Who Is More Likely to Be Delinquent in Their Mortgage Payments Among Homeowners? The Role of Financial Literacy

Ellie Donne Hansen
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WHO IS MORE LIKELY TO BE DELINQUENT IN THEIR MORTGAGE PAYMENTS AMONG HOMEOWNERS?

THE ROLE OF FINANCIAL LITERACY

by

Ellie Donne Hansen

A thesis submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Human Development and Family Studies

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UTAH STATE UNIVERSITY
Logan, UT
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ABSTRACT

Who is More Likely to be Delinquent in Their Mortgage Payments Among Homeowners? The Role of Financial Literacy

by

Ellie Donne Hansen, Master of Science
Utah State University, 2022

Major Professor: Dr. Yoon G. Lee
Department: Human Development and Family Studies

Homeownership is often referred to as the American dream and offers significant benefits, such as building wealth, social stability, and permanent residence. Despite the many benefits of homeownership, some homeowners could experience financial strain from high levels of debt. As debt continues to rise in the U.S., mortgage delinquency can be an important economic issue. Homeowners who are delinquent on their mortgages, risk financial stability, lose the effective means of wealth accumulation, and may trigger the beginning of the foreclosure process. Homeowners who lack financial literacy may have a difficult time understanding the risk characteristics associated with mortgages. There is evidence that homeowners with appropriate levels of financial literacy and financial capability have a lower likelihood of mortgage delinquency.

Using data from the 2018 National Capability Study (NFCS), this thesis examined how financial literacy and financial education were associated with mortgage delinquency. This study further investigated how personal/other factors and socio-
economic characteristics are associated with mortgage delinquency among homeowners. Logistic regression analyses were employed to investigate how financial literacy, financial education, personal/other factors, and socio-economic characteristics were associated with mortgage delinquency among homeowners (N=3,475).

The logistic regression results showed that as homeowners had higher levels of financial literacy, they were less likely to be delinquent in mortgage payments. The logistic regression results also indicated that homeowners who borrowed against their homes, those who experienced large income drops, and those with higher levels of financial stress were more likely to be delinquent in their mortgage payments. Further, this study found that millennials/Generation Z, Black individuals, working individuals, those with annual income between $75,000 - $99,999, and those residing in the South were more likely to be delinquent in their mortgage payments compared to their counterparts.

The contributions of this study could include adding to the current literature regarding financial literacy and mortgage delinquency among homeowners. The findings can provide insight on the mortgage delinquency issue for financial educators, financial counselors, and policy makers. Further, these professionals could help homeowners keep their valuable assets such as their homes and reduce the risk of foreclosure.
PUBLIC ABSTRACT

Who is More Likely to be Delinquent in Their Mortgage Payments Among Homeowners? The Role of Financial Literacy

by

Ellie Donne Hansen

Homeownership is a way for families to build wealth and marks status attainment. Despite the many benefits of homeownership, homeowners who are delinquent on their mortgages lose the effective means of wealth accumulation and may trigger the beginning of the foreclosure process. There is evidence that homeowners with appropriate levels of financial literacy have a lower likelihood of mortgage delinquency.

Using data from the 2018 National Financial Capability Study (NFCS), the main purpose of this study was to examine what factors are associated with mortgage delinquency among homeowners. This study also examined to what extent financial literacy plays a role in mortgage delinquency among homeowners. The findings of this study suggest that financial literacy, some personal/other factors, and socio-economic characteristics are important factors associated with mortgage delinquency. In particular, financial literacy such as budgeting ability and setting up an emergency fund were important skills that could help homeowners pay their mortgages on time. The findings of this study can help financial educators, financial counselors, and policy makers understand the role of financial literacy in mortgage delinquency and could help homeowners keep their homes and reduce the risk of foreclosure.
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Ellie Donne Hansen
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CHAPTER I

INTRODUCTION

Homeownership is often referred to as the American dream and offers significant benefits. Some benefits of homeownership include building wealth, financial stability, and a permanent residence (Goodman & Mayer, 2018). Homeownership also instills a sense of membership to the community, protects families from generally rising housing costs, and may provide rent-free housing later in life when the mortgage is paid off. Despite the many benefits of homeownership, some homeowners could experience financial strain from high levels of debt, including credit card debt, unpaid medical bills, auto loans, and student loan debt. Homeowners may accumulate higher than sustainable amounts of debt, which may seem unbearable especially when they lack financial literacy and the financial capability necessary (Gathergood & Weber, 2017).

According to the latest report on household debt, total household debt, including credit cards, mortgages, home equity lines of credit, auto loans, student loans, and other obligations reached $15.24 trillion in 2020 (Federal Reserve Bank of New York, 2021). Along with elevated levels of household debt, some homeowners could be behind on their mortgages. When homeowners are at least 30 days overdue on making at least one mortgage payment, their mortgages are considered delinquent. In 2021, under the effects of the COVID-19 crisis, 4.6% of homeowners (2.19 million) missed their mortgage payments (Mortgage Bankers Association, 2021). This level of delinquency has not been seen since the height of the Great Recession in 2010 (Consumer Financial Protection Bureau, n.d.). Homeowners who are delinquent on their mortgages risk financial
instability and may trigger the beginning of the foreclosure process where these homeowners will lose their homes and any equities that they may have established for many years. There is evidence that homeowners with appropriate levels of financial capability and financial knowledge have lower likelihoods of mortgage delinquency (Kim et al., 2020). It is crucial for financial professionals and practitioners to educate homeowners to be engaged in paying their mortgage on time, while fostering their financial knowledge and capability through financial education programs and homebuyer education workshops.

Statement of the Problem

The rapid increase in housing prices across the U.S. has contributed to the housing affordability issue (Manturuk et al., 2012). The average sales price for existing homes sold in the U.S. in November 2021 was $372,400 (Statista, 2022), while the median household income was $67,521 in 2020 (U.S. Census, 2020). The decrease in housing affordability can lead to high debt loads for U.S. homeowners. For example, the total amount of mortgage debt in the U.S. was $10.93 trillion in 2021 (Federal Reserve Bank of New York, 2021). In the third quarter of 2021, 3.4% of homeowners were considered seriously underwater; meaning the estimated balance of the mortgage was more than the properties estimated market value (ATTOM, 2021).

A substantial amount of research indicates debt is a continuing problem for U.S. households. The $15.24 trillion of U.S. household debt equates to the average American’s personal debt load of $90,460 (DeMatteo, 2021). As debt continues to rise, homeowners who lack financial literacy may be at financial risk if they encounter unforeseen events. Reich (2018) reported that nearly 80% of Americans lived paycheck to paycheck. It is
also reported that 40% of households had three to six months’ worth of liquid savings, and 28% had more than six months of liquid savings (Bhutta & Dettling, 2018). An unforeseen expense or financial shock could derail a homeowner with limited liquid savings and result in delinquency.

At some point, homeowners may experience a situation in which they are unable to make their mortgage payments. Homeowners fall behind on their mortgage payments for multiple reasons. Some homeowners could experience a change of circumstances such as a reduction in income, unemployment, illness, or divorce. In these situations, it is common for homeowners to fall behind on their mortgage payments, then bring the mortgage payments current, only to fall behind again (Foote et al., 2010; Kim et al., 2020). Research suggested that homeowners who fell behind on their mortgage payments intended to pay on time; however, they simply lacked the financial resources to do so (Dominy & Kempson, 2003; Kim et al., 2020).

Homeowners who are 30 to 89 days late in their mortgage payments are considered to be in the early stages of delinquency (Consumer Financial Protection Bureau, 2022). If they are 90 days late in their mortgage payments, these homeowners could face a more severe financial crisis. According to the Dodd-Frank Wall Street Reform and Consumer Protection Act passed in 2010, if homeowners are 120 days delinquent on their mortgage, the foreclosure process can begin. Previous research has shown that the average time to initiate and complete a foreclosure is 15 months (Herkenhoff & Ohanian, 2019).

Mortgage delinquency has significant and costly impacts on the homeowners’ financial outcomes (Fornero et al., 2011). For example, the typical late fee for a missed
mortgage payment is from 3% to 6% of the mortgage payment; however, the amount of
the late fee would depend on the loan terms (Herkenhoff & Ohanian, 2019; Stolba, 2019).
Late fees can be expensive and bring the homeowners even further behind. Another
costly outcome of mortgage delinquency is the negative effect on the homeowners’ credit
scores and reports. Delinquent mortgage payments lower the homeowners’ credit scores,
remain on their credit report for seven years, and affect future loan applications. It is
possible that mortgage delinquency continues to be an issue for homeowners as the
delinquency rate spiked to 8.22% in the second quarter of 2020 (Federal Reserve Bank of
New York, 2021; Statista, 2021c).

**Purpose of the Study**

Mortgage delinquency may be a result of an individual’s change in circumstances;
however, it also may be a result of poor financial literacy. Financial literacy is defined as
knowledge of basic financial concepts and the ability to use financial knowledge to make
financial decisions (Hung et al., 2009; Huston, 2010; Xiao & O’Neill, 2016). Substantial
research has shown the importance of financial literacy and making wise financial
decisions (Chaulagain, 2015; De Bassa Scheresberg, 2013; Dwiastanti, 2015; Hilgert et
al., 2003; Lusardi & Tufano, 2015; Van Rooij et al., 2011). For example, individuals who
are financially literate have a higher rate of return on savings, positive debt management
behaviors, and higher financial satisfaction (Behrman et al., 2012; Deuflhard et al., 2019;
Kaiser & Menkhoff, 2017; Lusardi, 2019; and Xiao et al., 2014).

Homeowners who lack financial literacy and financial experience may have a
difficult time understanding the terminology and risk characteristics associated with
mortgages (Seay et al., 2017). Because of the lack of financial knowledge, some
homeowners hold higher levels of mortgage debt or find themselves obtaining a high-risk mortgage that might not fit the needs of the family (Gathergood & Weber, 2017). It is evident that homeowners who lacked financial literacy were more likely to accept a mortgage from the first lender they contacted rather than shopping for a more appropriate mortgage (Fornero et al., 2011). On the other hand, individuals with higher levels of financial literacy comparison shopped for mortgages, understood the differences between mortgage types, had the ability to assess their mortgage risk tolerance, and were less likely to delay payments (Fornero et al., 2011). Further, previous research indicated that financially literate homeowners were more likely to receive better mortgage interest rates and were more likely to refinance for better terms when needed (Bialowolski et al., 2020). In contrast, financially illiterate homeowners were less likely to be aware of the risks of an ill-suited mortgage product; thus, putting these homeowners at higher risk for delinquency (Bucks & Pence, 2008; Fornero et al., 2011; Gerardi, 2010).

Today, financial education is important because it helps individuals and families build the knowledge and skills needed to manage finance and life. Financial education is the process in which people gain financial information, skills, and confidence to manage their day-to-day finances (U.S. Financial Literacy and Education Commission, 2020). Financial education can occur in formal settings such as in schools and colleges. Financial education can also occur in informal settings such as from parents, peers, and work experiences. Previous research is conflicted on the positive impact of financial education. However, Wagner (2015) found financial education had a positive effect on financial literacy and long-term behaviors such as having retirement accounts or investment accounts. Kaiser et al. (2021) also found that financial education had a
positive effect on financial knowledge and downstream behaviors such as budgeting and saving behavior. Although previous research has shown financial education is impactful on long-term financial behaviors, financial education needs to occur at an early age through adulthood (Robb & Woodyard, 2011).

Owning a home can be a status symbol and can be a tool to build wealth for homeowners as they pay off their mortgages. However, some homeowners may have poor financial knowledge and behaviors that put them at risk of becoming delinquent on their mortgages. This study attempts to examine the effect of financial literacy on mortgage payment behavior among homeowners. Specifically, using data from the 2018 National Financial Capability Study (NFCS), this study examined how financial knowledge, financial capability, and socio-economic and personal characteristics are associated with mortgage payment behavior among homeowners in the U.S. To accomplish these research objectives, the following four research questions were assessed throughout this study:

**Research Questions**

1) What is the association between financial literacy and mortgage delinquency?

2) What is the association between financial education and mortgage delinquency?

3) What personal (e.g., risk tolerance attitude, credit record, and home equity borrowing), and other factors (e.g., income drop, financial stress) are associated with mortgage delinquency?
4) What socio-economic characteristics (e.g., age, gender, race/ethnicity, education, marital status, employment status, household income, and region) are associated with mortgage delinquency?

**Importance of the Study**

Financial literacy is defined as “the skills, knowledge and tools that equip people to make individual financial decisions and actions to attain their goals” (U.S. Financial Literacy and Education Commission, 2020, p. 2). Financial decisions occur almost every day for most individuals. Financial decisions can be minor, such as deciding whether to buy a coffee every day, or they can be more complicated and important, such as obtaining a mortgage or borrowing money to purchase a car. Individuals who have financial literacy are more equipped to make sound financial decisions. Research has shown that financial literacy influences financial behaviors that are often recommended by financial professionals (Allgood & Walstad, 2016). Financial literacy is also associated with investing, spending, and saving behaviors (Henager & Cude, 2016). Lusardi and Tufano (2015) also noted that individuals with low financial literacy paid a significant amount in credit card fees and finance charges.

A growing amount of previous research indicated that financial literacy plays a vital role in households borrowing behaviors (Behrman et al., 2012; Deuflhard & Georgarakos, 2019; Kaiser & Menkhoff, 2017; Lusardi, 2019). However, fewer studies have focused on the association between financial literacy and mortgage delinquency behavior among homeowners in the U.S. The findings of this study will add to the current literature on the association between financial literacy and mortgage payment behavior. One of the most important long-lasting decisions that an individual can make is achieving
homeownership. This study can provide housing counselors and financial educators with greater insight into financial literacy and the impact it has on mortgage payment behavior. By understanding the associations among financial education, financial literacy, socio-economic characteristics, and mortgage payment behaviors; housing counselors and specialists will be able to better assist vulnerable homeowners who are at risk of becoming delinquent on their mortgage payments.

Findings of this study will benefit U.S. Housing and Urban Development (HUD) housing counselors. Many of these counselors provide mortgage delinquency and foreclosure prevention counseling. HUD encourages homeowners who are delinquent on their mortgages to reach out to a HUD approved counseling agency and begin counseling as soon as possible. Based on the findings of this study, mortgage default counselors will help identify the cause of the default and discuss options to reinstate the mortgage and retain ownership of the home. The HUD approved housing counselor will be able to discuss the consequences of default and the foreclosure process with their clients. Further, the findings of this study can provide mortgage default counselors with a deeper understanding of who is at risk for mortgage delinquency and the importance of financial literacy.
CHAPTER II

LITERATURE REVIEW

As debt continues to rise in the U.S., it is important to understand what factors influence mortgage payment behavior. At some point, homeowners may be unable to pay their mortgage payments due to a variety of factors. Hence the mortgage becomes delinquent. A mortgage is considered delinquent when the homeowner fails to make the mortgage payment as outlined in the loan documents. Homeowners with higher financial literacy shopped for a mortgage, evaluated their risk tolerance, and were less likely to experience mortgage delinquency (Fornero et al., 2011). This study examined how financial literacy, financial education, personal and other factors, and socio-economic characteristics are associated with mortgage delinquency among U.S. homeowners.

