often measured by utilizing a static called Pseudo R squared. This study utilized archival data, and thus, is more likely to experience external validity issues rather than internal validity issues. External validity issues arise when researchers draw incorrect conclusions and inferences from sample data (Creswell, 2014). This statistical conclusion validity issue mostly arises when there exists inadequate statistical power, or the violation of statistical assumptions (Creswell, 2014). This study tests for these threats to ensure the validity of the research.

Summary of Section 2 and Transition

This section discussed the role of the researcher, the research methodology, participants, population and sampling, data collection and organization, data analysis, and reliability and validity. The participants in this study were from the NFCS data for the 2018 NFCS Investor Survey, which consisted of a subset of participants who completed the State-by-State Survey (FINRA Foundation NFCS). A quantitative method was chosen for this research to test hypotheses, and a logistic regression analysis was used to measure factors that may predict overconfident behavior in U.S. investors. The population from which the sample was drawn consisted of the entire United States in which a sample of over 27,000 adults (over 18 years of age) was obtained through a self-administered survey by the participants on a website (FINRA Foundation NFCS). The 2018 Investor Survey sample consisted of 2,003 adults (over 18 years of age) who indicated they had investments outside of retirement accounts by answering “yes” to question B14 on the State-by-State Survey (FINRA Foundation NFCS). The data collection utilized an electronic survey sent out to participants via email for the State-by-State Survey. Finally, reliability and validity tests were discussed.

Section 3 presents the findings and results of the study. A summary of the descriptive statistics was reviewed and interpreted. Following the descriptive statistics, the logistic regression analysis is presented and interpreted for applicable results. Each research question was examined and answered, along with the associated hypotheses tested. The results were assessed, and conclusions were presented with recommendations for action. Applications to professional practice are discussed, along with recommendations for further study and reflections on this study. Finally, a summary is provided of this entire study.

Section 3: Application to Professional Practice and Implications for Change

This section provides a presentation of the research findings with data analysis that includes conclusions addressing the research questions and hypotheses. The presentation of the findings includes descriptive statistics of the data, hypothesis testing, and discussion of the relationship of findings relative to the research questions and hypotheses. Applications to professional practice, recommendations for action, recommendations for further study, reflections, and a summary of key findings are also discussed.

Overview of the Study

Technological advancement in the financial services industry, limited barriers to investment information, low transaction costs, and the burden of individuals being responsible for their retirement due to lack of pension funds have led to an increase in do-it-yourself investing among individual investors. Many financial managers in corporations are continually faced with the task of allocating capital to investment projects. The adverse effects of overconfident investor behavior can impede an organization's investment decisions, capital project decisions, and overall profitability for investors. In addition, individuals may make mistakes in their investment decisions that can limit their ability to retire early, retire at all, or achieve their financial goals. This study was designed to contribute to the limited research available regarding the relationship between financial literacy and overconfident behavior and fill the identified gap.

The design of this study was influenced by the objective of addressing the research questions and associated hypotheses already summarized. This study analyzed factors that may predict overconfident investors. The data were analyzed to understand key relationships and correlations among variables and were first filtered to eliminate survey responses that indicated

“I don’t know” and “Prefer not to say,” resulting in 1,853 participants. The original survey sample consisted of 2,003 adults who indicated they had investments outside of retirement accounts by answering “yes” to question B14 on the State-by-State Survey (FINRA Foundation NFCS). The dependent variable is overconfidence, and the independent variables were portfolio value, seeking financial advice, conducting research activity, gender, age, and income.

Descriptive statistics and a correlation matrix are presented to understand key data for each of the variables. Logistic regression analysis is performed to understand key relationships between variables and to test the hypotheses. Finally, a summary of the key findings is discussed to address each of the research questions.

Presentation of the Findings

This study analyzed factors that may predict overconfident investors. This section discusses descriptive statistics performed, including key metrics, testing of hypotheses, the relationship of the findings to the research questions, and a summary of the findings. The data were analyzed to understand key relationships and correlations among variables. The dependent variable (Overconfidence) is dichotomous and was given either a value of 1 or 0, with one meaning the participant was overconfident and zero meaning the participant was not overconfident. The data were first filtered to eliminate survey responses that indicated “I don’t know” and “Prefer not to say” in order to properly analyze survey responses. The independent variables were portfolio value, seeking financial advice, conducting research activity, and other demographic variables. Most variables contain measurements that are ordinal or categorical, making frequency distributions and tables most appropriate for evaluating these variables. Logistic regression analysis is performed to understand key relationships between variables and to test the hypotheses. Finally, a summary of the key findings is discussed.

Descriptive Statistics

Descriptive statistics show key relationships among the variables. The sample consisted of 2,003 adults (over 18 years of age) who indicated they had investments outside of retirement accounts by answering “yes” to question B14 on the State-by-State Survey (FINRA Foundation NFCS). After filtering out survey responses that indicated “I don’t know” and “Prefer not to say,” the data resulted in 1,853 participants. Table 2 provides summary statistics of the variables for the total of 1,853 participants analyzed. The summary confirms the appropriate data used filtered out responses that indicated “I don’t know” and “Prefer not to say,” confirmed by the min and max values for each variable. The summary of descriptive statistics includes all participants, whether they are overconfident or not overconfident and totals 1,853 participants who have indicated they have investments outside of retirement accounts and have input into decision-making responsibility for investments in their household. The respective means for each of the variables are most appropriate for analysis and show the mean response on the Likert scale survey question.

Table 2

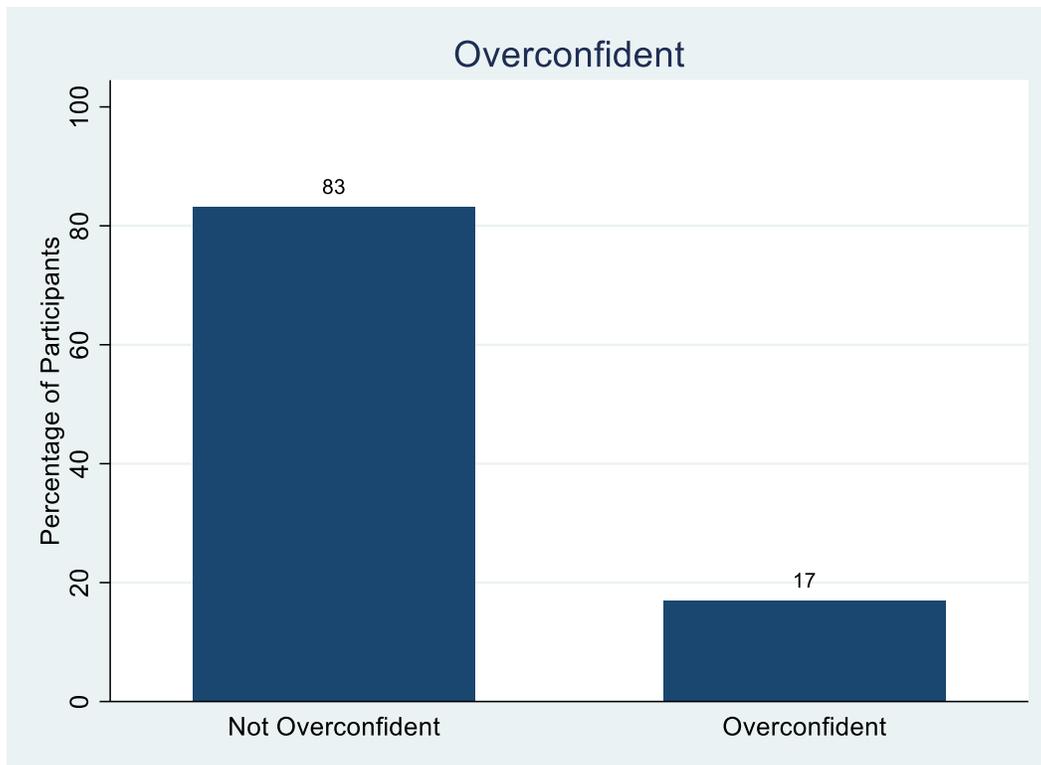
Summary Statistics

Variable	N	M	SD	Min	Max
Portfolio value	1,853	6.36	2.44	1	10
Seeking financial advice	1,853	1.93	0.84	1	3
Conducting research activity	1,853	2.24	0.78	1	3
Gender	1,853	1.43	0.49	1	2
Age	1,853	2.50	0.70	1	3
Income	1,853	2.10	0.76	1	3
Overconfident	1,853	0.17	0.37	0	1

The mean portfolio value falls in the range of \$100,000 to \$250,000 as determined from the Likert scale from 1 to 10 representing different portfolio value ranges. The Likert scale for seeking financial advice ranges from 1 to 3, along with research activity, age, and income. The range for Gender is binary, assigning 1 for males and 2 for females. More people avoid seeking financial advice, more people conduct research activities, there are slightly more men than women, and the majority of the participants are older with average income levels. Approximately 17% of participants are overconfident. Due to most of the data being ordinal or categorical, the data are best analyzed utilizing frequency distributions and tables. The distribution of overconfident participants as seen in Figure 2, shows that most of the participants are not overconfident.

Figure 2

Distribution of Overconfident Participants



Approximately 83% of the participants are not overconfident, meaning they did not self-access their knowledge at a six or a seven for question G2 (see Appendix A). However, this does not imply that these participants did not achieve a high score on the objective test-based questions. Approximately 15% of the participants that rated themselves below a six on the self-assessed knowledge question, also answered seven or more questions on the objective test-based questions. The median number of correct answers out of the 10 questions was six for all of the participants. This is substantially higher than the state-by-state survey. Only 40% of the participants were able to answer four questions correctly (FINRA Foundation NFCS). One may question whether investors with non-retirement investments have higher financial literacy levels than those without non-retirement assets, although further research is needed in this area. The 17% of participants determined to be overconfident rated themselves either a six or seven on question G2 but failed to answer more than six out of ten questions correctly on the objective knowledge test. Participants that were determined to be overconfident were assigned a 1, and participants who were not considered overconfident were assigned a 0. This subgroup serves as the dependent variable in this analysis to determine what factors may predict overconfident investors.

Portfolio value of non-retirement assets was measured on a Likert scale from 1 to 10, with each value representing a dollar range of investible assets. These values are observed in Appendix A. After filtering out survey responses that indicated “I don’t know” and “Prefer not to say,” we can observe a mean of 6.36 representing the mean score on the Likert scale, which corresponds to a portfolio value in the range of \$100,000 to \$250,000. The standard deviation was 2.44, the minimum was 1.00, and the maximum was 10.00. A distribution of portfolio value can be observed in Figure 3. The graph appears to follow a normal distribution, with the majority

of participants having a portfolio value between \$50,000 and \$500,000. The test for normality is not required considering the analysis focuses on logistic regression analysis, however, graphically portfolio value appears to be normally distributed. Comparing participants that are not overconfident to overconfident participants regarding portfolio value is important to understand to determine any visual differences in the data. Figure 4 highlights portfolio value among the two subgroups. Individuals that are not overconfident appear to follow a similar distribution to the one displayed in Figure 3. However, overconfident individuals appear to have a slightly different distribution. There are slightly higher percentages of portfolio values of overconfident individuals between the \$50,000 and \$500,000 value range.

Figure 3

Distribution of Portfolio Value Among Participants

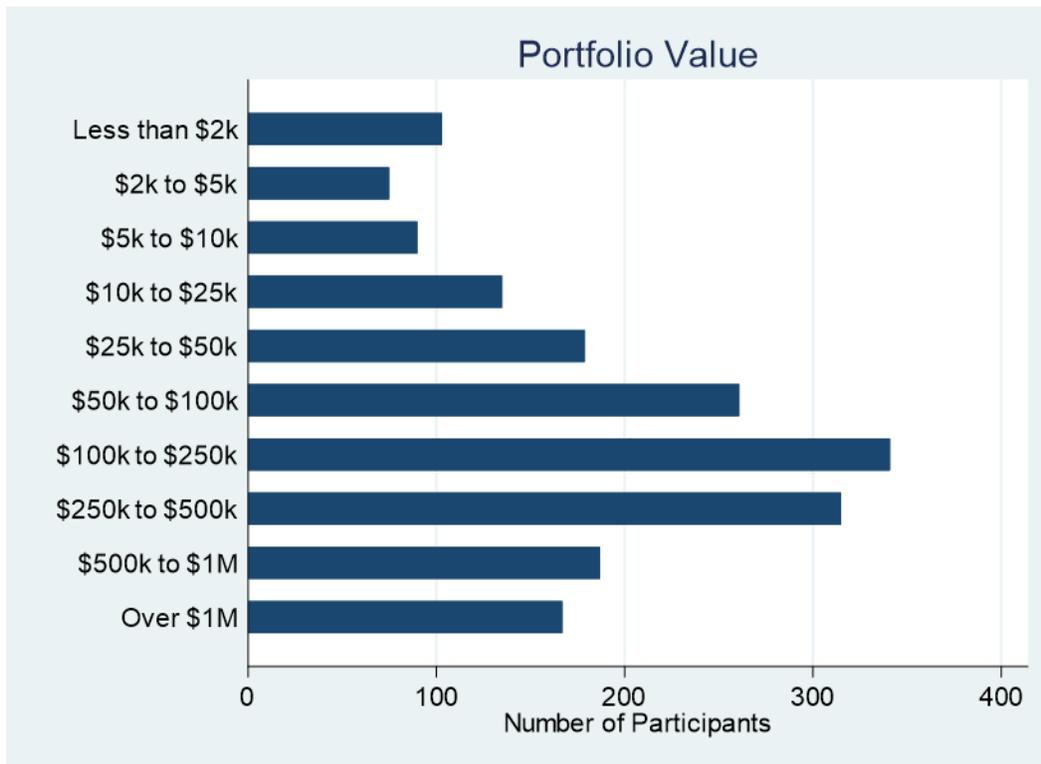
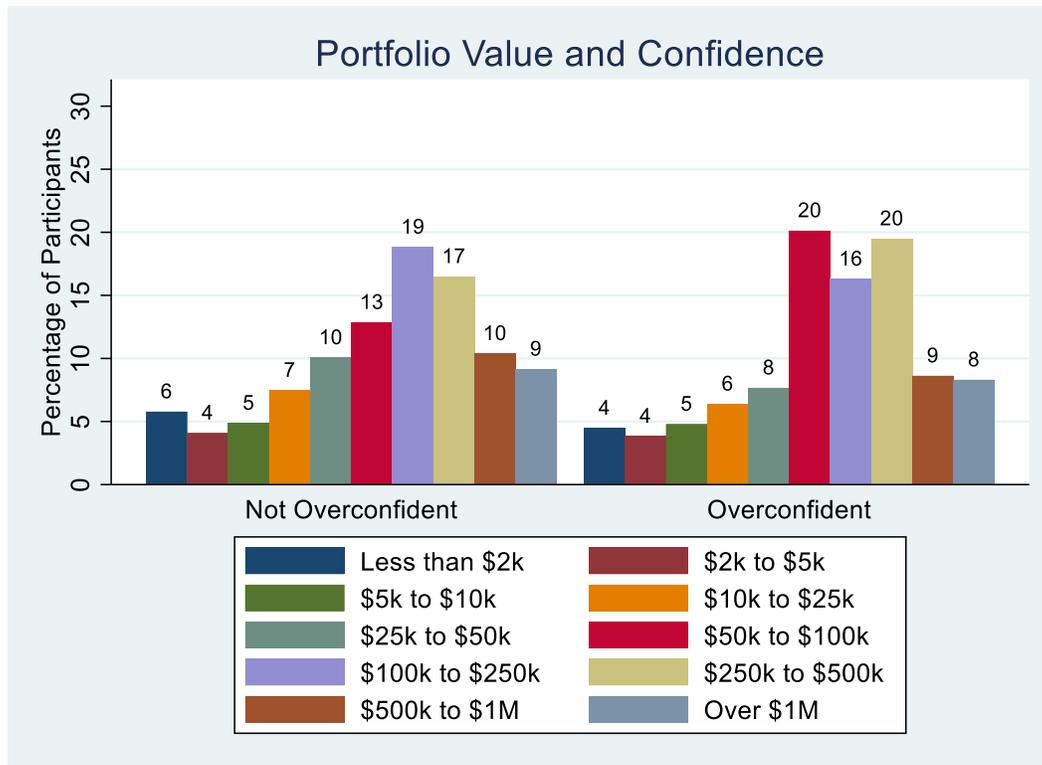


Figure 4

Comparing Overconfident Participants and Portfolio Value

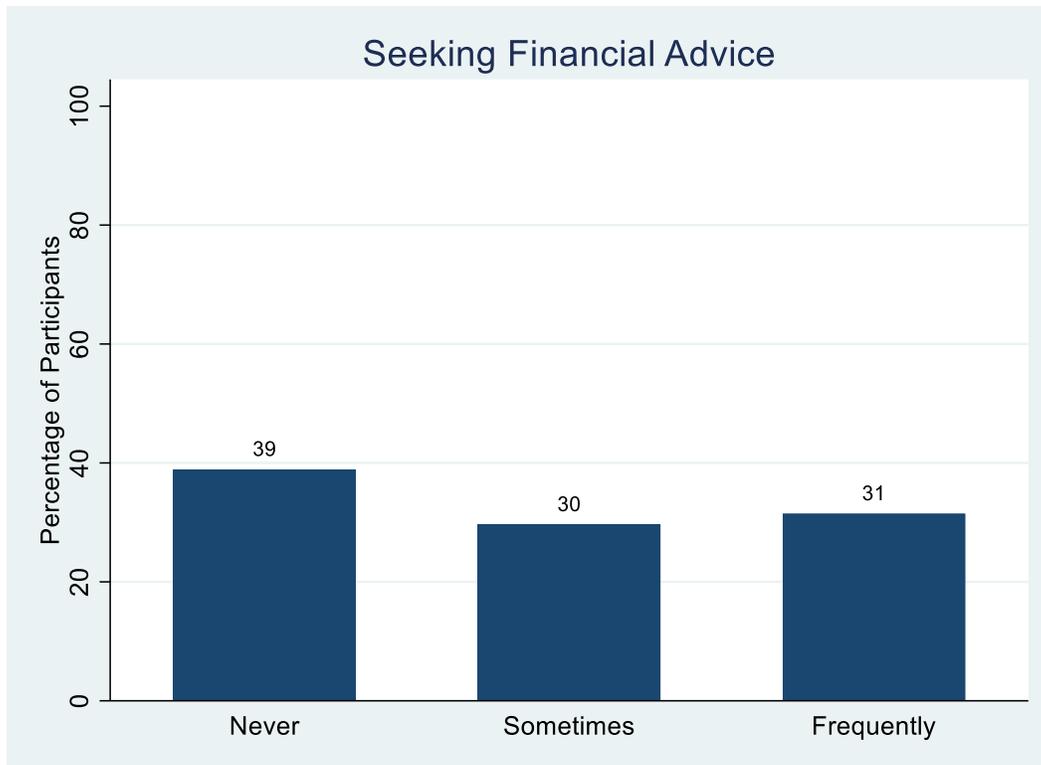


Notice that overconfident investors appear to be less normally distributed and more concentrated in the \$50,000 and \$500,000 value range. This relationship is further explored to determine any significant difference between the two subgroups.

Seeking financial advice is the next variable analyzed and is measured on a Likert scale from 1 to 3. These values are observed in Appendix A, in which the value of 1 refers to “never,” the value of 2 refers to “sometimes,” and the value of 3 refers to “frequently.” After filtering out survey responses that indicated “I don’t know” and “Prefer not to say,” we can observe a mean of 1.93 representing the mean score on the Likert scale, which corresponds to participants’ responses closest to “sometimes.”

Figure 5

Percentage of Participants Seeking Financial Advice



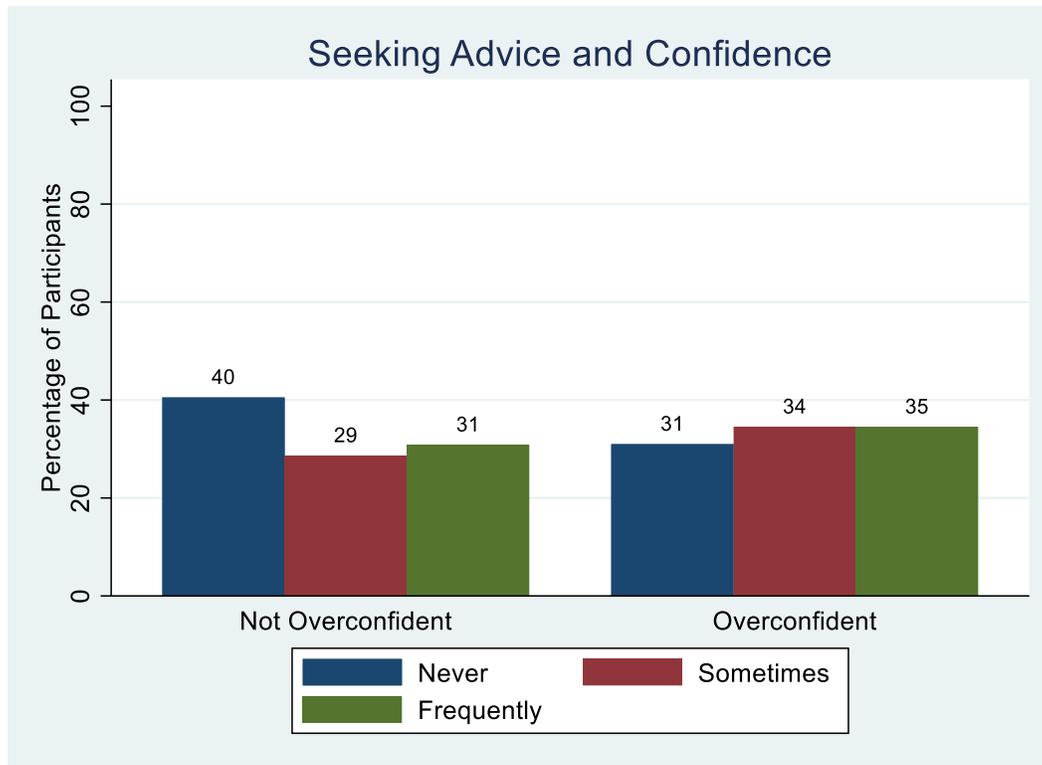
This means that participants sometimes let professionals choose investments for them.

The standard deviation was 0.84, the minimum was 1.00, and the maximum was 3.00.

Distribution of the responses to seeking financial advice can be observed in Figure 5. Notice that approximately 61% of participants seek financial advice at some point, while 39% of participants never seek financial advice. Despite financial literacy is low in the United States, only 31% of participants frequently seek financial advice. Comparing participants that are not overconfident to overconfident participants when seeking financial advice is important to understand to determine any visual differences in the data. Figure 6 highlights the data among the two subgroups.

Figure 6

Comparing Overconfident Participants and Seeking Financial Advice



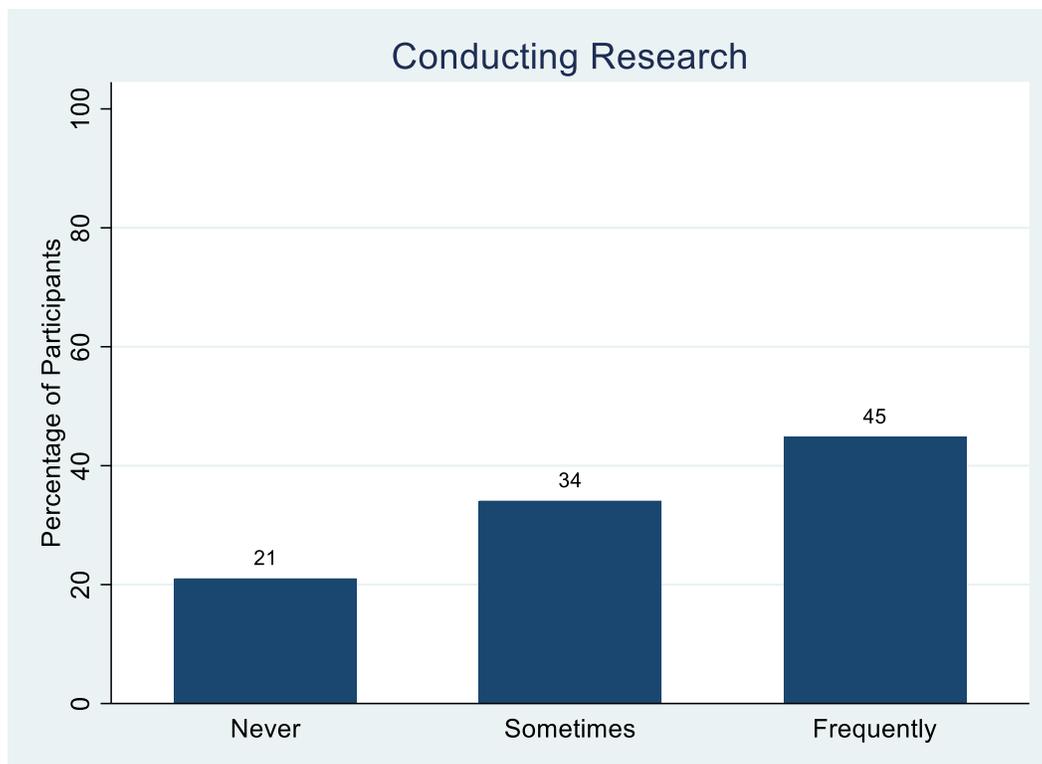
Notice that 40% of participants that are not overconfident never seek financial advice compared to 31% of overconfident participants that never seek financial advice. These numbers suggest that overconfident participants are more likely to seek financial advice than participants that are not overconfident. Approximately 35% of overconfident individuals frequently seek financial advice, while 31% of participants who are not overconfident frequently seek advice. The graph suggests that overconfident participants more frequently seek financial advice compared to participants that are not overconfident.

Research activity is the next variable analyzed and refers to how often participants conduct their own research when choosing investments. This variable is measured on a Likert scale from 1 to 3. These values are observed in Appendix A, in which the value of 1 refers to

“never,” the value of 2 refers to “sometimes,” and the value of 3 refers to “frequently.” After filtering out survey responses that indicated “I don’t know” and “Prefer not to say,” we can observe a mean of 2.24 representing the mean score on the Likert scale, which corresponds to participants’ response closest to “sometimes.” This means that participants sometimes conduct their own research, including reading articles, going to websites, watching the financial news, and other methods. The standard deviation was 0.78, the minimum was 1.00, and the maximum was 3.00. Distribution of the responses to the question regarding conducting research can be observed in Figure 7. The graph shows that approximately 45% of the participants conduct their own research activity frequently. Although this is less than half of all the participants, this response had the highest percentage among all responses, as can be seen in the graph.

Figure 7

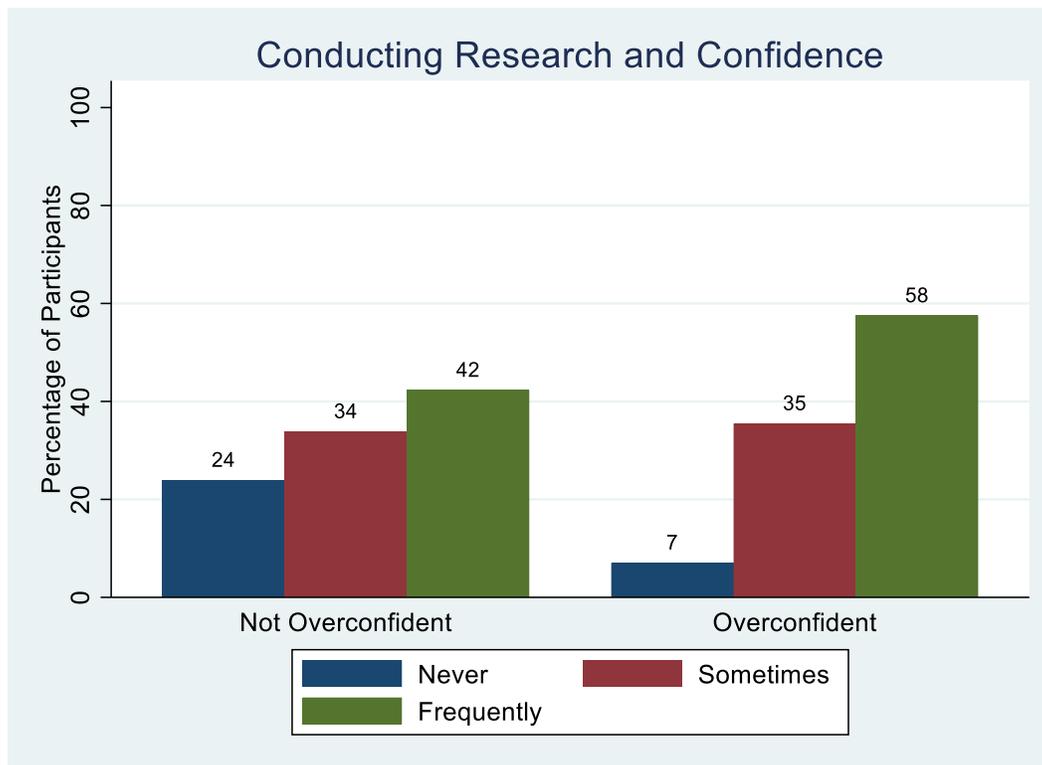
Percentage of Participants Conducting Research



Approximately 34% of participants sometimes conduct their own research, and only approximately 21% of participants never conduct their own research. This suggests that almost 80% of participants initiate some sort of research activity at some point, although the quality of research activity needs further exploration. It is important to understand key differences in research activity between overconfident participants and those that are not overconfident. Figure 8 shows the graph comparing these two groups. Analyzing the graph of these two groups shows that approximately 58% of overconfident participants frequently conduct research activity compared to 42% of those who are not overconfident.