This chapter reviews the literature related to mortgage payment behavior and components of financial literacy. The topics in this chapter include: 1) homeownership and housing wealth; 2) housing debt and mortgage payment behavior; 3) why does mortgage delinquency matter; 4) financial education and financial behavior; 5) measures of financial literacy; 6) socio-economic characteristics (age/generation, gender, race/ethnicity, marital status, education level, employment status, and household income) and financial behavior; and 8) factors associated with mortgage payment behavior.

Homeownership and Housing Wealth

Acquiring a home is typically one of the largest purchases that an individual will make during their lifetime. Homeownership is a mode for families to build wealth, serves as financial stability, and marks status attainment (Goodman & Mayer, 2018). Many
factors influence the financial benefits of owning a home, including current economic conditions, purchase timing, location of the property, and loan product requirements. Wealth accumulation from homeownership occurs when home values increase more than inflation resulting in a positive rate of return (Killewald & Bryan, 2016). Homeowners build wealth through holding the property during economic downturns when the property values may fall (Goodman & Mayer, 2018). Research has found that vulnerable homeowners, such as low-income and minorities, were less likely to hold the property through the economic cycle and thus eliminate the benefits of homeownership (Goodman & Mayer, 2018).

Americans are well-known for homeownership, and many would rather buy a home than rent (McCabe, 2018). During the past two decades, the homeownership rate remained steady and peaked in 2004 at 69.2% before the 2007 to 2009 Great Recession hit the housing market (Statista, 2021a). After the Great Recession, the homeownership rate slowly declined to 63.7% in 2016 (Statista, 2021a). Since 2016, homeownership has steadily increased to 65.4% of households as of the second quarter of 2021 (Statista, 2021b). Even amidst the 2019-2020 economic downturn, the rate of homeownership increased dramatically and matched the largest prior housing boom between 2003 and 2004 (Fry, 2021).

When purchasing a home, most Americans do not have enough cash on hand to purchase a home outright. Many Americans acquire a mortgage to finance the home purchase. Stolba (2021) reported that from 2019 to 2020, mortgage debt grew by 7% and reached record highs of $10.3 trillion. Housing debt continues to rise and was reported as

Mortgages are complex instruments that require individuals to decide which type of borrowing product to use as well as how much of a mortgage is sustainable. Some homeowners may fall victim to a high-risk mortgage. High-risk mortgages include interest-only, adjustable-rate mortgages, prepayment penalties, balloon payments, high loan-to-value ratios, and high loan-to-income ratios. Homeowners who do not understand these high-risk mortgage terms may misinterpret the initial perks and affordability, while not considering the long-term financial consequences (Gathergood & Weber, 2017).

A home is a valuable asset and can create wealth. Wealth is created through home appreciation, tax incentives, and forced savings by amortization (Grinstein-Weiss et al., 2013). Hays and Sullivan (2020) report that the average homeowner’s wealth is nearly 89% higher than the median wealth of renters. Previous studies indicated that the main contributor to wealth was home equity and retirement accounts (Di et al., 2007; Manturuk et al., 2012; U.S. Census, 2019a). It is estimated that in 2017, the median value of wealth in home equity was $118,000 (Hays & Sullivan, 2020). Although homeownership does not account for all the median wealth, households who owned a home had a median wealth of $269,100 compared to $3,036 for those who rented their home (Hays & Sullivan, 2020).

Homeownership does not guarantee wealth accumulation especially for low-income households. Key determinants of wealth accumulation among homeowners include the rate of housing appreciation, type of mortgage received, current market conditions, and tenure of ownership (Grinstein-Weiss, 2013). Low-income households
typically purchase lower priced homes. Research is inconclusive as to whether lower priced homes appreciate at the same rate as higher priced homes. Some research has found that lower priced homes have low appreciation rates (Shlay, 2006), while other research has found no significant difference in appreciation rate between low-priced and high-priced homes (Bostic & Lee, 2009).

**Housing Debt and Mortgage Payment Behavior**

Homeowners’ borrowing and payment behavior is an important factor in regard to financial stability and well-being. As U.S. households continue to accumulate consumer debt, housing debt is also on the rise. Over the past two decades, mortgage debt has significantly increased (Bahchiev et al., 2005). In 2021, mortgage debt reached $10.3 trillion in the U.S. (Federal Reserve Bank of New York, 2021); this debt is the main portion of total household debt of $15.24 trillion. The increase in mortgage debt may result in low-income households to become debt burdened. Although owning a home has many benefits, homeownership for debt-burdened households has become less of a means for financial security and may increase financial distress.

Research has shown that homeowners who had previous experience of poor mortgage payment behaviors increased the probability of future mortgage payment difficulties (May & Tudela, 2005). One explanation of this phenomenon is that individuals with lower levels of numerical ability may have a harder time in understanding their mortgage terms and maintaining a budget (Gerardi et al., 2013a). Gerardi et al. (2013a) also reported that individuals who are unable to perform numerical calculations were prone to financial mistakes such as being late on mortgage payments, as such resulting in financial distress.
Preventative measures may help buffer homeowners during times of financial shocks or economic downturns. For example, an established emergency fund is a preventative measure that can provide homeowners with financial resilience during unforeseen events. Many low-income individuals started homeownership with little or no savings – having an average of $2,000 in liquid assets (Moulton et al., 2015b). Research has found that households who lacked liquidity were more likely to experience mortgage default during the life of the mortgage (Moulton et al., 2015a). This lack of liquidity is especially salient during economic downturns. Households without access to liquid funds may experience financial hardship when an unexpected event occurs. Financial hardships can threaten housing stability and overall financial well-being (Collins & Gjertson, 2013).

**Why Does Mortgage Delinquency Matter?**

Mortgage delinquency is costly to households, communities, and the economy. Mortgage delinquency has been found to cause strain on the household and is positively related to financial stress (Xiao & Kim, 2022). Financial stress from mortgage delinquency presents unique stressors that may contribute to food insecurity as well as adverse physical and mental health outcomes (Alley et al., 2011; Marshall et al., 2021; Tsai, 2015). Xiao and Kim (2021) suggested that mortgage delinquency was common and 19% of households were delinquent on their mortgages. Since mortgage delinquency is frequent, this reveals that many U.S. homeowners are under financial stress and are at risk for adverse outcomes.

Individuals could face a high stress environment when they obtain a mortgage and become delinquent. Homeowners who are late on their mortgage payments are at risk of
becoming seriously delinquent and triggering the foreclosure process. Homeowners who lose their home in foreclosure might miss out on the effective means of accumulating wealth through home appreciation and paying down the mortgage. Monthly mortgage payments are a form of forced savings as the principal balance is paid down (Di et al., 2007). As the mortgage is paid down and the value of the home increases, the result is larger equity or wealth accumulation for the homeowner.

Communities also feel the far-reaching effects of mortgage delinquencies and foreclosures. Communities suffer on many levels including economically, physically, and socially (Vidmar, 2008). The effects of delinquencies and foreclosures during the Great Recession between 2007 and 2009 were particularly straining for low-income households and communities (Kim et al., 2017). During this time, millions of dollars of home equity were lost jeopardizing the financial security of homeowners, particularly low-income homeowners (Grinstein-Weiss et al., 2015). Vulnerable communities, such as disadvantaged and minority neighborhoods, were hardest hit with foreclosure, vacancy rates, and poverty (Owens & Sampson, 2018).

Studies have shown that communities with high levels of foreclosure have an increase in rate of crime. For example, thieves entered abandoned homes and stole valuables, such as copper wiring, water heaters, refrigerators, and air conditioning units (Vidmar, 2008). The stripping of the home makes the home harder to sell and requires money to replace the stolen items. Other studies suggested that communities with high foreclosure rates face a devaluation in their neighborhoods, which resulted in the community losing a significant base of property tax revenue (Alm et al., 2014).
Financial Education and Financial Behavior

According to the U.S. Financial Literacy and Education Commission (2020), financial education is defined as “the process by which people gain information, skills, confidence and motivation to act, through various means, including classroom education, one-on-one counseling and coaching, technology-based interventions, and self-study” (p. 2). Previous research has been contradictory on the effectiveness of financial education. Delgadillo and Lee (2021) noted that financial education could be separated into affective and cognitive financial knowledge. The researchers believed that a more robust insight into financial education would occur by separating the concept into the two domains (Delgadillo & Lee, 2021). Delgadillo and Lee (2021) explained that affective financial learning should include attitudes, motivations, and values, while cognitive financial learning included knowledge and numerical skills. The findings of their research suggested that individuals who participated in financial education had an increase in both affective and cognitive financial knowledge. Thus, long-term financial behavior was significantly influenced by financial education (Delgadillo & Lee, 2021).

Financial education can occur in formal settings such as schools, colleges, or agencies by financial educators, counselors, or coaches. However, financial education can also occur in non-formal and informal settings such as at home through parent-child interactions. Financial socialization could begin in the home either directly or by omission of the parents. Children absorb the financial behaviors in the home and then exhibit these behaviors throughout their lives (President’s Advisory Council on Financial Capability, 2013). This financial socialization translates into underlying trans-
generational financial behaviors developed in childhood that then drive adult financial decisions (Lawson et al., 2015).

Financial psychologists also believe that financial beliefs and behaviors can be passed down from generation to generation (Lawson et al., 2015). Previous research suggested that the parent-child financial relationship was more influential than the relationship with peers, media, educators, and self-learning (Gudmunson et al., 2016). Beliefs and values about money were formed by childhood experiences, household financial roles, parental behaviors, and culture (Klontz & Klontz, 2009). Individuals’ financial beliefs are established from early financial life events that are so powerful, they leave an impression that lasts into adulthood (Klontz and Klontz 2009). Kim and Chatterjee (2013) also suggested that childhood financial experiences influence individual’s money management skills as an adult. Crucial factors that affect trans-generational financial behaviors were parental communication regarding finances, childhood allowance, parental warmth, and parental monitoring of the child’s spending (Kim & Chatterjee, 2013).

**Measures of Financial Literacy**

In personal finance literature, the terms financial education, financial knowledge, and financial literacy are often used interchangeably (Henager & Cude, 2016; Hilgert et al., 2003; Hung, et al., 2009; Lusardi et al., 2010; Lusardi & Mitchell, 2011; Remund, 2010). However, these terms do not hold the same meaning (Delgadillo, 2014). Previous researchers found it difficult to conduct research on individuals’ levels of financial literacy because the term had not been clearly defined and a consistent measurement had not been identified (Remund, 2010). Other fields, such as mental health, have a variety of
standardized instruments to help practitioners measure anxiety, depression, and other psychological occurrences (Klontz et al., 2008). However, the personal finance field does not have a standardized measurement to test financial literacy. Using empirical evidence, Huston (2010) took a crucial step in the field by defining financial literacy and proposing a standardized measurement of financial literacy.

Huston (2010) defined financial literacy as “how well an individual can understand and use personal finance-related information” (p. 306). This definition suggests that financial literacy has two components: understanding financial concepts and application of the knowledge. By using these two components to define financial literacy, it provides researchers a way to measure an individual’s financial literacy by how well an individual not only understands, but also applies personal finance knowledge. Huston (2010) also posits that financial knowledge and financial education contribute to financial literacy, but they are not equivalent to financial literacy.

Financial literacy extends beyond an individual’s personal finance knowledge by including the individual’s confidence level in their ability to make healthy financial decisions (Huston, 2010). Henager and Cude (2016) expounded Huston’s (2010) definition, stating that financial literacy is “objective financial knowledge as well as subjective financial knowledge or confidence and subjective financial management ability” (p. 6). In other words, financial literacy includes financial knowledge, financial confidence, and financial ability.

Previous research has found that an individual’s level of financial literacy influences their financial behaviors and decisions. For example, financial literacy has been found to influence an individual’s saving and debt management behaviors (Behrman
et al., 2012; Deuflhard & Georgarakos, 2019; Kaiser & Menkhoff, 2017; Lusardi, 2019). Deuflhard & Georgarakos (2019) reported that financially literate individuals were more likely to earn a higher rate of return on savings than those with lower financial literacy. Homeowners who lacked financial literacy were also more likely to withdraw the equity that they have established in their homes (Fornero et al., 2011).

Previous research also investigated the relationship between financial literacy and the cost of borrowing. These studies have shown that those who were financially literate were more likely to pay less for borrowing, while those who were financially illiterate were more likely to borrow by using high-cost methods (Huston, 2012; Lusardi & Mitchell, 2014; Lusardi & Tufano, 2015). It is also documented that an individual’s financial literacy may influence cost effective borrowing decisions, use of alternative financial products, and understanding the implications of debt (Huston, 2012; Lusardi & Tufano, 2015). Lusardi and Tufano (2015) found particularly low levels of debt financial literacy among various demographic groups, including women, elderly, divorced or separated, and ethnic minorities.

Financial Knowledge

Individuals are confronted with complex financial decisions throughout their lifetime. Research has shown that individuals with lower levels of financial knowledge were more likely to make unwise financial decisions, such as having debt problems. (Clark et al., 2017; Jacobs-Lawson & Hershey, 2005; Kim et al., 2019; Lusardi et al., 2010; Robb, 2011; Robb & Woodyard, 2011; Xiao et al., 2011a). Previous studies evaluated the relationship between financial knowledge, financial satisfaction, and
financial self-efficacy. Robb and Woodyard (2011) found that personal financial knowledge significantly influence financial behaviors.

Financial knowledge has been defined multiple ways. It often refers to an individual’s ability to understand financial concepts (Huston, 2010). Delgadillo (2014) expanded Huston’s definition stating that financial knowledge refers to an individual’s cognitive abilities to internalize financial concepts and principles. Bloom and Krathwohl (1956) posit that learning can be broken into three domains: cognitive (knowledge), affective (attitudinal), and psychomotor (skills). Hence, financial knowledge can be broken down into two domains: affective financial knowledge and cognitive financial knowledge (Delgadillo & Lee, 2021). Affective financial knowledge refers to an individual’s financial attitudes, values, and motivations (Delgadillo & Lee, 2021). Affective financial knowledge can be measured by self-perceived financial satisfaction and financial well-being. On the other hand, cognitive financial knowledge refers to numeracy abilities and conceptual financial knowledge and is measured through knowledge-based questions (Delgadillo & Lee, 2021).