Figure 8

Comparing Overconfident Participants and Research Activity

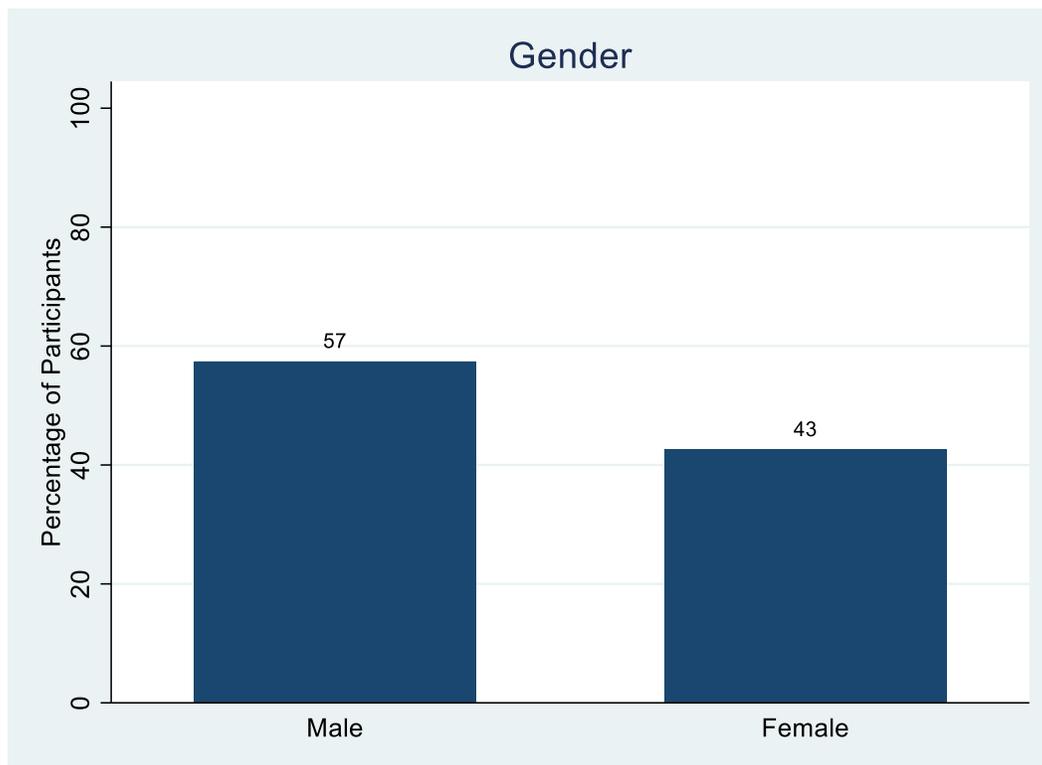


Both groups appear to be similar in conducting research activity only some of the time, with approximately 34% of those who are not overconfident and 35% of those who are overconfident. This significant difference between both groups appears within the response of

never conducting research activity. Approximately 24% of those who are not overconfident never conduct research activity compared to only 7% of those who are overconfident. Visually one can see from the graph that overconfident participants appear to conduct more research activity compared to those who are not overconfident. The difference between both groups is greater for those who frequently conduct research and those who never conduct research activities.

Figure 9

Gender Distribution Among Participants

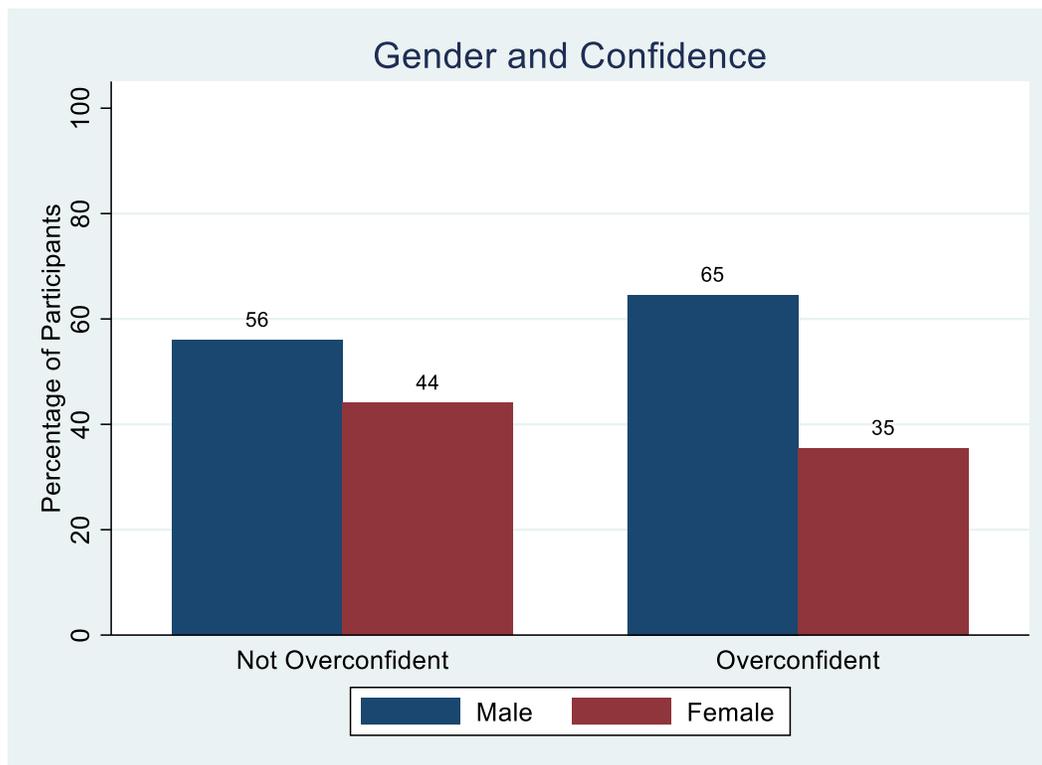


Gender was measured using binary values of 1 for males and 2 for females. After filtering out survey responses that indicated “I don’t know” and “Prefer not to say,” we can observe a mean of 1.43 representing the mean gender value which corresponds to a slight tilt towards males versus females. Therefore, there were slightly more participants that were male than

female within the data. The standard deviation was 0.49, the minimum was 1.00, and the maximum was 2.00 confirming the binary scale. Distribution of gender can be observed in Figure 9. The graph shows us that approximately 57% of the participants were male, and approximately 43% of the participants were female. It is important to understand key differences in gender between overconfident participants and those that are not overconfident. Figure 10 shows the graph comparing these two groups.

Figure 10

Comparing Overconfident Participants and Gender



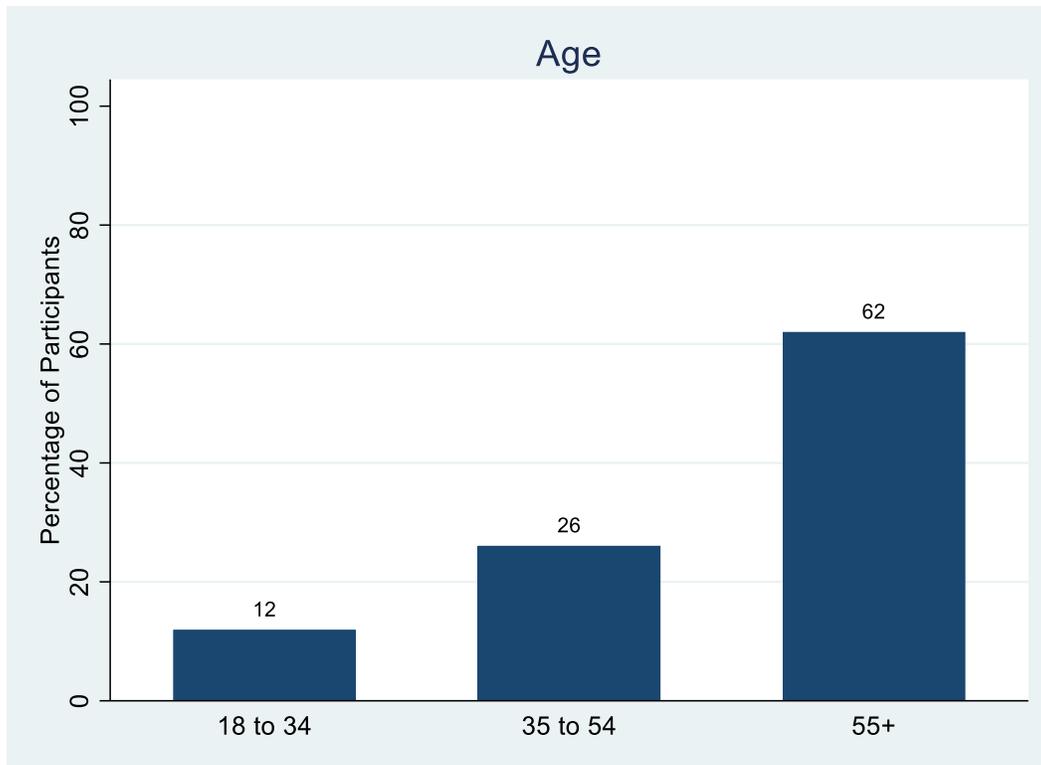
Analyzing the graph of these two groups shows that approximately 65% of overconfident participants were male compared to 56% of those who were not overconfident. In addition, approximately 35% of females were overconfident compared to approximately 44% of females who are not overconfident. The graph suggests that females are generally less overconfident, and

males are generally more overconfident. When comparing overconfident investors to investors that are not overconfident, it appears that males are more likely to be overconfident than females.

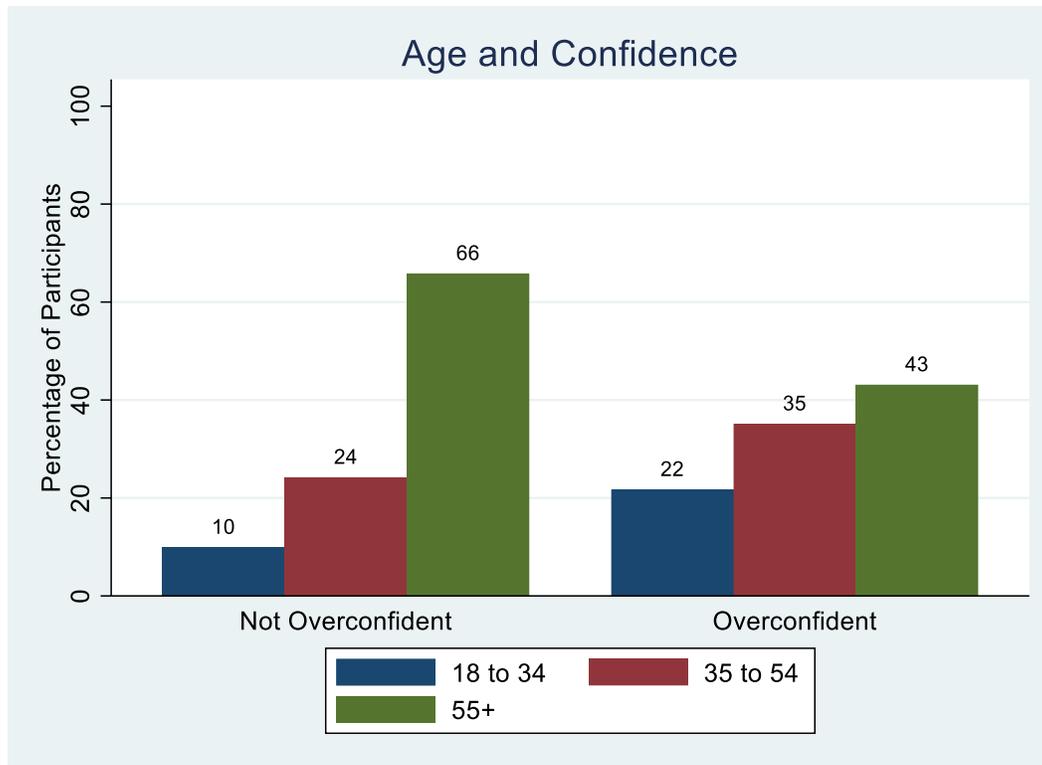
Age is another demographic variable analyzed as it is measured on a Likert scale from 1 to 3, with each value representing a specific age range. Age is broken down into three ranges between 18 to 34, 35 to 54, and over 55, with corresponding values of 1, 2, and 3. After filtering out survey responses that indicated “I don’t know” and “Prefer not to say,” we can observe a mean of 2.50 representing the mean score on the Likert scale, which corresponds to an age range exactly in the middle of the two ranges of 35 to 54 and over age 55. The standard deviation was 0.70, the minimum was 1.00, and the maximum was 3.00. Distribution of age can be observed in Figure 11. Notice that the majority of the participants are over age 55. Approximately 62% of participants are over the age of 55, approximately 26% are between the ages of 35 to 54, and approximately 12% are between the ages of 18 to 34. Approximately 88% of the participants are over the age of 35. One may assume that the majority of participants have good working experience and have potentially had a chance to save money. It is important to note that demographic variables such as age, portfolio value, and income may be positively correlated since people who are older are generally in peak earning years and have more time to accumulate larger savings in their accounts. It is also important to understand key differences in age between overconfident participants and those that are not overconfident. Figure 12 shows the graph comparing these two groups.