As young people launch into adulthood, they are expected to become more responsible for their finances, such as tracking their expenses, maintaining a budget, and paying their bills (Lowe & Arnett, 2020; Serido et al., 2010). Financial independence is also associated with other areas of the individual’s well-being, such as marriage and family relationships (Atwood, 2012; Britt & Huston, 2012). Research has found that financial knowledge is low among young adults, especially among women and minorities (De Bassa Scheresberg, 2013). A 2009 survey conducted of young adults found that many wished they had more financial knowledge (Lusardi et al., 2010). For example,
84% of young adults reported that they needed more financial management education, 64% reported that they would have liked to receive more financial knowledge in high school, and 40% reported that they would have liked to receive more financial knowledge as a freshman in college (Lusardi et al., 2010). Financial knowledge is salient in that it has the potential to help individuals understand the importance of positive financial behaviors, navigate the day-to-day financial questions, and make wise financial decisions for their families (Hilgert et al., 2003).

**Subjective Financial Knowledge**

Research has shown that individuals with higher financial knowledge make better financial decisions. However, an individual’s subjective financial knowledge or confidence in their financial knowledge may explain some of their financial behaviors (Atlas et al., 2019; Xiao et al., 2011b). Another way to think about subjective financial knowledge is as an individual’s self-perception and financial confidence. Subjective financial knowledge is measured by asking individuals to rate their perceived level of financial knowledge, financial satisfaction, income satisfaction, and saving satisfaction (Xiao et al., 2011a).

Previous research has found that subjective financial knowledge may be a more important factor than objective financial knowledge when evaluating an individual’s financial behavior. For example, Anderson et al. (2017) found that an individual’s subjective financial knowledge was a better indicator of saving behavior than objective financial knowledge. In that study, those individuals who believed that they were financially informed were more likely to be savers and planners (Anderson et al., 2017).
Although higher levels of subjective financial knowledge have been found to be an important factor in financial behavior, financial overconfidence is not a desirable trait. When an individual is overconfident in their financial abilities, they may not behave optimally. For example, Porto and Xiao (2016) found that households who were overconfident in their financial abilities did not seek financial advice when needed, failed to save for emergencies, and failed to have proper insurance. Additionally, overconfidence can lead to increased investment risks, such as overtrading, higher risk taking, and under diversification (Glaser & Weber, 2007; Merkle, 2017; Nosić & Weber, 2010). As it relates to this study, Kim et al., (2020) found that homeowners who were overconfident were more likely to be delinquent on their mortgage compared to those with appropriate levels of confidence.

**Objective Financial Knowledge**

Financial knowledge is also measured objectively. Objective financial knowledge is measured by having individuals respond to knowledge-based questions. Objective financial knowledge can be assessed by evaluating an individual’s income, debt, assets, debt-to-income ratio, and net worth (Xiao et al., 2011). In other words, objective financial knowledge can be thought of as an individual’s financial competence. Lin et al. (2018) found that most individuals indicated low levels of financial knowledge and had difficulty making financial decisions in real life scenarios. Among respondents, 66% were unable to answer three (or more) out of five financial situation questions, indicating low levels of financial knowledge (Lin et al., 2018). Only 34% of respondents could answer four or five questions correctly regarding financial situations they would encounter daily (Lin et al., 2018).
Financial Capability

In the U.S., the President’s Advisory Council on Financial Capability (2020) defines financial capability as the skills, knowledge, and access to financial products to make financial decisions and reach their financial goals. Delgadillo (2014) summarized the Council’s definition by suggesting that financial capability has three pillars. The three pillars include financial literacy, access to financial products, and consumer protection framework (Delgadillo, 2014). Other researchers also suggest that financial capability requires an individual to have knowledge, competencies, the ability to act on that knowledge, and the opportunity to act on that knowledge (Sherraden, 2010).

The National Financial Capability Study measures financial capability in terms of how well individuals make ends meet, plan ahead, choose and manage financial products, financial literacy, and self-assessed skills (Lusardi, 2011). Using these key indicators, research has shown that many U.S. households lack financial capability. Lusardi (2011) found that most U.S. adults did not plan for retirement, did not plan for emergencies, used high-cost borrowing products, and had low financial knowledge. These findings are alarming for multiple reasons. First, individuals have become increasingly responsible for their financial well-being in retirement (Lusardi & Mitchell, 2011). In the past, Americans’ financial well-being in retirement depended on Social Security and employer sponsored pension plans. A shift occurred where individuals are now more dependent on their own preparation for retirement through Individual Retirement Accounts (IRAs) and defined contributions plans. The findings of Lusardi (2011) research are also alarming because financial emergencies are common. Dodini et al. (2016) found that over one third
of U.S. households experienced a job loss or a health emergency in the previous year and that 46% of households could not cover a $400 unexpected expense.

**Socio-Economic Characteristics and Financial Behaviors**

Socio-economic characteristics are a vital component in understanding how an individual’s background may influence their financial decisions (Beiser, 2003; Grinblatt & Keloharju, 2001; Karolyi, 2016; Smith & Barboza, 2013; Stulz & Williamson, 2003). Within the family finance field, socio-economic characteristics typically explored are age, race/ethnicity, gender, marital status, employment status, and income. When individuals make financial decisions, these socio-economic characteristics may play a role in what the family values and considers important. An individual may consider their culture, attitudes, parents’ behavior, and trans-generational financial beliefs when making financial decisions. These characteristics may influence an individual’s decision to accumulate debt, homeownership versus renting, spending, saving behaviors, pursuit of higher education, and financial well-being (Grable et al., 2009; Mandell & Klein, 2009; Perry & Morris, 2005). This section explores previous research related to socio-economic characteristics and financial behaviors.

**Age/Generation**

Financial behaviors often vary based on age. As a result, research has shown that individuals of different ages display different financial behaviors (Henager & Cude, 2016; Wilson, 2021; Xiao et al., 2015; Zick et al., 2012). The difference in financial behaviors across ages is not surprising in that individuals at different stages of life will have different financial needs (Henager & Cude, 2016; Wilson, 2021). Research has
shown that financial knowledge improved over time, based on age and experiences (Alhenawi & Elkhal, 2013; Henager & Cude, 2016). Consequently, young adults have been shown to have the lowest financial knowledge and are unprepared for financial responsibilities (Rutherford & Fox, 2010; Xiao et al., 2015).

Individuals among different generations (baby boomers, Generation X, and millennials) have different behaviors when it comes to debt (Lee et al., 2019). A host of reasons explain the different behaviors among generations. However, some of the differences may be attributed to the life-cycle model and individuals smoothing consumptions across their lifetime. Across an individual’s lifetime, large variations may occur among income, consumption, and debt (Fulford & Schuh, 2015). For example, credit limits and debt increase rapidly in early adulthood; however, credit utilization slowly decreases throughout the life cycle (Fulford & Schuh, 2015).

Baby boomers are considered as those individuals born between 1946 and 1964, resulting from the boom in births following World War II (Statista, 2021d). As of June 2021, the baby boomer generation is the second largest generation group (following millennials) accounting for 70.68 million individuals in the U.S. (Statista, 2021d). Being one of the largest generational groups in the U.S., baby boomers have a significant impact on the economy. Previous research has shown that baby boomers were carrying more debt into retirement (Ebrahimi, 2020; Lusardi et al., 2020; Lusardi & Mitchell, 2013; Tippett, 2010). As a result, baby boomers’ financial security is at risk, forcing them to stay in the labor market longer and to delay claiming Social Security benefits (Ebrahimi, 2020).
Generation Xers are those individuals born between 1965 and 1980 (Statista, 2021d). As of June 2021, Generation X accounted for 64.95 million individuals in the U.S. (Statista, 2021d). Emmons and Noeth (2014) equated Generation X as Generation Debt because of their borrowing practices leading up to the Great Recession. During this time, borrowing by Generation X was focused primarily on mortgage debt (Emmons & Noeth, 2014). Emmons and Noeth (2014) suggested that Generation X is Generation Debt because they have accumulated about twice as much debt at a specific age than other generations at the same age.

Millennials are those individuals born between 1981 and 1996 (Statista, 2021d). As of June 2021, millennials accounted for 72.26 million individuals in the U.S., making them the largest generation (Fry, 2018; Statista, 2021d). Indeed, a generation of this size could have a significant impact on the economy (Kurz et al., 2019). Millennials are characterized as being burdened by debt, experience economic hardships, and lower levels of wealth (Lee et al., 2019). Previous research has indicated that millennials reported using alternative financial services, such as payday loans and title loans (Friedline & West, 2016). Millennials are thought to hold similar debt amounts as Generation X, although the debt composition may be different (Kurz et al., 2019). As a result of the Great Recession between 2007 to 2009, many millennials incurred high debt as they were trying to better themselves through higher education. (Lee et al., 2019). Lee et al. (2019) found that more millennials reported being delinquent with their debts than non-millennials. They also found that millennial student loan debt was 59.7% higher than non-millennials (Lee et al., 2019). Research has also shown that millennial
homeownership rate is significantly lower than their predecessors in the same age group (Choi et al., 2019).

**Gender**

Researchers in the personal finance field examine gender differences among various topics including financial knowledge, financial literacy, and financial behavior. Previous research has shown that Americans as a whole are not adequately prepared to manage their finances. A more acute issue is the lack of financial well-being among women. For example, a significant amount of research has shown the gender differences between financial knowledge and risk tolerance (Chen & Volpe, 2002; Lusardi & Mitchell, 2008; Mottola, 2013; Theodos et al., 2014). When asked objective financial knowledge questions, women were less likely than men to answer correctly, indicating lower levels of financial knowledge (Bucher-Koenen et al., 2017). Empirical research also suggested that women, on average, had less financial risk tolerance than men (Fisher & Yao, 2017; Gibson et al., 2013; Theodos et al. 2014). As a result, women accumulate lower wealth over time, as they were less likely to invest in risky financial products (Bannier & Neubert, 2016).

The debate about gender and financial differences is an issue because more women have joined the labor market, make consumer decisions, perform income management, and make debt decisions (Potrich et al., 2018). Although researchers have found a gender gap in the level of financial knowledge, it has been suggested that women practice more sound financial practices; however, they typically scored lower on financial knowledge measures (Robb & Woodyard, 2011). Along with financial knowledge, personal savings is a critical issue as it relates to financial security of households.
Research has shown that women were less financially knowledgeable compared to men, which could affect both saving and portfolio choice (Fisher, 2010; Lusardi & Mitchelli, 2007). Fisher (2010) found that unmarried women living alone were significantly less likely to be regular savers or to save over the short term. Women tended to have lower income, interrupted employment histories, and longer lifespans. These factors, combined with lower risk tolerance and less financial knowledge, engenders women vulnerable to poverty (Bannier & Neubert, 2016; Fisher, 2010).

**Race/Ethnicity**

Substantial research has examined the relationship between race/ethnicity and financial behaviors. It is a common belief that race/ethnicity and other demographic characteristics influence financial behaviors. The relationship between race/ethnicity and financial behaviors is confirmed by the significant amount of financial management programs in place that target populations based on race/ethnicity (Perry & Morris, 2005). Previous research suggested that an individual’s availability of resources had an influence on financial behavior (Robb & Woodyard, 2011). Systemic disadvantages created by society have caused some individuals to have fewer access to financial resources than others. For example, individuals with fewer resources were unable to meet their financial obligations, had fewer assets, and were less likely to have emergency savings (De Bassa Scheresberg, 2013; Perry & Morris, 2005). To this extent, African Americans and Hispanics were more frequent users of high-cost borrowing methods, such as payday loans, pawn shops, auto title loans, rent-to-own, and refund anticipation loans (De Bassa Scheresberg, 2013). Consequently, Black individuals have been shown to be less satisfied with their current economic situation than White individuals (Lee & Dustin, 2021).
Although owning a home is the American dream, homeownership rates by race/ethnicity vary. McCabe (2018) reported that 43% of African Americans and 46% of Latinos owned a home as compared to 73% of White individuals. The gap between homeownership rates may be explained by educational levels, income, and occupational status (Drew, 2015; McCabe, 2018). McCabe (2018) stated that White individuals typically reported higher levels of income and education than non-white individuals, which may explain the variation in homeownership rates.

**Marital Status**

Another factor that influences financial behaviors is marital status. Marriage is often the beginning of large financial decisions such as funding education, paying off debt, saving for a home, providing for children, and saving for retirement (Lee & Dustin 2021). These important financial decisions may be difficult to make when combining two individuals’ financial knowledge, habits, and values. Although combining two individuals’ financial background can be challenging, research has shown that married individuals with higher levels of financial knowledge engaged in high levels of positive financial behaviors (Lee & Dustin, 2021). Dew (2007) also reported that married couples saved at higher rates and accumulated more assets. As a result, generally when two individuals are married, they have greater income, more wealth, less debt, and more security (Society of Actuaries, 2019).

**Education Level**

Many Americans believe obtaining a college degree is a sound investment in human capital. Research has shown that individuals with higher levels of education earned more, were more likely than others to be employed, and demonstrated higher
financial literacy (De Bassa Scheresberg, 2013; Huston, 2012; Ma et al., 2019). Although financial literacy has been shown to increase with education level, even those with higher levels of education show low levels of financial literacy (De Bassa Scheresberg, 2013). De Bassa Scheresberg (2013) also found that individuals with less than a college degree accessed high-cost borrowing such as payday loans, auto title loans, and refund anticipation loans. The opposite is true for individuals with higher education. Highly educated individuals were less likely to use high-cost borrowing, more likely to have emergency funds, and more likely to plan for retirement (De Bassa Scheresberg, 2013; Heckman & Hanna, 2015). Cole et al. (2014) also suggested that individuals with higher levels of education had, on average, better credit scores and were less likely to be delinquent on their mortgage. Accordingly, researchers suggested that education improves financial behaviors (Cole et al., 2014; Robb & Woodyard, 2011).

**Employment Status**

Researchers often evaluate individuals’ employment status to help explain their consumption and debt management behaviors. As related to debt management behaviors, employment stability directly influences individuals’ ability to access low-cost borrowing (Huston, 2012). Unemployed individuals may be frequently denied access to credit and tend to report the lowest average financial satisfaction scores (Friedline & West, 2016; Sullivan, 2008). Research has shown that employment status is associated with individuals’ financial knowledge, financial attitude, financial literacy, and financial behaviors (Garg & Singh, 2018). Unemployed individuals were less likely to answer objective financial knowledge questions correctly than employed or self-employed individuals, which reflected their low levels of financial knowledge (Lusardi & Mitchell,
Households with unemployed individuals may be at risk of financial shock and mortgage delinquency (Angelini & Simmons, 2005).

**Household Income**

Income is an important factor in evaluating individuals’ financial knowledge, financial literacy, and financial behavior. Income has been found to significantly influence financial behavior (Robb & Woodyard, 2011). This finding is not surprising. Some financial behaviors, such as paying the minimum payment on a credit card or incurring late fees, may be a result of income constraints (Robb & Woodyard, 2011). Individuals with income constraints due to low-income tend to use high-cost alternative financial services such as payday loans. (Lusardi & Tufano, 2015). The high usage of alternative financial services results in low-income families using a significant amount of their income to service debts (Birkenmaier et al., 2011).

Another reason an individual may have poor financial behavior is due to their lack of financial literacy. Research has shown that low-income individuals had low levels of financial literacy (Lusardi & Mitchell, 2014). Debt literacy is a broader understanding of debt and is part of financial literacy (Lusardi & Tufano, 2015). As income increases, debt literacy increases sharply (Lusardi & Tufano, 2015). Low-income families use a variety of debt products, including mortgages, credit cards, installment loans, and alternative financial products (Kim et al., 2017). Low-income families who had low debt literacy also found themselves delinquent on their debts and in financial distress. Kim et al. (2017) conducted a study evaluating poverty levels and debt indicators among low-income households before and after the Great Recession. The results of that study showed that after the Great Recession, households in the 201%-300% poverty threshold were
50% less likely to be delinquent on their debts compared to those in the lowest income level (below the 100% poverty threshold) (Kim et al., 2017).

**Factors Associated with Mortgage Payment Behavior**

Deciding to purchase a home is one of the most important and long-lasting decisions an individual can make. A mortgage is typically a homeowner’s largest financial liability secured by their largest asset, which is their home (Bialowolski et al., 2020). Because of the long-lasting consequences of obtaining a mortgage; it is important for researchers to understand factors associated with mortgage payment behavior. Generally, previous research suggested that moderate and low-income borrowers had higher mortgage default rates than higher income individuals. Quercia et al. (2012) added to the previous research and found that as income decreased, the tendency to default increased. A contributing factor to this finding is that low and very low-income borrowers may experience cost burden. Hence, severe cost burden can make low-income borrowers more susceptible to market conditions, such as an economic downturn and income loss (Quercia et al., 2012).

Differences among race/ethnicity and mortgage delinquency rates have also been documented. During times of economic downturn, mortgage delinquency rates by race/ethnicity are starkly different. For example, during the Great Recession, Bayer et al. (2016) documented that more than 1 in 10 Black and Hispanic homeowners were delinquent, whereas only 1 in 25 White homeowners were delinquent in their mortgage payments. Aughinbaugh (2013) also found that Black and Hispanic individuals were more likely to be delinquent than their non-Black and non-Hispanic counterparts. Single women, especially those of color, were particularly susceptible to mortgage strain (Baker,
Some researchers suggested that higher delinquency rates among minorities is a result of more exposure to employment and income shocks, lending discriminations, and nontraditional loan terms (Hall et al., 2015; Hoynes et al., 2012; Reid et al., 2017; Rugh et al., 2015).

Mortgage delinquency is not only a U.S. issue but also a global issue. For instance, individuals from cultures who exhibit overconfidence and value leisure time and fun, may have higher mortgage delinquency rates than individuals from cultures who value restraint (Tajaddini & Gholipour, 2017). Research has shown that some homeowners are more vulnerable to mortgage delinquency than others. For example, homeowners who are low-income, minority, or have lower education level tend to have higher rates of mortgage delinquency.

Regional variation is a key factor to consider when evaluating mortgage delinquency. Variations among mortgage delinquency rates by region may be a result of regional economic conditions (Doms et al., 2007). Dettling and Lambie-Hanson (2021) suggested that mortgage delinquency typically followed the regional economic business cycle. For example, during the Great Recession mortgage delinquency rose as the unemployment rate rose and as housing prices fell (Dettling & Lambie-Hanson, 2021). Quercia et al. (2016) also noted that mortgage delinquency is sensitive to local unemployment rates of the region. Deteriorating regional economic conditions place strain on homeowners’ finances which may lead to mortgage delinquency.

Although mortgage delinquency may be a result of several factors such as high debt, housing affordability, or poor financial literacy, another plausible explanation of homeowners’ mortgage delinquency is “trigger events” inside the household (Gerardi et
al., 2013b). An unexpected large income drop is one example of a “trigger event” that may influence mortgage delinquency (Foote et al., 2010; Wadud et al., 2020). Income drops may be a result of unexpected job loss, divorce, death, or health problems (Crook & Banasik, 2012). Unexpected income drops for homeowners can cause costly consequences for the homeowner. For example, Mocetti and Viviano (2017) found that job loss more than doubled the homeowner’s delinquency risk. Homeowners who experienced a decrease in income defaulted because they did not have the financial resources to continue making their monthly mortgage payments (Gerardi et al., 2018).

High levels of debt among American households may be associated with financial stress (Xiao & Kim, 2021). Friedline et al. (2021) defined financial stress as “psychological stress or distress when they do not have adequate income, wealth, or debt to afford economic hardship” (p. S43). For example, financial stress occurred when homeowners were unable to meet their current obligations, had difficulty meeting basic needs, or difficulty in paying bills (Friedline et al., 2021). Previous research indicated that financial stress influenced psychological well-being, marital stress, workplace absenteeism, depression, and more (Dew & Yorgason, 2010; Kim et al., 2006; Stein et al., 2013; Valentino et al., 2014). Xiao and Kim (2021) found that mortgage delinquency is also positively associated with financial stress. By understanding factors associated with mortgage delinquency, the findings of this study will help fill the gaps in the literature. Financial professionals, counselors, and educators need to help homeowners understand the importance of paying their mortgages on time and the financial and psychological consequences of mortgage delinquency.
This study attempts to examine how financial literacy (financial knowledge and financial ability) plays a role in determining mortgage payment behavior of U.S. households. Huston (2010) created the conceptual framework of financial literacy by examining previous literature on personal finance and evaluated obstacles to accurately measure financial literacy. A difficulty outlined by Huston (2010) is that financial literacy has not been clearly defined. As a result, Huston (2010) clarifies financial knowledge, financial education, and defines financial literacy as measuring how well an individual can understand and use personal finance information. Huston (2010) then developed a model indicating the relationship between financial education, financial literacy, human capital, financial behaviors, and financial well-being. Using the conceptual framework of Huston (2010) model that measures financial literacy, this study develops a conceptual framework that helps explain financial education, financial literacy, and mortgage payment behavior among homeowners.

**Financial Literacy Conceptual Framework**

Figure 1 shows Huston (2010) original framework of financial literacy. In this model, financial literacy consists of subjective knowledge, objective knowledge, financial management ability, and application of human capital. Human capital can be defined as the skills and knowledge individuals possess that allow them to perform various tasks in personal life, social environments, and employment (Crook et al., 2011; Schultz, 1961). This concept of human capital implies that as individuals develop more skills, knowledge, and capabilities, they become more valuable in their workplace (Becker, 1975; Schultz, 1961). Greater human capital is attained through formal education, job
trainings, experience, and more (Becker, 1992). Research has shown that human capital can influence personal income and growth in other life areas (Mincer, 1958).

As it relates to personal finance, Huston (2012) explains that financial education, financial knowledge, and financial literacy are part of human capital. Huston (2010) explains that financial education is an input of an individual’s human capital, specifically enhancing their knowledge and application. Hence, financial literacy and “other influences” can impact financial behaviors. “Other influences” may include personal biases, family, peers, and impulsiveness. The framework of financial literacy can provide insight on how financial education, human capital, and other influences can affect financial behaviors and ultimately financial well-being (Huston, 2010).

Figure 1.

_Huston’s Financial Literacy Model (2010)_
In this study, Huston (2010) framework of financial literacy has been modified to consider the specific constructs of this study (Figure 2). The primary financial behaviors examined in this study are mortgage repayment behavior. One significant difference between Huston’s model and the model used for this study is the outcome variable. Huston’s outcome variable is financial well-being, whereas the outcome variable for this study is mortgage payment behavior.

**Figure 2.**

*A Conceptual Framework of Mortgage Payment Behavior*
Study Hypotheses

The goal of this study is to address the main research question - *How does financial literacy impact mortgage payment behavior?* Based on previous findings in the literature and Huston (2010) financial literacy framework, this study presents the following four hypotheses:

H1: Homeowners with high levels of financial literacy will be less likely to be delinquent with their mortgage payments than homeowners with low levels of financial literacy.

H2: Homeowners with financial education will be less likely to be delinquent with their mortgage payments than homeowners without financial education.

H3: Personal and other factors of homeowners will be associated with being delinquent with their mortgage payments.

H4: Socio-economic characteristics of homeowners will be associated with being delinquent with their mortgage payments.
CHAPTER III

METHODS

Data and Sample

Data used for this study is from the National Financial Capability Study (NFCS). NFCS is a large national study examining financial capability of American adults. NFCS is funded by the Financial Industry Regulatory Authority (FINRA) Investor Education Foundation (FINRA, n.d.). FINRA is dedicated to advancing financial inclusion and protecting consumers from fraud. To accomplish their goals, FINRA is devoted to communication, education, and research. The research employed data from the NFCS is valuable to policy makers and practitioners. The findings of their research have provided researchers and scholars with understanding of the current financial well-being of American adults.

The first wave of NFCS was conducted in 2009 and has since been conducted every three years. NFCS data were collected through online surveys to over 25,000 American adults in 2009, 2012, 2015, and 2018 (FINRA, 2022). NFCS data indicates key determinants of financial well-being such as financial behaviors, financial attitudes, and financial literacy (FINRA, n.d.). Since the first wave, survey questions have been updated and modified through inputs from academics, policymakers, and researchers who used the NFCS data for research (FINRA, n.d.). To gauge financial capability, the NFCS data includes several variables that indicate how American adults manage their financial resources and make financial decisions (FINRA, n.d.). The NFCS data also contain socio-demographic information of respondents, financial education, financial literacy, financial
well-being, and debt holdings (including mortgages). Variables in the NFCS are weighed to be representative of national, regional, and state populations (FINRA, n.d.).

This study utilized the data from the 2018 NFCS survey. The data for the 2018 NFCS were self-administered by respondents and conducted June – October 2018. The sample size consisted of 27,091 U.S. adults, with approximately 500 respondents per state including the District of Columbia. Oversamples were conducted in Oregon and Washington, resulting in 1,250 respondents in those states (FINRA, n.d.). Participants were provided by Survey Sampling International, EMI Online Research Solutions, and Research Now who used industry standard techniques to ensure demographic characteristics were valid. Each state was set with specific quotas to approximate Census distributions by socio-demographic characteristics. Participants were selected using non-probability quota sampling and offered incentives in exchange for participating in the online survey (FINRA, n.d.).

**Study Sample**

The purpose of this study was to understand the associations among financial education, financial literacy, socio-economic characteristics, personal/other factors, and mortgage payment behavior among homeowners. For this study, those respondents who reported “don’t know” and “prefer not to say” on key variables (i.e., financial education participation, financial knowledge, and mortgage payment behavior) were excluded in the analyses. After cleaning the data, the sample size of homeowners was 6,085. Among these homeowners, 3,475 (57.0%) reported they owned their homes with mortgages, whereas 2,620 (43.0%) reported they paid off their mortgages. To meet the research goals of this study, those respondents who reported they paid off their mortgages were
excluded. This study focused on homeowners who held mortgage debt when they responded to the questions in the 2018 survey time period. As a result, the final sample size for this study is 3,475.

**Sample Characteristics of Homeowners with Mortgages**

Table 1 describes the socio-economic characteristics of homeowners with mortgages (N = 3,475). In the study sample, 30.5% were millennials/Generation Z between the age of 18 - 37, 30.8% were Generation X between the age of 38 - 53, 34.5% were baby boomers between the ages of 54 - 72, and 4.2% were the silent generation, age 73 or older. About 66% of homeowners with mortgages were male and 34% were female. Of the study sample (i.e., homeowners with mortgages), 78.4% were married, while 21.6% were unmarried. The racial/ethnic distribution was White (75.7%), Black (10%), Hispanic (6.1%), and Asian/Other (7.2%). As for formal education attainment of homeowners, 13.2% had completed high school or less, 34.7% had some college education, 29.6% had college degree, and 22.5% had post-college education.

Of the homeowners with mortgages, 8.9% were self-employed, 66.2% were working, and 25.1% were not-working. As for household annual income, 4.2% reported their annual household income as less than $25,000, 12% reported annual income between $25,000 - $49,999, 18.7% reported annual income between $50,000 - $74,999, 24.9% reported annual income $75,000 - $99,999, and 40.1% reported annual income $100,000 or more. Table 1 also shows that 16.2% of the study sample reside in the Northeast, 21.7% reside in the Midwest, 30.7% reside in the South, and 31.4% reside in the West.
Table 1.

Sample Characteristics of Homeowners with Mortgages (N=3,475)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age/Generation:</strong></td>
<td></td>
</tr>
<tr>
<td>Millennials/Z, 18-37</td>
<td>1,058 (30.5%)</td>
</tr>
<tr>
<td>Xers, 38-53</td>
<td>1,071 (30.8%)</td>
</tr>
<tr>
<td>Baby boomers, 54-72</td>
<td>1,199 (34.5%)</td>
</tr>
<tr>
<td>Silent generation, 73+</td>
<td>147 (4.2%)</td>
</tr>
<tr>
<td><strong>Gender:</strong></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>2,295 (66.0%)</td>
</tr>
<tr>
<td>Females</td>
<td>1,180 (34.0%)</td>
</tr>
<tr>
<td><strong>Marital Status:</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>2,724 (78.4%)</td>
</tr>
<tr>
<td>Unmarried</td>
<td>751 (21.6%)</td>
</tr>
<tr>
<td><strong>Race/Ethnicity:</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>2,630 (75.7%)</td>
</tr>
<tr>
<td>Black</td>
<td>349 (10.0%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>211 (6.1%)</td>
</tr>
<tr>
<td>Asian/Other</td>
<td>285 (7.2%)</td>
</tr>
<tr>
<td><strong>Formal Education:</strong></td>
<td></td>
</tr>
<tr>
<td>Less than/Highschool grad</td>
<td>460 (13.2%)</td>
</tr>
<tr>
<td>Some college</td>
<td>1,205 (34.7%)</td>
</tr>
<tr>
<td>College graduate</td>
<td>1,028 (29.6%)</td>
</tr>
<tr>
<td>Post-college</td>
<td>782 (22.5%)</td>
</tr>
<tr>
<td><strong>Employment Status:</strong></td>
<td></td>
</tr>
<tr>
<td>Self-Employed</td>
<td>302 (8.9%)</td>
</tr>
<tr>
<td>Full/Part-time working</td>
<td>2,299 (66.2%)</td>
</tr>
<tr>
<td>Not-working</td>
<td>874 (25.1%)</td>
</tr>
<tr>
<td><strong>Household Income:</strong></td>
<td></td>
</tr>
<tr>
<td>Less than $25,000</td>
<td>145 (4.2%)</td>
</tr>
<tr>
<td>$25,000 - $49,999</td>
<td>418 (12.0%)</td>
</tr>
<tr>
<td>$50,000 - $74,999</td>
<td>651 (18.7%)</td>
</tr>
<tr>
<td>$75,000 - $99,999</td>
<td>866 (24.9%)</td>
</tr>
<tr>
<td>$100,000 or more</td>
<td>1,395 (40.1%)</td>
</tr>
<tr>
<td><strong>Residential Region:</strong></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>563 (16.2%)</td>
</tr>
<tr>
<td>Midwest</td>
<td>755 (21.7%)</td>
</tr>
<tr>
<td>South</td>
<td>1,068 (30.7%)</td>
</tr>
<tr>
<td>West</td>
<td>1,089 (31.4%)</td>
</tr>
</tbody>
</table>
As sample characteristics of this study, majority of the study sample can be described as married, White, homeowners with some college education, those working in the labor force, and those residing either in the South or in the West. Other than the silent generation, these homeowners were equally distributed between millennials/Generation Z, Generation X, and baby boomers at around 30%.