Figure 11

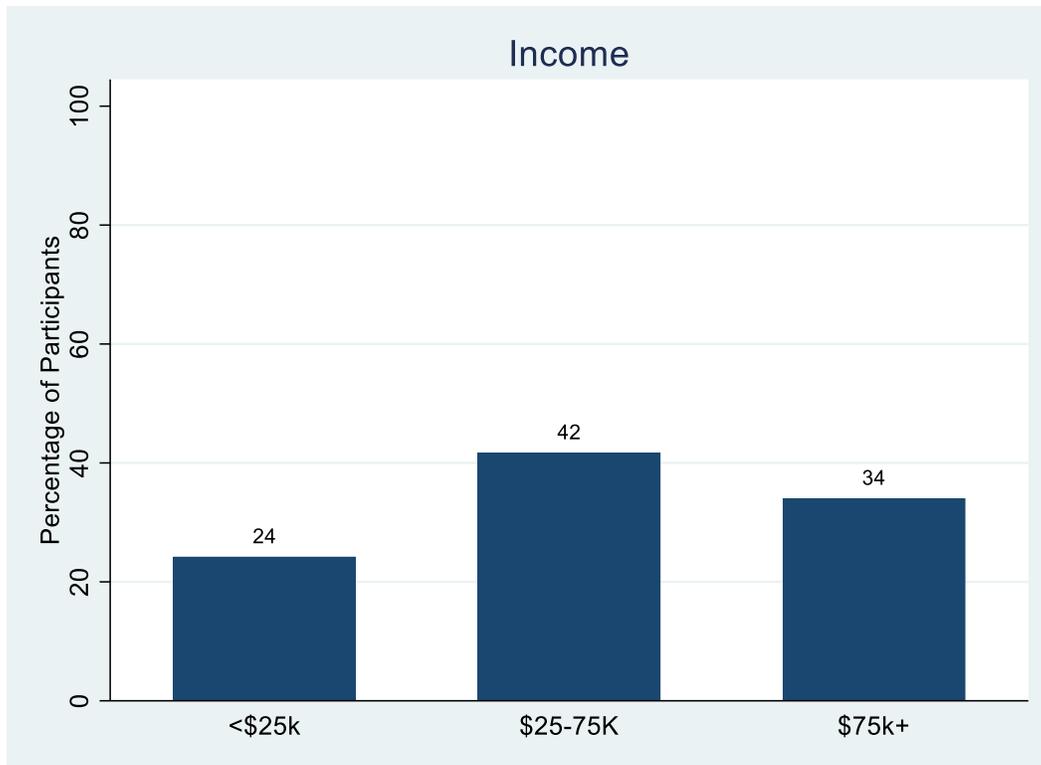
Percentage of Participants by Age Range



Analyzing the graph of these two groups highlights the differences visually. Notice that approximately 66% of investors over age 55 are not overconfident compared to only approximately 43% of those investors who are overconfident. In addition, approximately 35% of investors in the age range 35 to 54 are overconfident compared to approximately 24% of investors who are not overconfident. When comparing investors in the age range between 18 and 34, one can see that approximately 22% are overconfident compared to approximately 10% who are not overconfident. A trend present in the graph shows that younger investors appear to be more overconfident than older investors. Perhaps this trend indicates that investors tend to gain more knowledge over time and have a better understanding of their capabilities.

Figure 12*Comparing Overconfident Participants and Age Range*

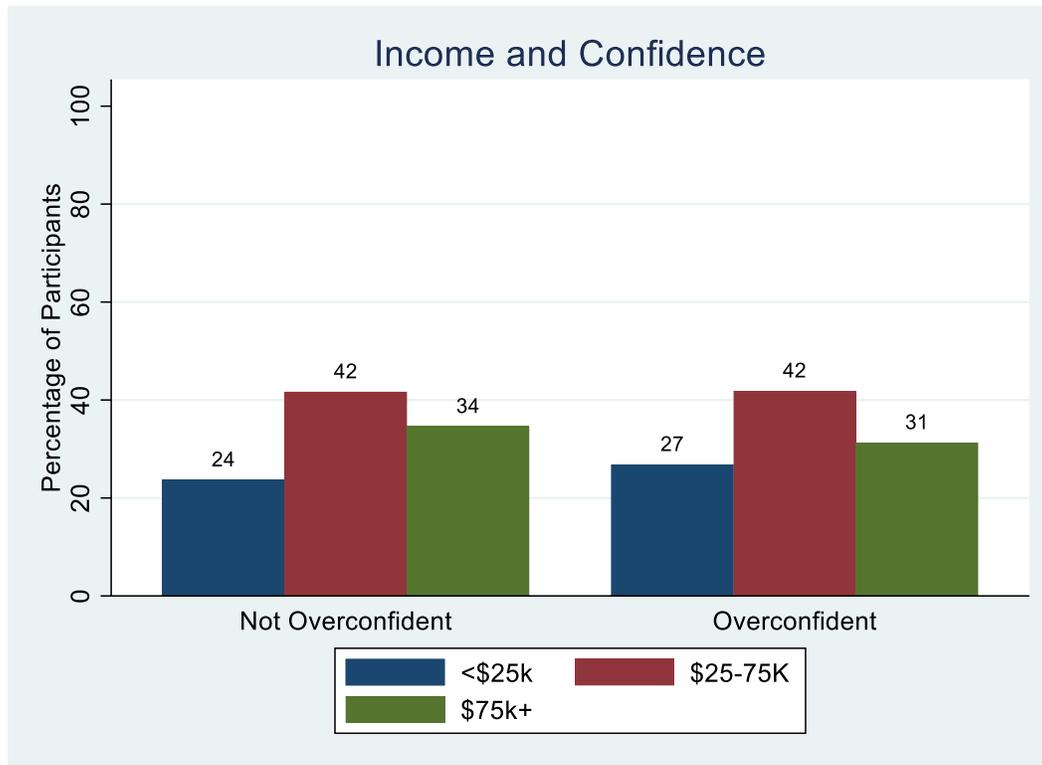
Income is the final variable analyzed and was measured on a Likert scale from 1 to 3, with each value representing a range of total earnings amounts. These values are observed in Appendix A. After filtering out survey responses that indicated “I don’t know” and “Prefer not to say,” we can observe a mean of 2.10 representing the mean score on the Likert scale, which corresponds to an income slightly above the range of \$25,000 to \$75,000. The standard deviation was 0.76, the minimum was 1.00, and the maximum was 3.00. Distribution of income can be observed in Figure 13. The graph shows us that approximately 42% of the participants have an income between \$25,000 and \$75,000, approximately 34% of the participants have income over \$75,000, and only approximately 24% of participants have an income below \$25,000.

Figure 13*Percentage of Participants by Income Range*

Approximately 76% of the participants have an income over \$25,000. However, the source of the income is not specified and could represent salary, commission, bonuses, dividends, interest income, or some combination of those sources. It is also important to understand key differences in income levels between overconfident participants and those that are not overconfident. Figure 14 shows the graph comparing these two groups and their corresponding income levels. The graph appears very similar for both groups; however, there are slightly more overconfident investors earning less than \$25,000 and slightly fewer overconfident investors earning over \$75,000 compared to investors that are not overconfident. Both groups have approximately 42% of participants earning between \$25,000 and \$75,000.

Figure 14

Comparing Overconfident Participants and Income Range



Approximately 34% of investors that are not overconfident earn more than \$75,000 compared to only approximately 31% of overconfident investors earning those amounts. In addition, approximately 24% of investors that are not overconfident earn less than \$25,000 compared to approximately 27% of overconfident investors earning those amounts. These slight differences suggest overconfident investors earn marginally less income than investors who are not overconfident.

It is important to understand the correlation between all the variables to understand if multicollinearity exists within the data. The existence of any high intercorrelations between the variables may cause lower probabilities in the data and less reliable results. Table 3 shows the correlation matrix among the variables.

Table 3*Correlation Matrix of Variables*

	Portfolio Value	Seeking Advice	Research Activity	Gender	Age	Income	Overconfident
Portfolio Value	1.000						
Seeking Advice	0.199	1.000					
Research Activity	-0.070	-0.503	1.000				
Gender	-0.041	0.090	-0.163	1.000			
Age	0.263	-0.008	-0.165	-0.027	1.000		
Income	0.366	0.023	0.046	-0.032	0.046	1.000	
Overconfident	0.011	0.059	0.155	-0.065	-0.185	-0.032	1.000

The correlation matrix shows that there are no strong intercorrelations between the independent variables that are likely to cause multicollinearity. The strongest correlation among the variables occurs between seeking financial advice and conducting research activity in which there is a negative correlation of -0.503. The next strongest correlation occurs between portfolio value and income, in which there is a positive correlation of 0.366. Although this demonstrates a positive relationship, the strength of this positive correlation is weak. Age and portfolio value have the next highest correlation at 0.263. This is a positive relationship, and intuitively this relationship is straightforward in that as people age, they accumulate more money over the years. This relationship is considered a weak relationship and under 0.7 in what would be considered a strong correlation between variables. Considering the remainder of the correlations between the variables are small, the issue of multicollinearity is not an issue for the model.

Hypotheses Testing

A binary logistic regression analysis is most appropriate to test the relationship between dependent and independent variables when the dependent variable has binary outcomes (Orme & Combs-Orme, n.d.). A quantitative method is most appropriate for inferential analysis to describe the population utilizing sample data (Stangor, 2011). A quantitative approach is necessary for exploring the relationship between two or more variables to better understand the association between the variables (Atlas et al., 2019). Quantitative research helps examine relationships among variables to test a hypothesis (Creswell, 2014). This study utilizes a binary logistic regression model to examine which factors predict overconfidence. Overconfidence is a binary dependent variable taking on the values of overconfident and not overconfident, which makes a logistic regression model most appropriate for testing the hypotheses and answering the overall research questions.

The following research questions were used to examine the factors that predict overconfidence in individual investors:

3. What factors predict overconfidence in U.S. investors?
4. What is the relationship between overconfidence and seeking investment assistance?

To better answer these research questions, three hypotheses were formulated to address areas that answer these questions. These hypotheses were developed based on previous literature identifying characteristics related to confidence levels and investment decisions. The model tests the following hypotheses:

H1. There is no significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence.

H1a. There is a significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence.

H2. There is no significant negative relationship between seeking financial advice and the U.S. investors' overconfidence.

H2a. There is a significant negative relationship between seeking financial advice and the U.S. investors' overconfidence.

H3. There is no significant positive relationship between doing financial research and U.S. investors' overconfidence.

H3a. There is a significant positive relationship between doing financial research and U.S. investors' overconfidence.

A multivariable logistic regression analysis was utilized to find the relationship between factors that predict overconfidence in U.S. investors and to determine the relationship between overconfidence and seeking investment assistance. Table 4 shows the results of the multivariable logistic regression analysis. Multiple independent variables were regressed against the dependent variable overconfidence.

Table 4

Logistic Analysis

Overconfident	Odds Ratio	SE	Wald	p	[95% CI]	
					LL	UL
Portfolio Value	1.072	0.033	2.240	0.025**	1.009	1.140
Seeking Advice	1.690	0.159	5.590	0.000***	1.406	2.032
Research Activity	2.255	0.250	7.340	0.000***	1.815	2.801
Gender	0.745	0.101	-2.170	0.030**	0.572	0.972
Age	0.569	0.052	-6.230	0.000***	0.476	0.679
Income	0.808	0.075	-2.290	0.022**	0.673	0.970
Constant	0.062	0.034	-5.090	0.000***	0.021	0.182

Note. N = 1,853. SE = standard error; Wald = Wald Test; CI = confidence interval; LL = lower limit; UL = upper limit.

*p < .10. **p < .05. ***p < .01.

The likelihood ratio (LR) chi-square test (chi2) is 143.3. The entire model is statistically significant, indicated by $P > \text{chi2}$ equal to 0.000, which provides the probability of obtaining the chi-square statistic given that the null hypothesis is true. This model is based on a total of 1,853 observations with six degrees of freedom (six predictors) indicated by the likelihood chi-square test statistic. A total of six predictor variables were tested, including three demographic variables. These variables are listed in Table 4, along with their corresponding statistics.

Table 4 shows the odds ratio for each of the independent variables and describes their relationship with the dependent variable overconfidence. Notice all six predictor variables are statistically significant, given their p-values are all below .05. The odds ratio for portfolio value is 1.072, indicating a slightly positive relationship between portfolio value and overconfident investors. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. The slightly positive relationship between overconfident investors and portfolio value is also seen in Figure 4, supporting the odds ratio for this predictor variable. The odds ratio suggests that there are slightly higher odds that investors with higher portfolio values are overconfident investors. However, due to the odds ratio value being so close to 1, further research is warranted to investigate the strength of this relationship.

The odds ratio for seeking advice is 1.690, indicating a slightly positive relationship between seeking advice and overconfident investors. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. The positive relationship between overconfident investors and seeking financial advice is

also seen in Figure 6, supporting the odds ratio for this predictor variable. This indicates that investors who seek financial advice have higher odds of being overconfident investors. The odds ratio for seeking advice is stronger than that of portfolio value; however, the strength of this relationship also warrants further research under different scenarios.

The odds ratio for the research activity is 2.255 indicating a positive relationship between conducting research activity and overconfident investors. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. The positive relationship between overconfident investors and conducting research activity is also seen in Figure 8. This graph displays a larger visual difference for overconfident investors, supporting the odds ratio for this predictor variable. This suggests that investors that conduct research activity have higher odds of being overconfident investors. The odds ratio for conducting research activity is stronger than that of both portfolio value and seeking financial advice. Although there is over a 100% increase in the odds of being an overconfident investor when conducting research activity, additional research on this relationship may produce interesting results in different scenarios.

In reviewing demographic data, the odds ratio for gender is 0.745 indicating a negative relationship between being female and being an overconfident investor. Recall that coding for gender assigned one for males and two for females. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. The relationship between overconfident investors and gender, as seen in Figure 10, shows more males than females being overconfident investors. The odds ratio suggests that overconfident investors have higher odds of being male. Put another way, being female provides approximately 25% lower odds of being overconfident. This is supported by the literature, which

reveals men are more overconfident than women and that women are generally underconfident (Spiwoks & Bizer, 2018).

Age is another demographic variable analyzed, producing an odds ratio of 0.569, indicating a negative relationship between the age predictor and overconfidence. Age is broken down into three ranges between 18 to 34, 35 to 54, and over 55, with corresponding values of one, two, and three in the dataset. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. The negative relationship of the odds ratio suggests that younger investors have higher odds of being overconfident. This relationship is confirmed visually in Figure 12. This relationship appears to contradict previous literature that shows potential higher overconfidence in older populations (Stolper & Walter, 2017).

The final predictor variable analyzed was the level of income made by a participant. This predictor variable produced an odds ratio of 0.808, indicating a negative relationship between income and overconfident investor behavior. The income levels are broken down into three ranges, with less than \$25,000 being assigned a value of 1, \$25,000 to \$75,000 being assigned a value of 2, and over \$75,000 being assigned a value of 3. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. The negative relationship of the odds ratio suggests that individuals with lower income levels have higher odds of being overconfident investors. This relationship is visually represented in Figure 14. The odds ratio for income is closer to one, indicating that further research into the relationship between income levels and overconfidence is warranted.