Also, in the study sample, more than half were male homeowners and more than 40% earned an annual income of $100,000 or more.

**Variables**

**Dependent Variable**

Table 2 shows the measurements of all variables that were examined in this study. Appendix A also explains the variables within the codebook of the 2018 NFCS data. The dependent variable of this study is mortgage payment behavior. To measure this variable, this study used a survey question “How many times have you been late with your mortgage payments in the past 12 months? (E15_2015).” Responses include 1 = Never, 2 = Once, 3 = More than once. If respondents answered either 2 (once) or 3 (more than once), it was coded as delinquent in their mortgage payment. If respondents answered 1, it was coded as not delinquent in their mortgage payment.

**Independent Variables**

Table 2 indicates the measurements of key independent and dependent variables. This study has four key independent variables: financial education, financial literacy, personal and other factors, and socio-economic characteristics. Financial literacy was measured by the sum of six variables, including objective financial knowledge, subjective
Table 2.  

*Measurements of Variables*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Literacy:</strong></td>
<td></td>
</tr>
<tr>
<td><em>Financial Knowledge:</em></td>
<td>Continuous, how would you assess your overall financial knowledge, 1= very low, 7= very high</td>
</tr>
<tr>
<td>Subjective knowledge</td>
<td></td>
</tr>
<tr>
<td>Financial quiz score</td>
<td>Continuous, sum of six financial literacy score, 0= zero corrected, 6= all corrected</td>
</tr>
<tr>
<td><strong>Financial Application:</strong></td>
<td></td>
</tr>
<tr>
<td>Financial ability</td>
<td>Continuous, 1-7, I am good at dealing with financial matters, 1= strongly disagree, 7= strongly agree</td>
</tr>
<tr>
<td>Financial self-efficacy:</td>
<td></td>
</tr>
<tr>
<td>No self-efficacy</td>
<td>1 if R reported no or little confidence, 0 if otherwise</td>
</tr>
<tr>
<td>Have self-efficacy</td>
<td>1 if R reported some or very confident, 0 if otherwise</td>
</tr>
<tr>
<td>Budgeting ability:</td>
<td></td>
</tr>
<tr>
<td>Spend equal/more</td>
<td>1 if R reported spending equal or more, 0 if otherwise</td>
</tr>
<tr>
<td>Spend less</td>
<td>1 if R reported spending less, 0 if otherwise</td>
</tr>
<tr>
<td>Having emergency savings:</td>
<td></td>
</tr>
<tr>
<td>No emergency savings</td>
<td>1 if R reported no emergency savings, 0 if otherwise</td>
</tr>
<tr>
<td>Setting aside savings</td>
<td>1 if R reported having emergency savings, 0 if otherwise</td>
</tr>
<tr>
<td><strong>Financial Education:</strong></td>
<td></td>
</tr>
<tr>
<td><em>Participation FE:</em></td>
<td></td>
</tr>
<tr>
<td>Received education</td>
<td>1 if R received financial education, 0 if otherwise</td>
</tr>
<tr>
<td><strong>Personal/Other Factors:</strong></td>
<td></td>
</tr>
<tr>
<td>Risk tolerance attitude</td>
<td>Continuous, how willing are you to take risks when thinking of your financial investments? 1= not at all willing, 10= very willing</td>
</tr>
<tr>
<td>Credit record rate</td>
<td>Continuous, how would you rate current credit record? 1= very bad, 3= Average, 5= very good</td>
</tr>
<tr>
<td>Home equity loan:</td>
<td></td>
</tr>
<tr>
<td>No home equity loan</td>
<td>1 if R did not borrow against home equity, 0 if otherwise</td>
</tr>
<tr>
<td>Yes, home equity loan</td>
<td>1 if R borrowed against home equity, 0 if otherwise</td>
</tr>
<tr>
<td>Large income drops</td>
<td>1 if H experienced a large drop in income which you did not expect, 0 if otherwise</td>
</tr>
<tr>
<td>Perceived financial stress</td>
<td>Continuous, discussing my finances can make my heart race or make me feel stressed, 1= strongly disagree, 7= strongly agree</td>
</tr>
</tbody>
</table>
**Socio-Economic Characteristics:**

**Age/Generation:**
- **Millennials/Z, 18-37**: 1 if R’s age 18-37, MZ generation, 0 if otherwise
- **Xers, 38-53**: 1 if R’s age 38-53, Generation Xers, 0 if otherwise
- **Baby boomers, 54-72**: 1 if R’s age 54-72, Baby boomers, 0 if otherwise
- **Silent generation, 73+**: 1 if R’s age 73+, silent generation, 0 if otherwise

**Gender:**
- **Males**: 1 if R is male, 0 if otherwise
- **Females**: 1 if R is female, 0 if otherwise

**Marital Status:**
- **Married**: 1 if R married, 0 if otherwise
- **Unmarried**: 1 if R never married, separated, divorced, widowed, 0 if otherwise

**Race/Ethnicity:**
- **White**: 1 if R is White, 0 if otherwise
- **Black**: 1 if R is Black, 0 if otherwise
- **Hispanic**: 1 if R is Hispanic, 0 if otherwise
- **Asian/Other**: 1 if R is Asian/Other, 0 if otherwise

**Formal Education:**
- **High school grad**: 1 if R some or high school graduate, 0 if otherwise
- **Some college**: 1 if R some college, 0 if otherwise
- **College graduate**: 1 if R college graduate, 0 if otherwise
- **Post college**: 1 if R advanced degree, 0 if otherwise

**Employment Status:**
- **Self-Employed**: 1 if R self-employed, 0 if otherwise
- **Working**: 1 if R employed, 0 if otherwise
- **Not-working**: 1 if R unemployed, full-time student, permanently sick/disabled, retired, 0 if otherwise

**Household Income:**
- **Less than $25,000**: 1 if HH income <$25,000, 0 if otherwise
- **$25,000 - $49,999**: 1 if HH income $25,000-$49,999, 0 if otherwise
- **$50,000 - $74,999**: 1 if HH income $50,000-$74,999, 0 if otherwise
- **$75,000 - $99,999**: 1 if HH income $75,000-$99,999, 0 if otherwise
- **$100,000 or more**: 1 if HH income $100,000+, 0 if otherwise

**Residential Area:**
- **Northeast**: 1 if R resides in Northeast Census region, 0 if otherwise
- **Midwest**: 1 if R resides in Midwest Census region, 0 if otherwise
- **South**: 1 if R resides in South Census region, 0 if otherwise
- **West**: 1 if R resides in West Census region, 0 if otherwise

**Dependent Variable:**
- **Mortgage Delinquency**: 1 if R is being late mortgage payments, 0 if otherwise
financial knowledge, financial self-efficacy, financial capability, budgeting, and emergency savings. Financial knowledge is measured by both subjective and objective financial knowledge. For subjective financial knowledge, this study used one question in the survey, “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? (M4)”. For objective financial knowledge, one variable was created by summing the six questions, including numeracy (M6), interest (M7), inflation (M7), bonds (M8), mortgage (M9), and compound interest (M31). The responses were coded 0 = respondents had zero correct answers to 6 = respondents answered all six questions correctly.

Financial ability was created by using a survey question, “How strongly do you agree or disagree with the following statements? – I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses (M1_1).” Responses to this question were on a continuous scale from 1 = Strongly disagree to 7 = Strongly agree. Financial self-efficacy refers to the individuals self-perceived ability to accomplish financial goals. Financial self-efficacy variable was created by using a survey question “If you were to set a financial goal for yourself today, how confident are you in your ability to achieve it? (J43).” Responses include 1 = Not at all confident, 2 = Not very confident, 3 = Somewhat confident, and 4 = Very confident. If respondents answered either 1 (not at all confident) or 2 (not very confidence), it was coded as not having financial self-efficacy. If respondents answered 3 (somewhat confident) or 4 (very confident), it was coded as having financial self-efficacy.

In this study, budgeting skills was measured by how homeowners spend less or more than they earned. Spending less than income is a fundamental factor in evaluating
an individual’s financial literacy. To create this budgeting skills variable, this study used a survey question, “Over the past year, would you say your [household’s] spending was less than, more than, or about equal to your [household’s] income? (J3).” Responses include 1 = Spending less than income, 2 = Spending more than income, 3 = Spending about equal to income. If respondents answered 1 (spending less than income), it was coded as having budgeting skills. If respondents answered 2 (spending more than income) or 3 (spending about equal to income), it was coded as not having budgeting skills.

Having emergency savings is also a key indicator of financial literacy. Emergency savings was created by a survey question “Have you set aside emergency or rainy-day funds that would cover your expenses for 3 months, in case of sickness, job loss, economic downturn, or other emergencies? (J5).” Responses included 1 = Yes and 2 = No. If respondents answered 1 (yes), it was coded as having emergency savings. If respondents answered 2 (no), it was coded as not having emergency savings.

Financial education variable was measured using a survey question, “Was financial education offered by a school or college you attended, or a workplace where you were employed? (M20)”. The responses included 1 = Yes, but I did not participate in the financial education, 2 = Yes, and I did participate in the financial education, and 3 = No. If respondents answered 1 or 3, it was coded as 0 for no participation. If respondents answered 2, it was coded as 1 for participation.

Personal factors include risk tolerance attitude, credit record, and having a home equity loan. Risk tolerance was created by a survey question “When thinking of your financial investments, how willing are you to take risks? (J2).” Responses to this question
were on a continuous scale from 1 = Not at all willing to 10 = Very willing. Credit record was created by a survey question “How would you rate your current credit record? (J32).” Responses to this question were on a continuous scale where 1 = Very bad, 2 = Bad, 3 = About average, 4 = Good, and 5 = Very good. Having a home equity loan variable was created by a survey question “Do you have any home equity loans? (E8).” Responses included 1 = Yes and 2 = No. If respondents answered 1 (yes), it was coded as having borrowed against home equity. If respondents answered 2 (no), it was coded as did not borrow against home equity.

Other factors include income drop and financial stress. Income drop was created by a survey question “In the past 12 months, have you [has your household] experienced a large drop in income which you did not expect? (J10).” Responses included 1 = Yes and 2 = No. If respondents answered 1 (yes), it was coded as having experienced a large drop in income which was not expected. If respondents answered 2 (no), it was coded has not having experienced a large drop in income which was not expected. Financial stress was created by a survey question “How strongly do you agree or disagree with the following statements? – Discussing my finances can make my heart race or make me feel stressed (J33_41).” Responses to this question were on a continuous scale where 1 = Strongly disagree to 7 = Strongly agree.

Socio-economic variables include age/generation, gender, race/ethnicity, marital status, education, employment status, household income, and region. Age/generation included four dummy categorical variables (millennials/Generation Z age 18 - 37, Gen Xers age 38 - 53, baby boomers age 54 - 72, silent generation age 73+). Race/ethnicity included four dummy categorical variables (White, Black, Hispanic/Latinx, Asian/other).
The other socio-economic variables include gender (females, males); marital status (married, unmarried), formal education (less than high school/high school graduate, some college, college graduate, advanced); employment status (self-employed, working, not working); household income (less than $25,000, $25,000 - $49,999, $50,000 - $74,999, $75,000 - $99,999, more than $100,000). Region includes four dummy categorical variables (Northeast, Midwest, South, West).

**Statistical Analyses**

Frequencies, percentages, means, and medians were calculated to obtain descriptive information on the dependent variable and all independent variables in the multivariate analyses. To compare the differences in the proportions of financial literacy, financial education, personal and other factors, and socio-economic factors by mortgage payment behavior, Chi-Square tests were conducted. Logistic regression analyses were used to test the four hypotheses presented in this thesis. Through this analytical technique, the effects of financial literacy, financial education, personal/other factors, and socio-economic characteristics on the likelihood of being late with mortgage payments were examined (H1, H2, H3, & H4).
Descriptive Results

Financial Literacy and Financial Education of Homeowners with Mortgages

Table 3 presents the descriptive statistics related to financial literacy and financial education among homeowners with mortgages (N = 3,475). According to Huston’s financial literacy model, financial literacy consisted of financial knowledge and financial application. In this study, financial knowledge was measured by perceived financial knowledge and objective quiz question corrected, whereas financial application was measured by daily financial ability, financial self-efficacy, budgeting ability, and having emergency savings.

As for financial knowledge, the average level of perceived financial knowledge was 5.8 with a median of 6.0, on 1 - 7 range (1 = very low, 7 = very high). Table 3 shows that only 9.5% reported their financial knowledge as low (1 - 4), whereas the majority (90.5%) of them perceived their financial knowledge as high (5 - 7). As for quiz questions corrected, the average number of questions answered correctly was 4.3 with a median of 5.0, on 0 – 6 range (0 = zero corrected, 6 = six corrected). In terms of percentage, 50.6% reported they answered 5 or 6 quiz questions correctly out of 6 questions, and 49.4% reported they answered 0 - 4 quiz questions correctly.
## Table 3.

**Descriptive Results: Financial Literacy and Financial Education of Homeowners with Mortgages (N=3,475)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean (Median)</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Literacy:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financial Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived knowledge (1-7)</td>
<td>5.8 (6.0)</td>
<td></td>
</tr>
<tr>
<td>Low overall financial knowledge</td>
<td>Low (1-4)</td>
<td>330 (9.5%)</td>
</tr>
<tr>
<td>High overall financial knowledge</td>
<td>High (5-7)</td>
<td>3,145 (90.5%)</td>
</tr>
<tr>
<td>Quiz questions corrected (0-6)</td>
<td>4.3 (5.0)</td>
<td></td>
</tr>
<tr>
<td>Zero - four corrected</td>
<td>Low (0-4)</td>
<td>1,717 (49.4%)</td>
</tr>
<tr>
<td>Five - six corrected</td>
<td>High (5-6)</td>
<td>1,758 (50.6%)</td>
</tr>
<tr>
<td><strong>Financial Application</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily financial ability (1-7)</td>
<td>6.2 (7.0)</td>
<td></td>
</tr>
<tr>
<td>Not good at dealing</td>
<td>Low (1-4)</td>
<td>316 (9.1%)</td>
</tr>
<tr>
<td>Good at dealing w/ finances</td>
<td>High (5-7)</td>
<td>3,159 (90.9%)</td>
</tr>
<tr>
<td>Financial self-efficacy (1-4)</td>
<td>3.3 (3.0)</td>
<td></td>
</tr>
<tr>
<td>No little confidence</td>
<td>Low (1-2)</td>
<td>409 (11.8%)</td>
</tr>
<tr>
<td>Some or very confident</td>
<td>High (3-4)</td>
<td>3,066 (88.2%)</td>
</tr>
<tr>
<td>Budgeting ability (1-2)</td>
<td>1.5 (1.0)</td>
<td></td>
</tr>
<tr>
<td>Spending equal or more</td>
<td>Low = 1</td>
<td>1,738 (50.0%)</td>
</tr>
<tr>
<td>Spending less than earn</td>
<td>High =2</td>
<td>1,737 (50.0%)</td>
</tr>
<tr>
<td>Having emergency savings (1-2)</td>
<td>1.7 (2.0)</td>
<td></td>
</tr>
<tr>
<td>Not setting up</td>
<td>1= No</td>
<td>968 (27.9%)</td>
</tr>
<tr>
<td>Setting up</td>
<td>2= Yes</td>
<td>2,507 (72.1%)</td>
</tr>
<tr>
<td><strong>Financial Education</strong> (1-2):</td>
<td>1.4 (1.0)</td>
<td></td>
</tr>
<tr>
<td>Not received education</td>
<td>1=No</td>
<td>2,237 (64.4%)</td>
</tr>
<tr>
<td>Received financial education</td>
<td>2=Yes</td>
<td>1,238 (35.6%)</td>
</tr>
</tbody>
</table>

*Note.* Mean and median values are presented for continuous variables, whereas frequencies and percentages are presented for categorical variables.
With respect to financial application, the average level of perceived daily financial ability was 6.2 with a mean of 7.0, on 1 - 7 range (1 = strongly disagree, 7 = strongly agree). In terms of the percentage, only 9.1% of homeowners with mortgages reported their daily financial ability as low (1 - 4), but 90.9% reported their daily financial ability as high (5 - 7). As for financial self-efficacy, the average level was 3.3 with median 3.0, on 1 - 4 range (1 = not at all confident, 4 = very confident). It also shows that 11.8% reported their financial self-efficacy as low (1 - 2), but the majority (88.2%) of them reported their financial self-efficacy level as high (3 - 4). Table 3 shows that as for budgeting ability, about half of them reported they were spending equal or more than they earned, while about half reported they were spending less than they earned. As for having emergency savings, 72.1% reported they have emergency savings and only 27.9% reported that they do not have an emergency savings.

Lastly, Table 3 also shows to what extent the study sample received financial education. It shows that only 35.6% reported they received financial education, while 64.4% reported they did not receive financial education. This indicated that the majority of the homeowners with mortgages did not receive any form of financial education.

**Personal and Other Factors of Homeowners with Mortgages**

Table 4 presents sample characteristics of this study by personal and other factors (N = 3,475). Personal factors include homeowners’ risk tolerance attitude, credit record rate, and home equity loan status. In this study, these variables were included because by looking at the associations between these factors and mortgage
Table 4.

Descriptive Results: Personal and Other Factors of Homeowners with Mortgages  
(N=3,465)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean (Median) Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Factors:</strong></td>
<td></td>
</tr>
<tr>
<td>Risk tolerance attitude (1-10):</td>
<td>6.5 (7.0)</td>
</tr>
<tr>
<td>Lower willingness to take Low (1-6)</td>
<td>1,617 (46.5%)</td>
</tr>
<tr>
<td>High willing to take High (7-10)</td>
<td>1,858 (53.5%)</td>
</tr>
<tr>
<td>Credit record rate (1-5):</td>
<td>4.4 (5.0)</td>
</tr>
<tr>
<td>Lower credit record Low (1-3)</td>
<td>613 (17.6%)</td>
</tr>
<tr>
<td>High credit record High (4-5)</td>
<td>2,862 (82.4%)</td>
</tr>
<tr>
<td>Home equity loan (1-2):</td>
<td>1.3 (1.)</td>
</tr>
<tr>
<td>Not borrowed 1=No</td>
<td>2,530 (72.8%)</td>
</tr>
<tr>
<td>Borrowed against home 2=Yes</td>
<td>945 (27.2%)</td>
</tr>
<tr>
<td><strong>Other Factors:</strong></td>
<td></td>
</tr>
<tr>
<td>Large income drops (1-2):</td>
<td>1.2 (1.0)</td>
</tr>
<tr>
<td>No experience 1=No</td>
<td>2,609 (75.1%)</td>
</tr>
<tr>
<td>Had experience 2=Yes</td>
<td>866 (24.9%)</td>
</tr>
<tr>
<td>Perceived financial stress (1-7):</td>
<td>3.9 (4.0)</td>
</tr>
<tr>
<td>Lower stress Low (1-4)</td>
<td>2,020 (58.1%)</td>
</tr>
<tr>
<td>High stress High (5-7)</td>
<td>1,455 (41.9%)</td>
</tr>
</tbody>
</table>

delinquency, one can gain greater understanding of factors associated with mortgage
delinquency among homeowners. The risk tolerance variable was measured by 1 - 10
range, where 1 = no willingness to take risk in financial investment and 10 = strong
willingness to take risk in financial investment. The average level of risk tolerance
attitude among the study sample was 6.5 with a median of 7.0, on 1 - 10 range. In terms
of percentage, 46.5% of them reported their risk tolerance attitude as lower level (1 - 6),
whereas 53.5% of them reported as higher level (7 - 10). This means that as the study sample, homeowners with mortgages tended to have higher levels of willingness to take risk in their financial investments.

As for credit record, the credit record was measured by 1 - 5 range, where 1 = very bad, 5 = very good. The average level of credit record was 4.4 with a median of 5.0. In terms of percentage, it shows that a higher proportion (82.4%) of the study sample reported their credit records as either 4 = good or 5 = very good, whereas only 17.6% reported their credit records as 1 = very bad, 2 = bad, or 3 = average. This indicated that overall, the study sample (homeowners with mortgages) had good credit record. Table 4 also shows the majority of them (72.8%) did not borrow against home equity; however, still more than a quarter (27.2%) reported that they held home equity loans.

As for other factors, this study included large income drop experience and perceived financial stress. These variables were included in the analyses to understand how trigger events (i.e., large income drops) and emotions with financial difficulty (e.g., financial stress) may influence mortgage delinquency; thus, the findings can provide important insights with mortgage delinquency issues among homeowners. For example, income drops may be a result of job loss, divorce, death, or health problems, whereas financial stress could occur when homeowners were unable to meet their current financial obligations and basic needs.

Table 4 shows to what extent the study sample reported large income drop experience and feelings of financial stress. Among the study sample, 75.1% reported that they did not experience large income drops during 2017 – 2018; however, about a quarter of them reported that they experienced a large income drop during this period. As for
perceived financial stress, the average level was 3.9 with a median 4.0. In this study, financial stress was measured by a question, “How strongly do you agree or disagree with the following statements? - Discussing my finances can make my heart race or make me feel stressed”. The responses ranged from 1 to 7, where 1 = strongly disagree, 4 = neither agree nor disagree, and 7 = strongly agree. Table 4 shows that 41.9% of homeowners included in this study reported higher levels of financial stress (5 – 7 level), while 58.1% reported lower levels of financial stress (1 - 4 level), which means respondents did not strongly agree with the statement.

Financial Literacy and Financial Education by Mortgage Delinquency Status

Table 5 shows the differences in financial literacy and financial education by mortgage delinquency status. In this study, financial literacy was measured by financial knowledge and financial application. According to the results of Chi-square tests, there were significant differences in perceived financial knowledge, quiz question corrected, daily financial ability, and budgeting ability, whereas there were no significant differences in financial self-efficacy and having emergency savings between the two groups.

Small but statistically significant results showed that a higher proportion of homeowners with higher perceived financial knowledge were found in the non-delinquent group (91.3%) than in the delinquent group (87.8%) ($\chi^2 = 8.369, p = .0038$). On the other hand, looking at objective financial knowledge, a much higher proportion of homeowners who scored higher on the financial quiz were found in the non-delinquent group (61.3%) than in the delinquent group (12.0%). The results for financial quiz score were statistically significant ($\chi^2 = 572.679, p < .0001$).
Table 5.

Descriptive Results: Financial Literacy and Financial Education by Mortgage Delinquency Status among Homeowners (N=3,475)

<table>
<thead>
<tr>
<th>Variables</th>
<th>No Delinquency (n=2,723)</th>
<th>Yes Delinquency (n=752)</th>
<th>P-value</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Literacy:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financial Knowledge:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived knowledge (1-7):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (1-4)</td>
<td>8.7%</td>
<td>12.2%</td>
<td>0.0038</td>
<td>$\chi^2 = 8.369^{	ext{**}}$</td>
</tr>
<tr>
<td>High (5-7)</td>
<td>91.3%</td>
<td>87.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quiz question corrected (0-6):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (0-4)</td>
<td>38.7%</td>
<td>88.0%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 572.679^{	ext{***}}$</td>
</tr>
<tr>
<td>High (5-6)</td>
<td>61.3%</td>
<td>12.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financial Application:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily financial ability (1-7):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (1-4)</td>
<td>7.8%</td>
<td>13.8%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 26.042^{	ext{***}}$</td>
</tr>
<tr>
<td>High (6-7)</td>
<td>92.2%</td>
<td>86.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial self-efficacy (1-4):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (1-2)</td>
<td>11.5%</td>
<td>12.9%</td>
<td>0.2777</td>
<td>$\chi^2 = 1.178$</td>
</tr>
<tr>
<td>High (3-4)</td>
<td>88.5%</td>
<td>87.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budgeting ability (1-2):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low = 1</td>
<td>45.1%</td>
<td>68.0%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 123.515^{	ext{***}}$</td>
</tr>
<tr>
<td>High = 2</td>
<td>55.0%</td>
<td>32.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having emergency savings (1-2):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No = 1</td>
<td>28.2%</td>
<td>26.7%</td>
<td>0.4359</td>
<td>$\chi^2 = 0.607$</td>
</tr>
<tr>
<td>Yes = 2</td>
<td>71.8%</td>
<td>73.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Education (1-2):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not received = 1</td>
<td>67.2%</td>
<td>54.3%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 42.845^{	ext{***}}$</td>
</tr>
<tr>
<td>Received = 2</td>
<td>32.8%</td>
<td>45.7%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05, **p<.01, ***p<.001

In terms of daily financial ability, most homeowners in this study reported they had higher levels of daily financial ability. Small but statistically significant results showed that a higher proportion of homeowners with higher level of daily financial
ability were found in the non-delinquent group (92.2%) than in the delinquent group (86.2%) \((\chi^2 = 26.042, p < .0001)\). Similarly, a little higher proportion of homeowners with high budgeting ability were found in the non-delinquent group (55.0%) than in the delinquent group (32.1%). The Chi-square results for budgeting ability were statistically significant \((\chi^2 = 123.515, p < .0001)\).

Further, Table 5 shows the Chi-square results for the difference in receiving financial education by mortgage delinquency status. It is interesting to note that small but statistically significant results indicated that a higher proportion of homeowners with financial education were found in the delinquent group (45.7%) than in the non-delinquent group (32.8%). It also shows that a little higher proportion of homeowners who did not have financial education were found in the non-delinquent group (67.2%) than in the delinquent group (54.3%). These differences were statistically significant \((\chi^2 = 42.845, p < .0001)\).

**Personal and Other Factors by Mortgage Delinquency Status**

Table 6 shows the differences in personal and other factors by mortgage delinquency status. These factors include risk tolerance attitude, credit record rate, home equity loan borrowing status, large income drop experience, and perceived financial stress. The descriptive results from the Chi-square tests showed that there were significant differences in these five factors between the two groups. It showed that a greater proportion of homeowners with higher levels of risk tolerance were found in the delinquent group (75.4%) than in the non-delinquent group (47.4%), whereas a higher proportion of homeowners with lower levels of risk tolerance were found in the non-
Table 6.

Descriptive Results: Personal and Other Factors by Mortgage Delinquency Status among Homeowners (N=3,475)

<table>
<thead>
<tr>
<th>Variables</th>
<th>No Delinquency (n=2,723)</th>
<th>Yes Delinquency (n=752)</th>
<th>P-value</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Factors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk tolerance attitude (1-10):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower risk tolerance (1-6)</td>
<td>52.6%</td>
<td>24.6%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 185.527^{***}$</td>
</tr>
<tr>
<td>High risk tolerance (7-10)</td>
<td>47.4%</td>
<td>75.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit record rate (1-5):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower record (1-3)</td>
<td>12.3%</td>
<td>36.8%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 243.373^{***}$</td>
</tr>
<tr>
<td>High record (1-5)</td>
<td>87.7%</td>
<td>63.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home equity loan (1-2):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not borrowed = 1</td>
<td>83.4%</td>
<td>34.4%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 713.405^{***}$</td>
</tr>
<tr>
<td>Borrowed = 2</td>
<td>16.6%</td>
<td>65.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other Factors:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large income drops (1-2):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No experience = 1</td>
<td>88.1%</td>
<td>27.9%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 1140.440^{**}$</td>
</tr>
<tr>
<td>Had experience = 2</td>
<td>11.9%</td>
<td>72.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived financial stress:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower stress (1-4)</td>
<td>69.6%</td>
<td>16.5%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 683.667^{***}$</td>
</tr>
<tr>
<td>High stress (5-7)</td>
<td>30.4%</td>
<td>83.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05, **p<.01, ***p<.001

delinquent group (52.6%) than in the delinquent group (24.6%). These differences were statistically significant ($\chi^2 = 185.527, p < .0001$).

In terms of credit record, a little higher proportion of homeowners with lower credit record were found in the delinquent group (36.8%) than in the non-delinquent group (12.3%); however, a higher proportion of homeowners with good credit record
were found in the non-delinquent group (87.7%) than in the delinquent group (63.2%). These differences were also statistically significant ($\chi^2 = 243.373, p < .0001$).