Structural validity of a model is extremely important when analyzing regressors on a dependent variable. It is common knowledge that one of the key assumptions in a logistic

regression model is the absence of multicollinearity among the independent variables. The correlation of the independent variables displayed a low correlation between the regressors. However, robustness checks in the model to address multicollinearity issues are warranted to avoid larger than normal standard errors. Many replication studies in psychology are implemented to reduce false positives in research due to publication bias, publication pressures, and questionable research practices (Nuijten, 2021). Encouragement of replication studies aims to limit false positives in research (Nuijten, 2021). The goal of robustness checks is to ensure the model is robust under different assumptions. The strongest correlation among the variables occurs between seeking financial advice and conducting research activity, with a negative correlation of -0.503. Although the strength of this correlation is not strong, implementing a robustness check by removing one of these independent variables tests the robustness of the model. The first robustness check performed removes the variable conducting research activity and is represented in Table 5. The likelihood ratio (LR) chi-square test (chi2) is 83.61.

Table 5

Robustness Check: Research Activity

Overconfident	Odds Ratio	SE	Wald	p	[95% CI]	
					LL	UL
Portfolio Value	1.086	0.034	2.660	0.008***	1.022	1.153
Seeking Advice	1.177	0.092	2.080	0.037**	1.010	1.373
Gender	0.661	0.087	-3.130	0.002***	0.510	0.857
Age	0.493	0.043	-8.130	0.000***	0.416	0.585
Income	0.833	0.076	-2.010	0.044**	0.697	0.995
Constant	1.239	0.435	0.610	0.542	0.622	2.467

Note. N = 1,853. SE = standard error; Wald = Wald Test; CI = confidence interval; LL = lower limit; UL = upper limit.

*p < .10. **p < .05. ***p < .01.

The entire model is statistically significant, indicated by $P > \chi^2$ equal to 0.0497, which provides the probability of obtaining the chi-square statistic given that the null hypothesis is true. This model is based on a total of 1,853 observations with five degrees of freedom (five predictors after removing research activity) indicated by the likelihood chi-square test statistic. All five predictor variables are statistically significant at the $p < .05$ level. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio for each variable. This model produced a log-likelihood of -799, which is smaller than the log-likelihood of -769 in the original model represented in Table 4. This indicates the original model is optimal and more robust than the model removing the predictor variable research activity.

The second robustness check performed removes the variable seeking financial advice and is represented in Table 6. The likelihood ratio (LR) chi-square test (χ^2) is 111.33.

Table 6

Robustness Check: Seeking Advice

Overconfident	Odds Ratio	SE	Wald	p	[95% CI]	
					LL	UL
Portfolio Value	1.109	0.034	3.420	0.001***	1.045	1.177
Research Activity	1.668	0.156	5.460	0.000***	1.388	2.004
Gender	0.752	0.101	-2.130	0.033**	0.578	0.978
Age	0.517	0.046	-7.480	0.000***	0.435	0.615
Income	0.796	0.073	-2.480	0.013**	0.664	0.953
Constant	0.366	0.157	-2.350	0.019	0.158	0.848

Note. N = 1,853. SE = standard error; Wald = Wald Test; CI = confidence interval; LL = lower limit; UL = upper limit.

*p < .10. **p < .05. ***p < .01.

The entire model is statistically significant, indicated by $P > \chi^2$ equal to 0.000. This model is based on a total of 1,853 observations with five degrees of freedom (five predictors after removing seeking financial advice) indicated by the likelihood chi-square test statistic. All five predictor variables are statistically significant at the $p < .05$ level. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio for each variable. This model produced a log-likelihood of -785, which is greater than the first robustness check model at -799 but smaller than the log-likelihood of -769 in the original model represented in Table 4. The robustness checks confirm there is no multicollinearity affecting the standard errors of the original model. This indicates the original model is optimal and more robust than the two models removing one of the predictor variables, research activity, or seeking financial advice.

The three hypotheses were tested using a logistic regression model to understand factors that predict overconfident investors. A summary of the findings for each hypothesis shows the relationships between the predictor variables and the dependent variable overconfidence.

Hypotheses 1. The first hypothesis tested the relationship between the portfolio value of non-retirement accounts and overconfidence. The results provided an odds ratio of 1.072, which is slightly positive. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. Based on these results, the null hypothesis is rejected there is no significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence. This warrants the acceptance of the

alternative hypothesis that there is a significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence. However, due to the odds ratio value being so close to one, further research is warranted to investigate the strength of this relationship and its applications under different domains.

Hypotheses 2. The second hypothesis tested the relationship between seeking financial advice and overconfidence. The odds ratio for seeking advice is 1.690, indicating a slightly positive relationship between seeking advice and overconfident investors. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. Based on these results, the null hypothesis is rejected. There is no significant negative relationship between seeking financial advice and U.S. investors' overconfidence. The alternative hypothesis is accepted that there is a significant positive relationship between seeking financial advice and U.S. investors' overconfidence. This is because the odds ratio identifies a positive relationship between seeking financial advice and overconfidence.

Hypotheses 3. The third hypothesis tested the relationship between conducting research activity and overconfidence. The odds ratio for the research activity is 2.255 indicating a positive relationship between conducting research activity and overconfidence. The 95% confidence interval does not include the value of 1, and the p-value is less than .05 indicating the significance of the odds ratio. The results show that the null hypothesis can be rejected that there is no significant positive relationship between doing financial research and U.S. investors' overconfidence. The alternative hypothesis is accepted that there is a significant positive relationship between doing financial research and U.S. investors' overconfidence.

Relationship of Findings

The research questions are presented below, with the above results of each hypothesis linked back to the associated research question to provide necessary conclusions appropriately addressing each question.

Research Question 1. What factors predict overconfidence in U.S. investors? To address this research question, all three hypotheses were tested to better understand what factors predict overconfidence in U.S. investors. In addition, demographic information was also tested to better understand the relationships between demographic variables and overconfidence. The literature revealed certain characteristics regarding investors, such as portfolio value levels, seeking financial advice, and conducting research activity. The first hypothesis tests portfolio value as a potential factor that may predict overconfidence in U.S. investors, the second hypothesis tests whether an individual seeking financial advice or not seeking advice is a sign of overconfidence, and the third hypothesis tests whether the amount of research activity is a factor in predicting overconfident investment behavior in U.S. investors. All six factors were statistically significant at the $p < .05$ level.

The first hypothesis tested the relationship between the portfolio value of non-retirement accounts and overconfident investor behavior. Descriptive statistics showed a mean value of 6.36, representing the mean score on the Likert scale, which corresponds to a portfolio value of \$100,000 to \$250,000. Figure 4 displays a comparison of the distributions between overconfident investors and non-overconfident investors and their corresponding portfolio values. The graph shows us overconfident investors have slightly higher portfolio values when compared to non-overconfident investors. A multi-variable logistic regression analyzed the relationship between portfolio value and overconfident investors. The results provided an odds ratio of 1.072, which is

slightly positive. The odds ratio was statistically significant, with the p-value less than .05 permitting rejection of the null hypothesis that there is no significant positive relationship between portfolio value in non-retirement accounts and U.S. investors' overconfidence. The alternative hypothesis is accepted that there is a significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence.

The second hypothesis tested the relationship between seeking financial advice and overconfident investor behavior. Descriptive statistics showed a mean of 1.93, representing the mean score on the Likert scale, which corresponds to participants' response closest to "sometimes." This means that, on average, investors sometimes seek financial advice by letting professionals choose investments for them. Figure 6 shows a graph comparing overconfident investors to those who are not overconfident and how often each group seeks financial advice. Approximately 41% of participants that are not overconfident never seek financial advice compared to 31% of overconfident participants that never seek financial advice, and approximately 35% of overconfident individuals frequently seek financial advice, while 31% of participants who are not overconfident frequently seek advice. The graph visually suggests that overconfident participants are more likely to seek financial advice than participants that are not overconfident. A multi-variable logistic regression analyzed the relationship between seeking financial advice and overconfident investors. The results provided an odds ratio of 1.69, which is slightly positive. The odds ratio was statistically significant, with a p-value less than .05. Therefore, the null hypothesis can be rejected that there is no significant positive relationship between seeking financial advice and the U.S. investors' overconfidence. The alternative hypothesis is accepted that there is a significant positive relationship between seeking financial advice and U.S. investors' overconfidence.

The third hypothesis tested the relationship between conducting research activity and overconfident investor behavior. Descriptive statistics showed a mean value of 2.24, representing the mean score on the Likert scale, which corresponds to participants' response closest to "sometimes." This means that, on average, participants sometimes conduct their own research, including reading articles, going to websites, watching the financial news, and other methods. Figure 8 displays a comparison of the distributions between overconfident investors and non-overconfident investors and their corresponding frequency of conducting research activity. The graph of these two groups shows that approximately 58% of overconfident participants frequently conduct research activity compared to 42% of those who are not overconfident, and approximately 24% of those who are not overconfident never conduct research activity compared to only 7% of those who are overconfident. Visually one can see from the graph that overconfident participants appear to conduct more research activity compared to those who are not overconfident. A multi-variable logistic regression analyzed the relationship between conducting research activity and overconfident investors. The results provided an odds ratio of 2.255, which is a positive relationship. The odds ratio was statistically significant, with the p-value less than .05. Therefore, the null hypothesis can be rejected that there is no significant positive relationship between conducting research activity and the U.S. investors' overconfidence. The alternative hypothesis is accepted that there is a significant positive relationship between conducting financial research and U.S. investors' overconfidence.

Each of the three hypotheses provides information to help answer the first research question regarding factors that predict overconfidence in U.S. investors. It was observed that portfolio value, seeking financial advice, and conducting research activity are all statistically significant predictors and have a positive relationship with overconfident investment behavior. In

addition, three demographic variables offer additional information when predicting overconfident behavior in U.S. investors. Gender, age, and income all have a negative relationship with overconfident behavior and are statistically significant at the $p < .05$ level. More specifically, males tend to be more overconfident than females, younger investors appear to be more overconfident than older investors, and those with lower incomes appear to be more overconfident than those with higher incomes. These six variables are utilized to construct an equation to predict overconfident investor behavior.

The logistic regression model displays odds ratios as presented in Table 4. However, to generate a meaningful expression of the relationship between overconfident investor behavior and the predictor variables, a logit transformation is needed. The logit function is

$$\begin{aligned} \text{logit}(p) = \ln\left(\frac{p}{1-p}\right) = & \beta_0 + \beta_1 \times (PV) + \beta_2 \times (SA) + \beta_3 \times (RA) + \beta_4 \times (G) + \\ & \beta_5 \times (A) + \beta_6 \times (I) \end{aligned} \quad (1)$$

where \ln is the natural logarithm, p equals the probability of overconfident behavior (O) represented as $p = \Pr(O = 1)$, $p/(1-p)$ is the odds ratio and defined as the probability of an event divided by the nonevent, PV is the size of portfolio value, SA is seeking financial advice, RA is conducting research activity, G is gender, A is age, and I is income. Each β_i represents the regression coefficients of the independent variables. Based on this, a logistic regression was computed to explain overconfident investor behavior based on these independent variables. The results of the logit transformation are presented in Table 7. The logit transformation provides coefficients in place of odds ratios to allow for a linear relationship between the response variable and the coefficients. The coefficients are in terms of the log odds and provide meaningful interpretations of the relationship between overconfident investor behavior and the

independent variables. The results show how the coefficients contribute to factors that predict overconfident behavior in U.S. investors.

Table 7

Logit Transformation

Overconfident	Coefficient	SE	Wald	p	[95% CI]	
					LL	UL
Portfolio Value	0.070	0.031	2.240	0.025**	0.009	0.131
Seeking Advice	0.525	0.094	5.590	0.000***	0.341	0.709
Research Activity	0.813	0.111	7.340	0.000***	0.596	1.030
Gender	-0.2945	0.135	-2.170	0.030**	-0.559	-0.028
Age	-0.564	0.091	-6.230	0.000***	-0.742	-0.387
Income	-0.213	0.093	-2.290	0.022**	-0.396	-0.031
Constant	-2.774	0.545	-5.090	0.000***	-3.841	-1.706

Note. N = 1,853. SE = standard error; Wald = Wald Test; CI = confidence interval; LL = lower limit; UL = upper limit.

*p < .10. **p < .05. ***p < .01.

Research Question 2. What is the relationship between overconfidence and seeking investment assistance? To address this research question, the second hypothesis was tested to better understand the relationship between overconfidence and seeking investment assistance in U.S. investors. Demographic information was tested to better understand the relationships between demographic variables and overconfidence. The second hypothesis tests whether an individual seeking financial advice or not seeking advice is a sign of overconfidence in U.S. investors. All six factors were statistically significant at the $p < .05$ level.

The evidence was gathered when answering the first research question to apply results regarding the relationship between overconfidence and seeking investment assistance. Figure 6 showed approximately 41% of participants that are not overconfident never seek financial advice

compared to 31% of overconfident participants that never seek financial advice, and approximately 35% of overconfident individuals frequently seek financial advice, while 31% of participants who are not overconfident frequently seek advice. In addition, logistic regression results provided an odds ratio of 1.69, revealing a positive relationship between overconfident behavior and seeking financial advice. The odds ratio was statistically significant, with the p-value less than .05. Therefore, the null hypothesis is rejected that there is no significant relationship between seeking financial advice and the U.S. investors' overconfidence. The alternative hypothesis is accepted that there is a significant positive relationship between seeking financial advice and U.S. investors' overconfidence.

The results combine two theoretical frameworks of overconfidence and financial literacy by identifying factors of financial literacy that predict overconfident investor behavior. The foundation of financial literacy theory is understanding individual financial knowledge capability and decision making around several financial topics, including savings, budgeting, debt, and investments (Lusardi, 2008). Financial literacy research and theory have gained momentum over the last decade, and seminal works have focused on descriptive statistics analyzing demographic and behavioral data to understand and measure financial literacy and capability (Agnew & Harrison, 2015; Allgood & Walstad, 2013, 2016; Al-Tamimi & Kalli, 2009; Asaad, 2015; Calvet et al., 2009; Chen & Volpe, 1998; Ciemleja et al., 2014; de Bassa Scheresberg, 2013; Fernandes et al., 2014; Gamble et al., 2015; Hastings et al., 2013; Hilgert et al., 2003; Howlett et al., 2008; Hung et al., 2009; Huston, 2010; Jappelli, 2010; Jappelli & Padula, 2014; Knoll & Houts, 2012; Kramer, 2016; Lusardi, 2008, 2011, 2015; Lusardi & Mitchell, 2007, 2011a, 2011b, 2014; Lusardi & Tufano, 2015; Lusardi et al., 2017; Servon & Kaestner, 2008; Van Rooij et al., 2011; Willis, 2009). The independent variables in the logistic regression analysis are key financial

literacy characteristics that help explain financial literacy levels, demographic characteristics, and key financial behaviors. Financial literacy is low among U.S. investors and particularly low among women, younger individuals, less educated individuals, Hispanics, and African Americans (Lusardi & Mitchell, 2011a). University students with low financial literacy were more overconfident and accepted larger risks (Mudzingiri et al., 2018), and investors in Turkey who demonstrated overconfidence were younger investors (often Male), investors with a lower portfolio value, and investors with low income and low education regions (Tekçe & Yılmaz, 2015). The results of the logistic regression showed that males and younger individuals have higher odds of being overconfident. In addition, there is a slight positive relationship between portfolio value and overconfident behavior in U.S. investors. The logistic regression results confirmed males are more overconfident than females, a slight positive relationship between younger investors and the odds of being overconfident, and a positive relationship between lower income levels and higher odds of being overconfident. However, the results show a slight positive relationship between portfolio value and overconfident behavior in U.S. investors. This result is different than research showing investors in Turkey in which those with lower portfolio values demonstrated overconfident behavior (Tekçe & Yılmaz, 2015). Research showing that overconfident investors take more risks (Asaad, 2015) and taking more risks can lead to an increase in wealth (Kannadhasan, 2015) may offer support for the results of a slight positive relationship between portfolio value and overconfident behavior. Further research may offer an opportunity to gain a better understanding of this relationship.