According to the home-equity loan status, there were significant differences between the delinquent and non-delinquent groups. Table 6 showed that a much higher proportion of homeowners who held home equity loans were found in the delinquent group (65.6%) than in the non-delinquent group (16.6%). On the other hand, a higher proportion of homeowners who did not borrow against home equity were found in the non-delinquent group (83.4%) than in the delinquent group (34.4%). The results of the Chi-square tests indicated that these differences were statistically significant ($\chi^2 = 713.405, p < .0001$).

Table 6 also shows the differences in other factors (i.e., large income drops experience and perceived financial stress) between delinquent and non-delinquent homeowners. There was a striking difference between the two groups as they experienced large income drops. Specifically, a much higher proportion of homeowners who experienced large income drops were found in the delinquent group (72.1%) than in the non-delinquent group (11.9%). In the same line, a much higher proportion of homeowners who did not experience large income drops were found in the non-delinquent group (88.1%) than in the delinquent group (27.9%). These differences were statistically significant ($\chi^2 = 1140.440, p < .0001$).

Lastly, Table 6 presents that there was a significant difference in perceived financial stress between the two groups. For example, a much higher proportion of homeowners with high levels of financial stress were found in the delinquent group (83.5%) than in the non-delinquent group (30.4%). However, a lower proportion of
homeowners with lower levels of financial stress were found in the non-delinquent group (69.6%) than in the delinquent group (16.5%). The Chi-square results showed that the differences were statistically significant ($\chi^2 = 683.667, p < .0001$).

**Socio-Economic Characteristics by Mortgage Delinquency Status**

Table 7 shows the differences in socio-economic characteristics between those who were not delinquent and delinquent in their mortgage payments. Overall, there were significant differences in all socio-economic characteristics by mortgage delinquency status, including age/generation, gender, marital status, race/ethnicity, formal education, employment status, household income, and residential region. Specifically, as compared to other age groups, a much higher proportion of millennials/Generation Z were found in the delinquent group (69.6%) than in the non-delinquent group (19.6%). Other than millennials/Generation Z, a higher proportion of the homeowners were found in the non-delinquent group. Specifically, a much higher proportion of baby boomer homeowners were found in the non-delinquent group (41.8%) than in the delinquent group (8.1%). The differences across age/generation were statistically significant ($\chi^2 = 733.514, p < .0001$).

In terms of gender difference, small but statistically significant results showed that a higher proportion of male homeowners were found in the delinquent group (73.1%) than in the non-delinquent group (64.1%), whereas a little higher proportion of female homeowners were found in the non-delinquent group (35.9%) than in the delinquent group (26.9%). The results of the Chi-square tests indicated that these differences were statistically significant ($\chi^2 = 21.542, p = .00041$).

As for marital status, a higher proportion of unmarried single homeowners were found in the delinquent group (32.2%) than in the non-delinquent group (18.7%),
Table 7.

Descriptive Results: Socio-Economic Characteristics by Mortgage Delinquency Status among Homeowners (N=3,475)

<table>
<thead>
<tr>
<th>Variables</th>
<th>No Delinquency (n=2,723)</th>
<th>Yes Delinquency (n=752)</th>
<th>P-value</th>
<th>Test Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age/Generation:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millennials/Z, 18-37</td>
<td>19.6%</td>
<td>69.6%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 733.514^{***}$</td>
</tr>
<tr>
<td>Xers, 38-53</td>
<td>33.3%</td>
<td>21.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby boomers, 54-72</td>
<td>41.8%</td>
<td>8.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silent generation, 73+</td>
<td>5.3%</td>
<td>0.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>64.1%</td>
<td>73.1%</td>
<td>0.0041</td>
<td>$\chi^2 = 21.542^{***}$</td>
</tr>
<tr>
<td>Females</td>
<td>35.9%</td>
<td>26.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Marital Status:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>81.3%</td>
<td>67.8%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 63.283^{***}$</td>
</tr>
<tr>
<td>Unmarried</td>
<td>18.7%</td>
<td>32.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Race/Ethnicity:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>80.7%</td>
<td>57.6%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 417.387^{***}$</td>
</tr>
<tr>
<td>Black</td>
<td>4.6%</td>
<td>29.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>6.0%</td>
<td>6.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian/Other</td>
<td>8.7%</td>
<td>6.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Formal Education:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than/Highschool grad</td>
<td>11.9%</td>
<td>18.1%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 151.046^{***}$</td>
</tr>
<tr>
<td>Some college</td>
<td>30.5%</td>
<td>49.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College graduate</td>
<td>32.5%</td>
<td>19.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-college</td>
<td>25.1%</td>
<td>13.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Employment Status:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Employed</td>
<td>7.6%</td>
<td>12.6%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 157.334^{***}$</td>
</tr>
<tr>
<td>Full/Part-time working</td>
<td>62.5%</td>
<td>79.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-working</td>
<td>29.9%</td>
<td>7.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Household Income:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $25,000</td>
<td>3.3%</td>
<td>7.3%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 228.884^{***}$</td>
</tr>
<tr>
<td>$25,000 - $49,999</td>
<td>11.8%</td>
<td>13.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$50,000 - $74,999</td>
<td>19.9%</td>
<td>14.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$75,000 - $99,999</td>
<td>20.0%</td>
<td>42.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$100,000 or more</td>
<td>45.0%</td>
<td>22.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Residential Region:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>16.7%</td>
<td>14.4%</td>
<td>&lt;.0001</td>
<td>$\chi^2 = 43.965^{***}$</td>
</tr>
<tr>
<td>Midwest</td>
<td>22.0%</td>
<td>20.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>28.1%</td>
<td>40.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>33.2%</td>
<td>24.6%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05, **p<.01, ***p<.001*
whereas a higher proportion of married homeowners were found in the non-delinquent group (81.3%) than in the delinquent group (67.8%). The Chi-square tests results indicated that these differences across marital status were statistically significant ($\chi^2 = 63.283, p < .0001$). Considering race/ethnicity, a greater proportion of Black homeowners were found in the delinquent group (29.8%) than in the non-delinquent group (4.6%). On the other hand, a much higher proportion of White homeowners were found in the non-delinquent group (80.7%) than in the delinquent group (57.6%). The results of the Chi-square tests indicated that these differences were statistically significant ($\chi^2 = 417.387, p < .0001$).

Table 7 also presents the Chi-square tests of the difference in educational attainment of homeowners by mortgage delinquent status. A little higher proportion of homeowners with post-college degree were found in the non-delinquent group (25.1%) than in the delinquent group (13.3%). Small but statistically significant results showed that a higher proportion of homeowners with a high school diploma or less were found in the delinquent group (18.1%) than in the non-delinquent group (11.9%). Similarly, a higher proportion of homeowners with some college education were found in the delinquent group (49.6%) than in the non-delinquent group (30.5%). It seemed that as the level of formal education increased, a higher proportion of non-delinquent homeowners were found among those with college degrees or more. These results were statistically significant ($\chi^2 = 151.046, p < .0001$).

As it related to employment status, small but statistically significant results were found, suggesting that higher proportions of homeowners either self-employed or working part/full time in the labor force were found in the delinquent group than in the
non-delinquent. The results were statistically significant ($\chi^2 = 157.334, p < .0001$). As for household income, it showed that a higher proportion of homeowners with income less than $25,000, income between $25,000 and $49,999, and income between $75,000 and $99,999 were found in the delinquent group (7.3%, 13.0%, and 42.7%, respectively) than in the non-delinquent group (3.3%, 11.8%, and 20.0%, respectively). On the other hand, a higher proportion of homeowners with income between $50,000 and $74,999 and more than $100,000 were found in the non-delinquent group (19.9% and 45.0%, respectively) than in the delinquent group (14.5% and 22.5%, respectively). The results were statistically significant ($\chi^2 = 228.884, p < .0001$).

In terms of residential region, a relatively higher proportion of homeowners residing in the South were found in the delinquent group (40.1%) than in the non-delinquent group (28.1%). However, a little higher proportion of homeowners residing in the other three regions (i.e., Northeast, Midwest, and West) were found in the non-delinquent group (16.7%, 22.0%, and 33.2%, respectively) than in the delinquent group (14.4%, 20.9%, and 24.6%).

In summary, according to Table 7 that presents the Chi-square results across socio-economic characteristics, it is described that a greater proportion of delinquent homeowners were millennials/Generation Z, male homeowners, unmarried singles, Black individuals, homeowners with some college education, working homeowners, homeowners a little higher than middle income ($75,000-$99,999), and those residing in the South region.
**Logistic Regression Results: Determinants of Mortgage Loan Delinquency**

This study examined the effects of financial literacy, financial education, personal/other factors, and socio-economic characteristics on the likelihood of being delinquent in mortgage payments among homeowners. Table 8 showed the results of the logistic regression analysis. The -2 Log likelihood ratio and Chi-squared statistics are also presented in Table 8. The -2 Log likelihood ratio is 1721.940. The Chi-squared statistic is 2063.5521 and statistically significant ($p < .0001$). This indicated that the model shown is significant in explaining mortgage delinquency among homeowners.

**Hypothesis 1**

Based on literature and the conceptual framework, this study hypothesized that homeowners with high levels of financial literacy will be less likely to be delinquent with their mortgage payments than homeowners with low levels of financial literacy. To measure financial literacy, this study included perceived financial knowledge, objective quiz score, financial ability, financial self-efficacy, budgeting ability, and having emergency savings. As expected, the coefficients associated with objective quiz score, financial ability, spending less, and setting up emergency savings were statistically significant and negative. This means that as homeowners have these components of financial literacy, they were less likely to be delinquent in their mortgage payments. However, the coefficient associated with high self-efficacy was not statistically significant. In addition, the effect of perceived financial knowledge on mortgage delinquency was significant and positive. This indicated that as perceived financial knowledge increased, homeowners were 22% more likely to be delinquent (Odds Ratio = 1.215, $p = .0016$). On the other hand, as objective quiz score increased, homeowners
Table 8.

*Logistic Regression Results – Determinants of Mortgage Loan Delinquency among Homeowners (n=3,475)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Estimated Coefficient</th>
<th>Standard Error</th>
<th>P-value</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Literacy: (H1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived financial knowledge</td>
<td>0.195</td>
<td>0.062</td>
<td>0.0016</td>
<td>1.215</td>
</tr>
<tr>
<td>Objective quiz score</td>
<td>-0.516</td>
<td>0.056</td>
<td>&lt;.0001</td>
<td>0.597</td>
</tr>
<tr>
<td>Financial ability</td>
<td>-0.178</td>
<td>0.050</td>
<td>0.0004</td>
<td>0.837</td>
</tr>
<tr>
<td>Financial self-efficacy:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High self-efficacy</td>
<td>0.176</td>
<td>0.191</td>
<td>0.3562</td>
<td>1.193</td>
</tr>
<tr>
<td>Low self-efficacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budgeting ability:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spending less</td>
<td>-0.676</td>
<td>0.140</td>
<td>&lt;.0001</td>
<td>0.509</td>
</tr>
<tr>
<td>Spending equal/more</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having emergency savings:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting up savings</td>
<td>-0.398</td>
<td>0.155</td>
<td>0.0103</td>
<td>0.672</td>
</tr>
<tr>
<td>Not setting up savings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financial Education: (H2)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received financial education</td>
<td>0.382</td>
<td>0.133</td>
<td>0.0041</td>
<td>1.465</td>
</tr>
<tr>
<td>Not received</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Personal/Other Factors: (H3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk tolerance attitude</td>
<td>0.040</td>
<td>0.031</td>
<td>0.1879</td>
<td>1.041</td>
</tr>
<tr>
<td>Credit record rate</td>
<td>-0.439</td>
<td>0.061</td>
<td>&lt;.0001</td>
<td>0.645</td>
</tr>
<tr>
<td>Home equity loan:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borrowed against home</td>
<td>0.570</td>
<td>0.155</td>
<td>0.0002</td>
<td>1.767</td>
</tr>
<tr>
<td>Not borrowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large income drops:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had experience</td>
<td>1.337</td>
<td>0.145</td>
<td>&lt;.0001</td>
<td>3.806</td>
</tr>
<tr>
<td>No experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived financial stress</td>
<td>0.265</td>
<td>0.037</td>
<td>&lt;.0001</td>
<td>1.303</td>
</tr>
<tr>
<td><strong>Socio-Economic Characteristics: (H4)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age/Generation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millennials/Gen Z, Age 18-37</td>
<td>1.798</td>
<td>0.857</td>
<td>0.0360</td>
<td>6.038</td>
</tr>
<tr>
<td>Gen Xers, Age 38-53</td>
<td>1.1251</td>
<td>0.856</td>
<td>0.1886</td>
<td>3.080</td>
</tr>
<tr>
<td>Boomers, Age 54-72</td>
<td>0.749</td>
<td>0.857</td>
<td>0.3821</td>
<td>2.114</td>
</tr>
<tr>
<td>(Silent, Age 72+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Gender:
- Female: -0.116  0.149  0.436  0.891
- (Male) (Reference)

Marital Status:
- Married: 0.116  0.155  0.4536  1.123
- (Unmarried) (Reference)

Race/Ethnicity:
- Black: 0.467  0.197  0.0175  1.596
- Hispanic: -0.031  0.189  0.8714  0.970
- Asian/Other: -0.284  0.240  0.2352  0.753
- (White) (Reference)

Formal Education:
- High school drop/grad: -0.060  0.235  0.8001  0.942
- Some college: 0.244  0.196  0.2135  1.277
- College graduate: 0.003  0.210  0.9902  1.003
- (Post college) (Reference)

Employment Status:
- Self-employed: 0.179  0.279  0.5216  1.196
- Full/Part-time working: 0.702  0.200  0.0004  2.017
- (Not working) (Reference)

Household Income:
- Less than $25,000: 0.539  0.286  0.0593  1.714
- $25,000 - $49,999: 0.121  0.215  0.5732  1.129
- $75,000 - $99,999: 0.549  0.193  0.0043  1.732
- $100,000 or more: 0.164  0.194  0.3978  1.179
- ($50,000 - $74,999) (Reference)

Residential Region:
- Midwest: 0.092  0.215  0.6685  1.096
- South: 0.599  0.194  0.0020  1.820
- West: 0.345  0.211  0.1025  1.412
- (Northeast) (Reference)

Intercept: -1.626  1.035  0.116

-2 Log likelihood: 1721.940
\( \chi^2 = 2063.5521 \)

Note: Weighted results. ( ) represents a reference group in regression analysis.

were 40% less likely to be delinquent in their mortgage payments (Odd Ratio = 0.597, \( p < .0001 \)). Similarly, as reported financial ability increased, homeowners were 16% less likely to be delinquent (Odds Ratio = 0.837, \( p = .0004 \)).
As for the relationship between budgeting ability and mortgage delinquency, homeowners who spent less than they earned were 49% less likely to be delinquent compared to homeowners who spent equal to or more than they earned (Odds Ratio = 0.509, \( p < .0001 \)). Similarly, as for the relationship between having emergency saving and mortgage delinquency, homeowners who had an emergency fund were 33% less likely to be delinquent compared to those who did not have an emergency fund (Odds Ratio = 0.672, \( p = .0103 \)).