The other theory that forms the framework for this study is overconfidence. The foundation of overconfidence theory is a well-known cognitive bias in the field of psychology and is broadly defined as one who overestimates their own abilities (Daniel et al., 1998).

Overconfidence theory as it relates to finance and investing has offered seminal works focused on defining, measuring, and understanding data related to overconfident behavior and decision-making (Abreu & Mendes, 2012; Angner, 2006; Daniel et al., 1998; DeBondt & Thaler, 1985; DeBondt & Thaler, 1995; Dhar & Zhu, 2006; Kahneman et al., 1982; Moore & Healy, 2008; Odean, 1998; Ritter, 2003; Xia et al., 2014). Overconfidence serves as the dependent variable in understanding which factors may predict overconfident behavior in U.S. investors.

Overconfidence theory applied to securities markets is most often defined as an individual overestimating the precision of their knowledge, ability, and/or information. Overconfidence theory assumes that investors' self-perception they can value securities more accurately than they actually can, results in underestimating their forecast error variance (Daniel et al., 1998). Kramer (2016) found a negative relationship between seeking financial advice and an individual's confidence in their own financial literacy. In addition, this negative association is more pronounced among wealthier individuals (Kramer, 2016). In addition, investors who increase the frequency of information acquisition are likely to trade more frequently, thus resulting in overconfidence in their abilities (Abreu & Mendes, 2012). The results of the logistic regression analysis showed a positive relationship between conducting research activity and overconfident behavior. This result aligns with research showing the increase in the frequency of information acquisition resulting in overconfident behavior (Abreu & Mendes, 2012). However, results from the logistic regression analysis showed a positive relationship between seeking financial advice and overconfident investment behavior. This does not align with Kramer (2016), who shows a negative association between seeking financial advice and overconfidence. There could be several explanations for this difference, such as demographic related factors. For example, there is a positive relationship between younger investors and overconfident behavior. Perhaps these

younger investors are just getting started with investing and therefore seek financial advice to obtain confirmation of their existing knowledge or to seek new knowledge. Another example is that seeking financial advice could be part of the information acquisition process and/or conducting research. Additional research may provide a better understanding of this relationship.

The specific problem to be addressed was to examine the factors predicting overconfidence in U.S. investors. In the past decade, there has been an increase in web-based research tools, lower brokerage costs, and easier access to financial data, which have increased self-directed investing (McClintock, 2014). However, it is known that financial literacy is low (Lusardi & Mitchell, 2011a) and that overconfidence can lead to risky behavior in U.S. investors, causing people to make costly financial mistakes (Asaad, 2015). The results of this logistic regression analysis provide insight and potential solutions to this problem. The results show a positive relationship between overconfident behavior and portfolio value, seeking financial advice, conducting research activity, male investors, younger investors, and investors with lower incomes. Understanding the characteristics of individuals that are likely to demonstrate overconfident behavior can lead to generating potential solutions such as targeted educational initiatives, programs, and self-awareness practices. Utilizing these results can help institutions target resources towards individuals with these characteristics and/or demographics to help prevent costly financial mistakes.

Summary of the Findings

This study focused on answering two questions to better understand the factors that predict overconfidence in U.S. investors:

1. What factors predict overconfidence in U.S. investors?
2. What is the relationship between overconfidence and seeking investment assistance?

The objective of this study was to address the problem of understanding factors predicting overconfidence in U.S. investors. A logistic regression analysis model was utilized to understand the relationship between financial literacy, demographics, and overconfident investor behavior. Three hypotheses were tested to answer these two research questions. The first hypothesis tested the relationship between the portfolio value of non-retirement accounts and overconfidence. The null hypothesis (H1) was rejected that there is no significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence. The alternative hypothesis (H1a) was accepted that there is a significant positive relationship between portfolio value in non-retirement accounts and the U.S. investors' overconfidence. The second hypothesis tested the relationship between seeking financial advice and overconfidence. The null hypothesis (H2) was rejected that there is no significant negative relationship between seeking financial advice and the U.S. investors' overconfidence. The alternative hypothesis (H2a) was accepted that there is a significant positive relationship between seeking financial advice and the U.S. investors' overconfidence. The results showed a positive relationship between seeking financial advice and overconfident investor behavior, contrary to research showing a negative relationship. The third hypothesis tested the relationship between conducting research activity and overconfidence. The null hypothesis (H3) was rejected that there is no significant positive relationship between doing financial research and U.S. investors' overconfidence. The alternative hypothesis (H3a) was accepted that there is a significant positive relationship between doing financial research and U.S. investors' overconfidence.

The results of this analysis show a positive relationship between overconfident behavior and portfolio value, seeking financial advice, and conducting research activity. These results conflict with Tekçe and Yılmaz (2015) regarding portfolio value and Karmer (2016) regarding

seeking financial advice. The results align with Abreu and Mendes (2012) regarding a positive relationship with research activity and overconfident behavior implied by frequent trading activity. In addition, results show that overconfidence is higher in male investors, younger investors, and investors with lower incomes. The results align with Tekçe and Yılmaz (2015) regarding lower income levels and younger male investors displaying overconfidence. These results provide additional clarity regarding factors that predict overconfident investor behavior.

Application to Professional Practice

This study was designed to contribute to the growing body of knowledge regarding financial literacy and investor behavior. One of the goals of this study was to bridge the gap between financial literacy and investor behavior by providing a link between both research areas to support the application of solutions to problems that exist within both topics. Previous literature has focused on financial literacy and overconfident behavior as separate issues with little exploration investigating the link between these two research areas. Understanding how financial literacy and other investor characteristics might predict overconfident behavior will be extremely useful to both corporations and individuals.

Improving General Business Practice

The results of this study serve both corporations and individuals. Corporations continuously make decisions regarding their capital and the optimal ways to invest this capital for shareholder returns. Individuals are responsible for making these investment decisions which include investing in projects, completing mergers and acquisitions, or returning capital to shareholders in the form of dividends. Overconfident behavior can impact these decisions by these individuals. The results of overconfident decision-making are unclear. Higher knowledge levels and higher confidence levels have resulted in more proactive decision-making behavior

(Atlas et al., 2019) but have also resulted in risky and costly financial behaviors (Asaad, 2015). Utilizing the results of this study can help corporations identify overconfident behavior in the workplace and address it appropriately. Overconfident CEOs and other executives often receive higher compensation packages from exploiting their positively biased views of firm prospects (Humphery-Jenner et al., 2016). Moreover, overconfident behavior coupled with narcissism may result in dramatic outcomes, including fraudulent behavior (Brunzel, 2021). The ability for corporations to identify this ahead of hiring overconfident executives has potential cost savings and risk mitigation opportunities. Experts such as economists can demonstrate overconfidence resulting in overestimation, poor judgment, and bad advice on economic policy decisions (Angner, 2006). Corporations often hire economists and other consultants to help guide their corporate policies. In addition, governments hire economists to receive advice and set economic policies based on their analysis. Having a deeper understanding of characteristics that predict overconfident behavior can be beneficial in avoiding poor guidance and risky behavior from economists and external consultants.

Individuals are becoming more involved in making major personal financial decisions such as buying a house, saving for college, and saving for retirement. For the past several decades individuals are taking on increasing responsibility for securing their own retirement as employers have eliminated defined benefit pension plans (Lusardi & Mitchell, 2011a). Individuals are forced to manage their own defined contribution plans and IRAs to fund their retirement (Lusardi & Mitchell, 2011a). Recent advances on the Internet and networking have resulted in an increase in web-based research tools, lower brokerage costs, and easier access to financial data, which have fueled self-directed investing (McClintock, 2014). With financial literacy being low and information now readily available for individual investors to utilize in

making financial decisions, investors are susceptible to overconfident behavior. Higher knowledge levels and higher confidence levels result in more proactive decision-making behavior (Atlas et al., 2019), and financial literacy and overconfidence are positively correlated with stock market participation (Xia et al., 2014). The higher confidence levels coupled with investors taking on more responsibility for their financial decision-making open individuals up to making financial mistakes. Overconfident individuals tend to overestimate their perceived financial knowledge resulting in risky and costly financial behaviors (Asaad, 2015), however, investors who overestimate their perceived financial knowledge are less likely to seek financial advice (Kramer, 2016). The results of this study can bring awareness and make a positive impact on financial decision-making for individuals. Having a better understanding of financial literacy and overconfident behavior can mitigate risks and large financial mistakes individuals often make.

Potential Application Strategies

There are opportunities to improve general business practices for both corporations and individuals. The applications strategies involved in addressing problems arising from low financial literacy and overconfident behavior will vary depending on the circumstances. Corporations can partake in strategies that will help mitigate corporate risks and personnel issues resulting from overconfident behavior. Individuals can mitigate risks by increasing financial literacy, creating awareness around cognitive biases and overconfident behavior, and seeking financial advice.

Corporations are responsible for initiating projects which achieve a sufficient internal rate of return on capital for their shareholders and need to continuously evaluate risk and return scenarios of given opportunities. Leaders in charge of making decisions on these projects need to

have both competent financial literacy and prudent decision-making behavior. Overconfident individuals in charge of corporate investments are likely to leave the corporate portfolio riskier than originally desired. Certain personality traits of individuals should be considered during the investment decision-making process (Sadiq & Khan, 2019). Corporations can mitigate risks by creating training programs and awareness around selecting individuals with personality traits and characteristics that are least likely to result in overconfident behavior. In addition, financial literacy training programs can be implemented to help individuals identify common behavioral biases and education to overcome biases as they relate to financial decision-making within the corporation. It is important for corporations to understand the capabilities of their employees. One may assume corporate finance departments are financially literate. However, some corporations may be short staffed, requiring employees without financial backgrounds to take on responsibility for making financial decisions. Some small businesses do not have corporate finance departments and rely on a select few individuals to complete a variety of tasks. In these circumstances, it is important to identify people who have good financial literacy and who are least likely to demonstrate overconfident behavior. This study helps identify the factors that predict these characteristics.

Individuals are responsible for financial decision-making related to their personal finances daily. These decisions relate to budgeting, debt management, investments, retirement, major purchases, and other financial decisions. The results of this study are extremely helpful to individuals, financial advisors, and corporations that serve these individuals and employ these financial advisors. These results are helpful to individuals by potentially helping them self-realize their cognitive biases as it relates to financial decision-making abilities. Individuals who are more aware of their cognitive biases have a better chance of avoiding large financial mistakes

if they can recognize behavioral patterns. Governments and school districts can incorporate financial literacy programs to be implemented within primary and secondary education settings across the nation to establish a minimal baseline financial literacy knowledge level. These programs can increase overall financial literacy within the population to help create more awareness and better decision-making abilities for individuals. Financial advisors can utilize these results to be more aware of characteristics that have a higher probability of predicting overconfident behavior among individuals. Advisors that can better identify individuals that are likely to have low financial literacy and/or demonstrate overconfident investor behavior have a better chance of helping these individuals avoid making large financial mistakes. Corporations that employ financial advisors can utilize these results to design training programs that create awareness around identifying characteristics that may predict overconfident behavior. In addition, corporate training programs can offer solutions to properly educating and addressing the needs of individuals with low financial literacy, overconfident behavior, and other cognitive biases that may impair financial decision-making abilities. Many low-cost brokerage firms that offer self-directed investing can be better equipped at identifying individuals who are likely to demonstrate overconfident behavior. In addition, they can identify those who may have low financial literacy levels and offer specialized training and education for them. Advisors who are better trained by these corporations can make a larger impact when advising individuals on their finances. Identifying characteristics that have higher odds of predicting overconfident behavior will benefit individuals, financial advisors, and corporations.

Summary of Application to Professional Practice

These results showed the relationship between characteristics that produce higher odds of identifying overconfident investor behavior. These results are useful to individuals, corporations,

and employees of those corporations. Individuals can increase self-awareness regarding overconfident behaviors to help them avoid making large financial mistakes. Financial advisors can utilize this information to become more aware of individuals that are likely to demonstrate overconfident behavior and help them mitigate these risks. Government entities can incorporate financial literacy programs to establish baseline financial literacy competency in primary and secondary education. Finally, corporations can utilize the results to identify personnel who are less likely to be overconfident when investing in corporate projects.

Recommendations for Further Study

Further research regarding financial literacy and overconfident behavior can focus on targeted individual investment behavior, corporate investment behavior, and institutional investor behavior. Individuals who trade their own capital can demonstrate specific demographics and characteristics that predict overconfident behavior that may differ from characteristics demonstrated by corporations and professional money managers. In addition, measurement of financial literacy and overconfident investor behavior offers variations within each concentrated group.

This study focused on individual investors across the United States and did not distinguish any difference between professional money managers, corporate finance investment professionals, or individuals not associated with any professional investment environment. It is unknown if some of the respondents were, in fact, professional investors or money managers, corporate finance specialists, or individuals with no prior investment knowledge. It is assumed overconfident behavior exists within each of these subgroups. Further study which focuses on a particular subgroup may offer additional insight as to predictors of overconfidence. For example, one may consider targeting specific demographics such as younger investors, investors that

conduct research frequently, male investors, or those with higher portfolio values. Another example would be to focus on individuals who do not work in finance, investments, or a related field. Another focus area may be to narrow the specific region to identify regional differences in financial literacy and/or overconfident behavior. One may investigate areas of financial literacy within categories such as budgeting, insurance, investments, or debt to identify specific characteristics and their association with overconfident behavior. Finally, a mixed methods or qualitative approach involving interviews may provide further explanation as to why individuals demonstrate overconfident behavior and any other potential predictors.

Further areas of study can also be applied to corporations and their invested capital. Applications that involve specific industries, regions, or specific companies may offer additional insight into predictors of overconfident behavior. For example, further study regarding automotive companies and their capital allocation decisions may reveal characteristics of overconfident behavior at the corporate level. Another example is identifying professional investment managers and their confidence levels regarding particular stock selection and the probability of success in their forecasting abilities. Finding characteristics that predict overconfident investment behavior can be applied in these different settings.

Reflections

This study has offered several contributions beyond filling the gap in the literature between financial literacy and overconfident behavior in U.S. investors. This study has contributed to my personal and professional growth and has offered solutions to problems through a Christian worldview. This next section discusses contributions to my personal and professional growth along with integrations from a Christian worldview.

Personal and Professional Growth

This study has contributed both insights and skills that can be applied both personally and professionally. Personally, this study has sharpened tools that can be utilized continuously regarding intellectual rigor applied to personal and philosophical beliefs. The research experience follows a systematic process involving many critical steps to achieve reliability of results. Intellectual rigor is applied to information to understand the underlying source and narrative in which a theoretical concept exists. The process of investigating, analyzing, and questioning information from multiple viewpoints creates the objective ability and desire to find truth in concepts that can be applied to multiple settings. This intellectual process can be applied to personal beliefs, new information, opinion, and other aspects of information gathering. In addition, the application of this information through analytical processes, hypothesis testing, robust fact checking, and synthesis is used to form an opinion, philosophical beliefs, and contribute to the theoretical process. As one is influenced by their personal surroundings, friends, family, and new information, this process provides useful tools for filtering bias and false information to arrive at truthful objective content. This process has allowed personal growth by questioning existing beliefs, philosophical viewpoints, and current information from new angles. This cleansing of information forms new philosophical beliefs that help mold new objective thinking, leading to more balanced and objective behaviors.

Professionally, this same systematic process is applied to past, present, and future business problems. Both institutional and individual investment problems have existed and continue to exist, especially as it relates to cognitive bias and investor behaviors. As a financial advisor to both individuals and corporations, patterns in individual behavior emerged through many years of experience. These patterns can be analyzed by utilizing these newly sharpened

tools to arrive at potential solutions that will benefit individuals, corporations, and society. The tools learned through this study have already been applied to other business problems and have produced quicker, more efficient, and concrete solutions to these problems. These tools will continue to be sharpened and used both personally and professionally.

Biblical Perspective

This study is integrated with a Christian worldview in that it seeks to help individuals and corporations avoid larger financial mistakes from poor decisions due to cognitive biases. The relationship between financial literacy and investor behavior is one in which improvement in both areas will contribute to the well-being of individuals. Paul declares to followers “chosen people, a royal priesthood, a holy nation, God’s special possession, that you may declare the praises of him who called you out of darkness into his wonderful light” (1 Peter 2:9, NIV). Therefore, one shall always act through the lens of a Christian worldview with the goal of serving a greater purpose with the aim of helping people. “So whether you eat or drink or whatever you do, do it all for the glory of God” (1 Corinthians 10:31, English Standard Version). This Christian worldview is not only applicable to spiritual matters, but a lifestyle of beliefs and actions that are practiced daily through work. Work is highly valued by God, the original Creator of work (Gen. 1:28, NIV). God finished his work he had done and rested on the seventh day (Genesis 2:1-3, 15 English Standard Version). It is demonstrated that not only is God’s creation beautiful, but that God goes on to care for his creation. People should find beauty and purpose in what they do for the glory of God. This study does this by exploring the relationship between financial literacy and investor behavior with the aim of improving financial literacy to minimize large mistakes caused by overconfident investor behavior. Through a Christian worldview, this study is focused on helping people and solving problems that arise through common mistakes

individuals make. An individual's work should be approached with the purpose of serving society and having a plan for helping people with the work they do. Individuals can focus on how their work contributes to society and makes a positive impact on people. Demonstrating good ethics at all times promotes good decisions that are in the best interests of their firm and will translate into positive results for society. For example, conducting business with a Christian worldview eliminates decisions to cut corners, reduces unnecessary risks, reduces fraud, reduces environmental damage, promotes work/life balance, and increases trust among consumers. A Christian worldview encourages followers of Christ to "live a life worthy of the Lord and please him in every way: bearing fruit in every good work, growing in the knowledge of God" (Col. 1:10, NIV). It encourages individuals to be filled with spiritual wisdom, understanding, and knowledge of His will, in which distinction and knowledge are pursued through the purpose of helping people. This study serves individuals, advisors, and corporations to obtain His knowledge to find a deeper understanding of investor behavior to mitigate large risks and/or mistakes.

Financial advisors can utilize the findings of this study to have a better awareness and understanding of their client's financial literacy levels and investment behaviors. It also provides brokerage firms and investment firms with a better understanding to provide their advisors with better training programs to help their clients. In addition, the result of this study provides financial institutions with the ability to focus educational programs on helping individuals gain the knowledge necessary to make better financial decisions. It is important to help people and encourage their learning and progress. "Each of us should please our neighbors for their good, to build them up" (Romans 15:2, NIV). This reference talks about helping people and that those who are strong should bear the shortcomings of the weak to help them and not to please

themselves. “They help each other and say to their companions, “Be strong!”” (Isaiah 41:6, NIV). This reference regarding God’s help to Israel provides insight into the help we can provide to each other. Increasing focus on providing proper education around financial literacy and behavioral self-awareness for individuals and corporations to avoid large financial mistakes will create more prosperity for all of mankind. This study was conducted through a Christian worldview of helping people and providing solutions to create better prosperity for society.

Summary of Reflections

This study helps improve general business practices for both individuals and corporations while integrating a Christian worldview. A deeper understanding of characteristics that predict overconfident behavior will benefit corporations in avoiding poor guidance and risky behavior from executives, economists, and external consultants. This study can help individuals increase their financial literacy and self-awareness regarding overconfident behavior to help them avoid making large financial mistakes. Financial advisors can utilize these results to become more aware of their clients and identify individuals that are likely to demonstrate overconfident behavior. This study is focused on helping individuals through a Christian worldview which emphasizes doing what is right in the world of God and helping others. Finally, further studies can focus on targeted individual investment behavior, corporate investment behavior, and institutional investor behavior utilizing specific demographics and/or regions.

Summary of Section 3

This section discussed the research findings with data analysis that included conclusions addressing the research questions and hypotheses, applications to professional practice, recommendations for further study, and reflections. The findings discussed descriptive statistics of the data, hypothesis testing, and discussion of the relationship of findings relative to the

research questions and hypotheses. Key findings of factors that predict overconfident behavior were examined, along with the relationship between overconfident behavior and seeking financial advice. Applications to professional practice such as how the results can be applied to businesses and individuals were also examined. Recommendations for further study were suggested, such as narrowing down geographic regions and focusing on key demographic data. Finally, key reflections, including how a Christian worldview is important in applying the results of this study to business problems were reviewed.

Summary and Study Conclusions

This study adopted a quantitative research method using the 2018 NFCS Investor Survey data to explore the relationship between financial literacy and investor behavior in the U.S. stock market. This study examined the factors predicting overconfidence in U.S. investors and the relationship between overconfidence and seeking investment assistance. Financial literacy is low among U.S. investors (Lusardi & Mitchell, 2011a), and individuals take control of their own investments as opposed to seeking professional investment advice. Overconfidence may explain this phenomenon since individuals tend to overestimate their perceived financial knowledge relative to their actual financial knowledge, resulting in risky and costly financial behaviors (Asaad, 2015). Financial literacy is particularly low among women, younger individuals, less educated individuals, Hispanics, and African Americans (Lusardi & Mitchell, 2011a); and Americans do not have the basic financial skills necessary to understand investments, credit, and to take advantage of the banking system (Lusardi & Mitchell, 2014). This study combined theories in financial literacy and overconfident behavior to identify factors that predict overconfident behavior in U.S. investors.

A logistic regression analysis model was utilized to understand the relationship between financial literacy, demographics, and overconfident investor behavior. The results show a positive relationship between overconfident behavior and portfolio value, seeking financial advice, and conducting research activity. Results also showed that overconfidence is higher in male investors, younger investors, and investors with lower incomes. These results show the factors that predict overconfident investor behavior. These findings can be applied to individuals and corporations across several scenarios. Individuals can increase self-awareness regarding their own behaviors to identify certain biases, such as overconfidence, to help them avoid making large financial mistakes. Financial advisors can utilize these findings to become more aware of their clients that are likely to demonstrate overconfident behavior and help them mitigate these risks. Government entities can incorporate financial literacy programs that will establish baseline financial literacy competency in primary and secondary education programs. In summary, these results provide additional understanding of factors that predict overconfident behaviors in U.S. investors and tools that can help mitigate risks associated with these behaviors.

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Appendix A: Survey Instrument

2018 National Financial Capability Study Investor Survey Instrument

Note:

- Changes from the 2015 NFCS Investor Survey are footnoted in this document.

Sample Characteristics:

- N = 2,000 investors who completed the 2018 NFCS State-by-State Survey
- All respondents screened to have:
 - Investments outside of retirement accounts
 - Primary or shared decision-making responsibility for investments in their household

Coding Notes:

- For all questions in the survey:
 - Code 98 = Don't know
 - Code 99 = Prefer not to say

Z)Thank you very much for participating in this research.

- Please be assured that all of your answers will be completely ANONYMOUS and CONFIDENTIAL. Therefore, please try to answer these questions as openly and honestly as possible.

A)[SECTION A: SCREENING]

A1)Which of the following best describes the situation in your household with regards to investments?

- I am the primary decision-maker when it comes to making investments for my household..... 1
- I share the decision-making responsibility when it comes to making investments for my household..... 2
- I do not participate in decisions when it comes to making investments for my household..... 3
- Don't know..... 98
- Prefer not to say..... 99

[IF Q.A1 = 3, 98, 99 (NOT DM/DK/PNTS); TERMINATE & SKIP TO QTERM]

A2)Do you have any investments in retirement accounts (e.g., 401(k), IRA, etc.)?

- Yes..... 1
- No..... 2
- Don't know..... 98
- Prefer not to say..... 99

A3)Not including retirement accounts, do you have any investments in stocks, bonds, mutual funds, or other securities?

- Yes..... 1
- No..... 2
- Don't know..... 98
- Prefer not to say..... 99

[IF Q.A3 = 2, 98, 99 (NO/DK/PNTS); TERMINATE & SKIP TO QTERM]

B)[SECTION B: INVESTMENTS]

B1)The following questions are about your investments that are not in retirement accounts. We will refer to these as “non-retirement accounts.”

B2)Which of the following types of investments do you currently own in non-retirement accounts?

[CREATE TWO BLOCKS: BLOCK 1 = B2_1 THROUGH B2_20; BLOCK 2 = B2_21 through B2_25; ALWAYS DISPLAY BLOCK 1 FIRST AND THEN BLOCK 2, BUT RANDOMIZE WITHIN BLOCKS – ANCHOR B2_8]

		Yes	No	Don't Know	Prefer Not to Say
B2_1)	Individual stocks	1	2	98	99
B2_2)	Individual bonds	1	2	98	99
B2_3)	Mutual funds	1	2	98	99
B2_4)	Exchange Traded Funds (ETFs)	1	2	98	99
B2_5)	Annuities (fixed, indexed, or variable)	1	2	98	99
B2_7)	Commodities or futures	1	2	98	99
B2_20) ¹	Whole life insurance (not term life insurance)	1	2	98	99
B2_21) ²	REITs	1	2	98	99
B2_22) ³	Options	1	2	98	99
B2_23) ⁴	Microcap stocks or penny stocks	1	2	98	99
B2_24) ⁵	Structured notes	1	2	98	99
B2_25) ⁶	Private placements	1	2	98	99

B3)In the past 12 months, how many times have you bought or sold investments in non-retirement accounts?

None	1
1 to 3 times	2
4 to 10 times	3
11 times or more	4
Don't know.....	98
Prefer not to say	99

B4)What is the approximate total value of all of your investments in non-retirement accounts?

Less than \$2,000.....	1
\$2,000 to less than \$5,000.....	2
\$5,000 to less than \$10,000.....	3
\$10,000 to less than \$25,000.....	4
\$25,000 to less than \$50,000.....	5
\$50,000 to less than \$100,000.....	6
\$100,000 to less than \$250,000.....	7
\$250,000 to less than \$500,000.....	8
\$500,000 to less than \$1,000,000.....	9
\$1,000,000 or more.....	10
Don't know.....	98
Prefer not to say.....	99

B5)Do any of your investment accounts allow you to make purchases on margin?

Yes.....	1
No.....	2
Don't know.....	98
Prefer not to say.....	99

[IF Q.B5 = 1 (YES), ASK; OTHERWISE SKIP TO Q.B21]

B6) Have you made any securities purchases on margin?

Yes.....	1
No.....	2
Don't know.....	98
Prefer not to say.....	99

[IF Q.B6 = 1 (YES), ASK; OTHERWISE SKIP TO Q.B21]

B20)⁷ Have you ever had a margin call?

Yes.....	1
No.....	2
Don't know.....	98
Prefer not to say.....	99

B21)⁸ Some investment firms offer you the option to use your investment accounts as collateral for a loan or line of credit. You cannot use the borrowed money to purchase securities, but you can use it for other purposes, such as buying a car or renovating a home.

Do you have this type of loan or line of credit?

Yes.....	1
No.....	2
Don't know.....	98
Prefer not to say.....	99

B10) Which of the following statements comes closest to describing the amount of financial risk that you are willing to take when you save or make investments?

- Take substantial financial risks expecting to earn substantial returns1
- Take above average financial risks expecting to earn above average returns.....2
- Take average financial risks expecting to earn average returns.....3
- Not willing to take any financial risks.....4
- Don't know.....98
- Prefer not to say99

B11) How much of your non-retirement portfolio is invested in stocks or mutual funds that contain stocks?

- More than half.....1
- Less than half2
- None3
- Don't know.....98
- Prefer not to say99

B22)⁹ Do you currently rely on your investments to cover any of your living expenses?

- Yes1
- No2
- Don't know.....98
- Prefer not to say99

B23)¹⁰ Have you heard of cryptocurrencies (e.g., Bitcoin, Ethereum, or Litecoin)?

- Yes.....1
- No2
- Don't know.....98
- Prefer not to say99

[IF Q.B23 = 1 (YES), ASK; OTHERWISE SKIP TO Q.C20]

B24)¹¹ In your opinion, how risky are cryptocurrencies as an investment?

- Not at all risky.....1
- Slightly risky2
- Moderately risky.....3
- Very risky4
- Extremely risky.....5
- Don't know.....98
- Prefer not to say99

B25)¹² Have you invested in cryptocurrencies, either directly or through a fund that invests in cryptocurrencies?

Yes	1
No	2
Don't know.....	.98
Prefer not to say.....	.99

B26)¹³ Are you considering investing in cryptocurrencies in the future?

Yes.....	1
No	2
Don't know.....	.98
Prefer not to say.....	.99

C)[SECTION C: INTERMEDIARIES]

C20)¹⁴ How often do you make investment decisions for your non-retirement accounts in the following ways?

[RANDOMIZE]

		Never	Sometimes	Frequently	Don't Know	Prefer not to Say
C20_1)	I let a professional choose investments for me	1	2	3	98	99
C20_2)	I discuss investment options with a professional then make the decisions myself	1	2	3	98	99
C20_3)	I conduct my own research (e.g., read articles, go to websites, watch financial news) then make the decisions myself	1	2	3	98	99
C20_4)	I use a web-based, online tool that chooses investments for me	1	2	3	98	99
C20_5)	I use a mobile app that chooses investments for me	1	2	3	98	99

[IF Q.C20_1 = 2 OR 3 (SOMETIMES/FREQ LET PROF. CHOOSE), ASK; OTHERWISE SKIP TO Q.C22]

C21)¹⁵ When a professional chooses investments for you, does he or she need your approval for each individual transaction?

Yes	1
No	2
Don't know	98
Prefer not to say	99

C22)¹⁶ How often do you buy or sell investments for your non-retirement accounts in the following ways?

[DO NOT RANDOMIZE]

		Never	Sometimes	Frequently	Don't Know	Prefer not to Say
C22_1)	I contact a specific person (my financial advisor) and ask them to make the sale or purchase	1	2	3	98	99
C22_2)	I call my financial firm and speak to an available representative	1	2	3	98	99
C22_3)	I place orders online through a website	1	2	3	98	99
C22_4)	I place orders through a mobile app	1	2	3	98	99

C23)¹⁷ Do you pay any of the following types of fees for investing in your non-retirement accounts?

[RANDOMIZE]

		Yes	No	Don't Know	Prefer not to Say
C23_1)	Fees for investment advice	1	2	98	99
C23_2)	Fees or commissions for trades	1	2	98	99
C23_3)	Mutual fund fees or expenses	1	2	98	99
C23_4)	Account service fees	1	2	98	99

C24)¹⁸ Considering all the various types of fees, approximately what percentage of your invested assets do you pay annually in fees for your non-retirement accounts?

- Do not pay any fees 1
- Less than 0.5% 2
- 0.5% to less than 1% 3
- 1% to less than 2% 4
- 2% to less than 4% 5
- 4% or more 6
- Don't know 98
- Prefer not to say 99

[IF Q.C24 = 1 – 6, ASK; OTHERWISE SKIP TO Q.C26]

C25)¹⁹ How confident are you in the answer you just provided?

Not At All Confident	2	3	4	5	6	7	8	9	Extremely Confident	Don't Know	Prefer Not to Say
1									10	98	99
1	2	3	4	5	6	7	8	9	10	98	99

C26)²⁰ A **trusted contact** is a person you authorize your investment firm to contact if the firm has trouble reaching you or suspects financial exploitation.

Have you authorized a trusted contact for any of your investment accounts?

- 1
- 2
- Don't know 98
- Prefer not to say 99

C7)Have you ever checked with a state or federal regulator regarding the background, registration, or license of a financial professional?

- Yes1
- No2
- Don't know.....98
- Prefer not to say.....99

D)[SECTION D: SECURITIES MARKET]

D1)How confident are you that U.S financial markets...

[RANDOMIZE]

	Not At All Confident 1	2	3	4	5	6	7	8	9	Extremely Confident 10	Don't Know	Prefer Not to Say
D1_1) Offer good long-term opportunities for investors	1	2	3	4	5	6	7	8	9	10	98	99
D1_2) Are fair to all investors	1	2	3	4	5	6	7	8	9	10	98	99

D2)What do you expect the approximate average annual return of the S&P 500 stock index to be over the next 10 years (without adjusting for inflation)?

- Less than 0% (a negative return)..... 1
- 0% to 4.9% 2
- 5% to 9.9% 3
- 10% to 14.9% 4
- 15% to 19.9% 5
- 20% or more 6
- Don't know 98
- Prefer not to say 99

D3)Over the next 12 months, how well do you expect your portfolio of investments to perform?

[RANDOMIZE PUNCHES 1 AND 3]

- Worse than the market as a whole..... 1
- About the same as the rest of the market as a whole 2
- Better than the market as a whole 3
- Don't know 98
- Prefer not to say 99

D20)²¹ When the stock market dropped by 10% in early February of this year, what did you do in response?

[RANDOMIZE PUNCHES 1 & 2]

- Bought stocks or stock funds 1
- Sold stocks or stock funds 2
- Neither 3
- Don't know 98
- Prefer not to say 99

D21)²² If the stock market were to drop by 20% over a short period of time, what would you do in response?

[RANDOMIZE PUNCHES 1 & 2]

- Buy stocks or stock funds.....1
- Sell stocks or stock funds2
- Neither.....3
- Don't know.....98
- Prefer not to say.....99

D4)How strongly do you agree or disagree with the following statement?

Please give your answer on a scale of 1 to 7, where 1 = “Strongly Disagree,” 7 = “Strongly Agree,” and 4 = “Neither Agree Nor Disagree”. You can use any number from 1 to 7.

	Strongly Disagree 1	2	3	Neither Agree nor Disagree 4	5	6	Strongly Agree 7	Don't Know 98	Prefer Not to Say 99
I am worried about being victimized by investment fraud	1	2	3	4	5	6	7	98	99

E)[SECTION E: DISCLOSURE & REGULATION]

E1_1)²³ How confident are you that U.S. financial markets are effectively regulated to protect investors from fraud and abusive sales practices ?

Not At All Confident 1	2	3	4	5	6	7	8	9	Extremely Confident 10	Don't Know	Prefer Not to Say
1	2	3	4	5	6	7	8	9	10	98	99

E20)²⁴ Do you feel that investment industry disclosures regarding topics such as fees, risks of investing, and potential conflicts of interest are adequate?

_____	1
_____	2
Don't know _____	98
Prefer not to say _____	99

E5) What do you believe is the purpose of disclosures?

Protecting investors _____	1
Protecting the institutions that manage investments _____	2
_____	3
_____	4
Don't know _____	98
Prefer not to say _____	99

E6)By which method would you prefer to receive mandatory disclosures regarding your investments?

In-person meetings with a broker or advisor	1
Paper documents physically mailed to you.....	2
Documents delivered to you electronically by email	3
Documents that you access on the Internet (not via email)	4
None of the above.....	5
Don't know.....	98
Prefer not to say.....	99

F)[SECTION F: INFORMATION SOURCES]

F1)Which of the following information sources do you use when making an investment decision?

[RANDOMIZE – ALWAYS PAIR F1_1/F1_2 TOGETHER IN THAT ORDER]

		Yes	No	Don't Know	Prefer Not to Say
F1_1)	Stockbrokers	1	2	98	99
F1_2)	Financial advisors other than stockbrokers	1	2	98	99
F1_3)	Information from the company you are investing in (e.g., annual reports, company websites)	1	2	98	99
F1_4) ²⁵	Information from brokerage firms, mutual fund companies, or other financial services companies (e.g., research reports, brochures, newsletters, seminars, websites)	1	2	98	99
F1_5)	The media (i.e., TV, radio, newspapers, magazines, online news sources and financial information websites)	1	2	98	99
F1_6)	Industry regulators (e.g., FINRA, SEC, state securities regulators)	1	2	98	99
F1_7)	Investment clubs or investor membership organizations	1	2	98	99
F1_8)	Your employer	1	2	98	99
F1_9)	Friends, colleagues, or family members	1	2	98	99

F2)In the past 12 months, which of the following have you used for information about investing?

[RANDOMIZE]

		Yes	No	Don't Know	Prefer Not to Say
F2_1)	Brochures or newsletters	1	2	98	99
F2_2)	Newspapers, magazines, or books	1	2	98	99
F2_5)	Television/radio programs	1	2	98	99
F2_6) ²⁶	Free online services, websites, or blogs	1	2	98	99
F2_20) ²⁷	Seminars or group meetings	1	2	98	99
F2_21) ²⁸	Paid subscription services	1	2	98	99
F2_22) ²⁹	Social media	1	2	98	99

F3)Have you heard of any of the following consumer information tools?

[RANDOMIZE]

		Yes	No	Don't Know	Prefer Not to Say
F3_1)	BrokerCheck	1	2	98	99
F3_2)	IAPD (Investment Adviser Public Disclosure) database	1	2	98	99
F3_3)	EDGAR (Electronic Data-Gathering, Analysis, and Retrieval) database	1	2	98	99
F3_4)	CarFax	1	2	98	99
F3_5)	FreeCreditReport.com	1	2	98	99
F3_6)	AnnualCreditReport.com	1	2	98	99
F3_7)	SmartCheck	1	2	98	99
F3_8)	Investor.gov	1	2	98	99

[IF Q.F3_1 = 1 (YES, HEARD OF BROKERCHECK), ASK; OTHERWISE SKIP TO Q.F5]

Have you ever used BrokerCheck?

- Yes 1
- No 2
- Don't know 98
- Prefer not to say 99

[IF Q.F3_4 = 1 (YES, HEARD OF CARFAX), ASK; OTHERWISE SKIP TO Q.F20]

Have you ever used CarFax?

- Yes 1
- No 2
- Don't know 98
- Prefer not to say 99

[IF Q.F3_8 = 1 (YES, HEARD OF INVESTOR.GOV), ASK; OTHERWISE SKIP TO Q.G1]

Have you ever used Investor.gov?

- Yes 1
- No 2
- Don't know 98
- Prefer not to say 99

G)[SECTION G: QUIZ & SELF-PERCEPTION]

G1)How comfortable are you when it comes to making investment decisions?

Not At All Comfortable 1	2	3	4	5	6	7	8	9	Extremely Comfortable 10	Don't Know	Prefer Not to Say
1	2	3	4	5	6	7	8	9	10	98	99

G2)On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall knowledge about investing?

Very Low 1	2	3	4	5	6	Very High 7	Don't Know	Prefer Not to Say
1	2	3	4	5	6	7	98	99

G20)³¹ How strongly do you agree or disagree with the following statement?

Please give your answer on a scale of 1 to 7, where 1 = “Strongly Disagree,” 7 = “Strongly Agree,” and 4 = “Neither Agree Nor Disagree”. You can use any number from 1 to 7.

	Strongly Disagree 1	2	3	Neither Agree nor Disagree 4	5	6	Strongly Agree 7	Don't Know	Prefer Not to Say
I have access to the information I need to make investment decisions	1	2	3	4	5	6	7	98	99

G3)You will now see a set of questions regarding various aspects of investing. This is not a test, and you will not be “graded” on your responses. If you do not know an answer or are not sure, please feel free to indicate that.

G4)If you buy a company’s stock...

- You own a part of the company 1
- You have lent money to the company 2
- You are liable for the company’s debts..... 3
- The company will return your original investment to you with interest..... 4
- Don’t know..... 98
- Prefer not to say 99

- # G5) If you buy a company’s bond...
- You own a part of the company1
 - You have lent money to the company2
 - You are liable for the company’s debts.....3
 - You can vote on shareholder resolutions4
 - Don’t know.....98
 - Prefer not to say.....99
- # G6)If a company files for bankruptcy, which of the following securities is most at risk of becoming virtually worthless?
- The company’s preferred stock1
 - The company’s common stock2
 - The company’s bonds.....3
 - Don’t know.....98
 - Prefer not to say.....99
- # G7)In general, investments that are riskier tend to provide higher returns over time than investments with less risk.
- True1
 - False2
 - Don’t know.....98
 - Prefer not to say.....99
- # G21)³² The past performance of an investment is a good indicator of future results.
- True1
 - False2
 - Don’t know.....98
 - Prefer not to say.....99
- # G8)Over the last 20 years in the US, the best average returns have been generated by:
- Stocks.....1
 - Bonds.....2
 - CDs.....3
 - Money market accounts.....4
 - Precious metals5
 - Don’t know.....98
 - Prefer not to say.....99

- # G22)³³ What is the main advantage that index funds have when compared to actively managed funds?
- Index funds are generally less risky in the short term..... 1
 - Index funds generally have lower fees and expenses.....2
 - Index funds are generally less likely to decline in value3
 - Don't know.....98
 - Prefer not to say99
- # G11) Which of the following best explains why many municipal bonds pay lower yields than other government bonds?
- Municipal bonds are lower risk 1
 - There is a greater demand for municipal bonds2
 - Municipal bonds can be tax-free3
 - Don't know.....98
 - Prefer not to say99
- # G12) You invest \$500 to buy \$1,000 worth of stock on margin. The value of the stock drops by 50%. You sell it. Approximately how much of your original \$500 investment are you left with in the end?
- \$500 1
 - \$250 2
 - \$0 3
 - Don't know 98
 - Prefer not to say 99
- # G13) Which is the best definition of "selling short?"
- Selling shares of a stock shortly after buying it 1
 - Selling shares of a stock before it has reached its peak 2
 - Selling shares of a stock at a loss 3
 - Selling borrowed shares of a stock 4
 - Don't know 98
 - Prefer not to say 99
- # G23)³⁴ If you own a call option with a strike price of \$50 on a security that is priced at \$40, and the option is expiring today, which of the following is closest to the value of that option?
- \$10 1
 - \$0 2
 - \$10 3
 - Don't know 98
 - Prefer not to say 99

H)[SECTION H: MISCELLANEOUS QUESTIONS]

H1)There are two questions left, and the survey will be complete.

H2)Have you ever read customer reviews online (e.g. Yelp, TripAdvisor) before deciding to eat at a particular restaurant?

Yes 1
No 2
Don't know 98
Prefer not to say 99

H3)Have you ever purchased a used car?

Yes 1
No 2
Don't know 98
Prefer not to say 99

999) [POINT OF COMPLETE]

Appendix B: Abbreviations

AFS	Alternative Financial Services
CATI	Computer Aided Telephone Interview
CEO	Chief Executive Officer
ETF	Exchange-traded Fund
FINRA	Financial Industry Regulatory Authority
GEM	Global Entrepreneurship Model
GRE	Graduate Record Examination
IRA	Individual Retirement Account
NFCS	National Financial Capability Study
OECD	Organization for Economic Cooperation and Development
PISA	Program for International Student Assessment
SSI	Survey Sampling International
UAE	United Arab Emirates
WTP	Willingness to Pay

Appendix C: Stata Codes

Summary Statistics	summarize
Correlation	correlate
Graphs	graph bar
Logistic Regression	logistic
Logistic Transformation	logit