Since the effect of financial self-efficacy on mortgage delinquency was not statistically significant and the direction of perceived financial knowledge on mortgage delinquency was positive, the logistic regression results do not fully support Hypothesis 1 (Homeowners with high levels of financial literacy will be less likely to be delinquent with their mortgage payments than homeowners with low levels of financial literacy).

**Hypothesis 2**

As for Hypothesis 2, this study found that homeowners with financial education will be less likely to be delinquent with their mortgage payments than homeowners without financial education. However, the logistic regression results showed that all else being equal, the effect of financial education was statistically significant, but positive. This finding suggested that homeowners who received financial education were 47% more likely to be delinquent in their mortgage payments than homeowners who did not receive financial education (Odds Ratio = 1.465, \( p = .0041 \)). Thus, Hypothesis 2 (Homeowners with financial education will be less likely to be delinquent with their mortgage payments than homeowners without financial education) was not supported.
Hypothesis 3

Based on the literature, Hypotheses 3 (Personal and other factors of homeowners will be associated with being delinquent with their mortgage payments) were presented. As personal and other factors, risk tolerance attitude, credit record rate, home equity loan, large income drops, and financial stress were included in the regression model. Table 8 showed that except the risk tolerance attitude, the coefficients associated with credit record, home equity loan, large income drop experience, and perceived financial stress were statistically significant.

As expected, there was a negative relationship between good credit record and mortgage delinquency. Specifically, as the level of the homeowners’ credit record increased, they were 36% less likely to be delinquent (Odds Ratio = 0.645, \( p < .0001 \)). In contrast, homeowners who borrowed against their homes (i.e., having home equity loan) were 77% more likely to be delinquent than homeowners who did not borrow against home (Odds Ratio = 1.767, \( p = .0002 \)).

According to previous studies, a negative relationship between large income drop experience and mortgage delinquency was expected. Table 8 shows that homeowners who experienced large income drops were 281% more likely to be delinquent compared to homeowners who did not experience large income drops (Odds Ratio = 3.806, \( p < .0001 \)). Similarly, as the level of financial stress increased, homeowners were 30% more likely to be delinquent (Odds Ratio = 1.303, \( p < .0001 \)). The findings suggested that other than risk tolerance attitude, all coefficients associated with personal and other factors in the regression model were statistically significant; thus, Hypothesis 3 was partially supported.
Hypothesis 4

Based on literature, Hypothesis 4 (Socio-economic characteristics of homeowners will be associated with being delinquent with their mortgage payments) was proposed. As the socio-economic characteristics, age/generation, gender, marital status, race/ethnicity, formal education, employment status, household income, and residential region were included in the logistic regression model. Table 8 shows that age/generation, race/ethnicity, employment status, household income, and region were statistically significant. Specifically, the coefficient associated with millennials were 504% more likely to be delinquent compared to the silent generation (Odds Ratio 6.038, \( p = .0360 \)). The logistic regression results also indicated that Black individuals were 60% more likely to be delinquent in their mortgage payments compared to their White counterparts (Odds Ratio = 1.596, \( p = .0175 \)).

As for employment status, homeowners who worked part time or full time in the labor force were 102% more likely to be delinquent in their mortgage payments than those who were not working in the labor force (Odds Ratio = 2.017, \( p = .0004 \)). As for the association between household income level and mortgage delinquency, only the coefficient associated with $75,000 - $99,999 was statistically significant (Odds Ratio = 1.732, \( p = .0043 \)). These finding indicated that homeowners who made between $75,000 - $99,999 were 73% more likely to be delinquent compared to the middle-income group (i.e., annual income between $50,000 - $74,999).

As for the relationship between residential region and mortgage delinquency, homeowners residing in the South was the only variable that was statistically significant (Odds Ratio = 1.820, \( p = .0020 \)). This finding suggested that homeowners residing in the...
South were 82% more likely to be delinquent than their counterparts living in the
Northeast. Based on Table 8, the coefficients associated with gender, marital status, and
formal education were not statistically significant. Thus, the Hypothesis 4 (Socio-
economic characteristics of homeowners will be associated with being delinquent with
their mortgage payments) was partially supported.

Summary

This study proposed four hypotheses based on an adapted version of Huston’s
financial literacy framework (2010). Table 9 presents a summary that shows the study
hypotheses and related results. The effect of self-efficacy on mortgage delinquency was
not statistically significant; thus, Hypothesis 1 was partially supported. The effect of
financial education was statistically significant, but positive; thus, Hypothesis 2 was not
supported.

Table 9.

Summary Results of Hypotheses

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Supporting evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1:</strong> Homeowners with high levels of financial literacy will be less</td>
<td>Partially Supported</td>
</tr>
<tr>
<td>likely to be delinquent with their mortgage payments than homeowners with</td>
<td></td>
</tr>
<tr>
<td>low levels of financial literacy.</td>
<td></td>
</tr>
<tr>
<td><strong>H2:</strong> Homeowners with financial education will be less likely to be</td>
<td>Not Supported</td>
</tr>
<tr>
<td>delinquent with their mortgage payments than homeowners without</td>
<td></td>
</tr>
<tr>
<td>financial education.</td>
<td></td>
</tr>
<tr>
<td><strong>H3:</strong> Personal and other factors of homeowners will be associated with</td>
<td>Partially Supported</td>
</tr>
<tr>
<td>being delinquent with their mortgage payments.</td>
<td></td>
</tr>
<tr>
<td><strong>H4:</strong> Socio-economic characteristics of homeowners will be associated</td>
<td>Partially Supported</td>
</tr>
<tr>
<td>with being delinquent with their mortgage payments.</td>
<td></td>
</tr>
</tbody>
</table>
Table 9 also presents the results related to the Hypotheses 3 and 4. It shows that coefficients associated with risk tolerance attitude were not statistically significant, while coefficients associated with credit record, home equity borrowing, large income drop experience, and financial stress were statistically significant. Thus Hypothesis 3 was partially supported. Finally, the coefficients associated with gender, marital status, and formal education were not statistically significant, while age/generation, employment status, household income, and region were statistically significant. Thus Hypothesis 4 was partially supported.
CHAPTER V

DISCUSSION, IMPLICATIONS, AND CONCLUSION

Discussion

As household debt continues to rise in the U.S., and a home is the most important form of wealth for typical Americans, understanding who is more likely to be delinquent with their mortgage payments and what factors may contribute to mortgage delinquency is important and timely. This study examined how financial literacy and financial education are related to mortgage delinquency among homeowners. In addition, this study sought to explore how personal and other factors (e.g., large income drops and financial stress) are related to mortgage delinquency. This study further investigated how socio-economic characteristics of homeowners (i.e., age/generation, gender, marital status, race/ethnicity, formal education, employment status, household income, and residential region) are related to mortgage delinquency. This study found significant results that could add to the previous research on mortgage delinquency in the U.S. The findings of this study could also provide housing and financial professionals with insight on important factors of mortgage delinquency among homeowners.

As the study sample, homeowners with mortgages were examined. Relatively, a higher proportion of homeowners included in this study were male, married, White, had some college, working full or part time, those with annual income of $100,000 or more, and residing in the West. As for age/generation of the homeowners, millennials/Generation Z, Generation X, and baby boomers were evenly distributed in the study sample. In terms of financial literacy and financial education of homeowners with
mortgages, a higher proportion of homeowners with mortgages reported a higher level of perceived financial knowledge, objective financial knowledge (i.e., correct quiz questions), daily financial ability, financial self-efficacy, and having emergency savings. The majority (64.4%) did not receive financial education.

Financial Literacy

In this study, the association between financial literacy and mortgage delinquency was examined. As two main components of financial literacy, financial knowledge and financial application were included in the analysis. Financial knowledge was measured by subjective financial knowledge and objective financial knowledge, whereas financial application was measured by financial self-efficacy, budgeting ability, and setting up emergency funds. Among these variables, objective financial knowledge, financial ability, budgeting ability, and having emergency savings were statistically significant and negative, suggesting that as homeowners had these components of financial literacy, they were less likely to be delinquent. However, the effect of subjective financial knowledge on mortgage delinquency was significant, but negative.

As expected, the effect of objective financial knowledge, financial ability, budgeting ability, and setting up emergency funds were negative. These findings indicate that homeowners with these types of financial literacies were less likely to be delinquent in their mortgage payments. Objective financial knowledge is the factual financial information that a homeowner learns, while financial ability, budgeting ability, and setting up emergency funds are ways that homeowners could apply financial knowledge. Homeowners who had financial literacy in these areas could be making different financial decisions that allow them to be current on their mortgage payments. It is important for
financial educators, financial practitioners, and mortgage counselors to stress enhancing these types of human capital in their personal financial education and counseling sessions.

An important finding of this study is that the effect of perceived financial knowledge on mortgage delinquency was positive. This means that as homeowners had high levels of perceived financial knowledge (self-assessed), they were more likely to be delinquent. Based on this finding, it could be said that homeowners who were delinquent may be overconfident in their financial knowledge. This finding is consistent with the previous literature that individuals who were overconfident in their financial abilities did not behave optimally (Glaer & Weber, 2007; Merkle, 2017; Nosić & Weber, 2010; Porto & Xiao, 2016). Previous research also noted that individuals who were overconfident were more likely to engage in costly financial behaviors such as being delinquent on their mortgages compared to those with appropriate levels of confidence (Kim et al., 2020; Tokar Asaad, 2015). Based on the findings of the logistic regression results for financial literacy, since not all financial literacy components were statistically significant, Hypothesis 1 was not fully supported.

**Financial Education**

Financial education is described as the process in which people gain financial information, skills, and confidence to manage their day-to-day finances (U.S. Financial Literacy and Education Commission, 2020). Considering Huston’s (2010) conceptual framework that guided this study, the association between financial education and mortgage delinquency was examined. Logistic regression results showed that the effect of financial education on mortgage delinquency was statistically significant and positive.
This finding means that homeowners who received financial education were more likely to be delinquent than homeowners who did not receive financial education. The positive association between receiving financial education and mortgage delinquency suggests that homeowners included in this study tended to be practicing undesirable financial behaviors such as mortgage delinquency, despite their financial education. This result is an unexpected finding; thus, Hypothesis 2 was not supported.

According to descriptive results, only a small proportion (35.6%) of homeowners with mortgages received financial education; thus, it may be considered that financial education did not decrease the likelihood of mortgage delinquency. If a larger proportion of the study sample had received financial education, the effect of financial education could be different. It is unclear what type of financial education program (e.g., homebuyer education, debt management, budgeting, or credit) the study sample received. This study could also not assess the duration of the financial education, the timing of the financial education, or the quality of the financial education.

There have been conflicting findings in previous studies regarding the relationship between financial education and positive financial behavior. While previous research shows that financial education is crucial for improving financial behavior, financial education alone is not enough. For example, there is evidence that individuals were more likely to have healthy financial behaviors when financial habits were established early (Robb & Woodyard, 2011). A more holistic approach to financial education as well as starting financial education at an early age through college may help individuals establish healthy financial habits (Robb & Woodyard, 2011).
The goal of most financial education programs is to increase knowledge and create positive behavior change which improves overall financial well-being. Serido et al. (2013) suggested that the improvement of financial behaviors is a developmental process. For example, as young adults develop, implement financial behaviors, and transition to adulthood, the levels of financial knowledge, financial self-belief, and financial well-being increased (Serido et al., 2013). Financial education is an important component that can enhance a homeowner’s financial literacy. Therefore, it is crucial for researchers to continue to examine in what ways financial education can be improved to be more effective.

**Personal and Other Factors**

This study examined the associations between personal and other factors (e.g., risk tolerance attitude, credit record, home equity borrowing, large income drop experience, and financial stress) and mortgage delinquency. Except risk tolerance attitude, the other four personal/other factors were statistically significant. In particular, the logistic regression results indicated that home equity borrowing, income drop experience, and higher levels of financial stress increased the likelihood of mortgage delinquency. As expected, there was a negative association between good credit record of homeowners and mortgage delinquency. Credit scores are calculated by using a variety of credit data in the homeowners’ credit record. Payment history shows how the homeowner has paid their accounts over time and is the largest contributor (35%) to their credit score (myFICO, n.d.). It is considered that homeowners who are not delinquent on their mortgages could have practiced desirable financial behavior such as paying bills on time, including mortgage payments.
The findings of this study regarding the positive association between income drop experience and mortgage delinquency are consistent with the previous findings in the literature regarding “trigger events” (Foote et al., 2010; Gerardi et al., 2013b). Income drops from unexpected job loss can lead to mortgage delinquency among homeowners (Crook & Banasik, 2012). It is considered that income drop experiences can cause costly consequences for homeowners such as delinquency. That is, homeowners who experienced a decrease in income could often be delinquent because they did not have enough financial resources to continue making their mortgage payments (Gerardi et al., 2018).

In this study, financial stress was found to be associated with mortgage delinquency. Financial stress may occur when homeowners do not make enough money to meet their current obligations and have difficulty meeting basic needs (Friedline et al., 2021). In this study, the financial stress variable was measured by a question “How strongly do you agree or disagree with the following statements? – Discussing my finances can make my heart race or make me feel stressed”. Financial stress can cause anxiety, worry, marital stress, depression, and more (Dew & Yorgason, 2010; Kim et al., 2006; Stein et al., 2013; Valentino et al., 2014). Along with the importance of this variable, research is beginning to emerge regarding the link between financial stress and mortgage delinquency. For example, Xiao and Kim (2021) found consistent results, showing that financial stress is positively associated with mortgage delinquency. The current and previous studies indicated that the financial stress variable is crucial in understanding the outcome such as mortgage delinquency.
Socio-Economic Characteristics

In the conceptual framework of this study, socio-economic characteristics of homeowners were included to predict mortgage delinquency. The logistic regression results show that several socio-economic characteristics, including millennials/Generation Z, Black individuals, working full- or part-time, annual income between $75,000 - $99,999, and those homeowners who reside in the South were statistically significant.

Among these variables, one of the notable socio-economic characteristics associated with mortgage delinquency was age/generation. This study found that millennials/Generation Z (age 18 - 37) were more likely to be delinquent on their mortgage than the silent generation (age 73+). The finding of this study is consistent with the previous literature regarding millennials’ financial well-being (Kim et al., 2019; Lee et al., 2019). Millennials entered the work force when the economy was still rebounding after the Great Recession (Kim et al., 2019). As a result, they were faced with economic hardships, lower wages, and higher debt loads (Kim et al., 2019; Lee et al., 2019). Millennials may also lack financial experiences compared to other generations (Lee et al., 2019). In a long-term perspective, as millennials age and have more financial experiences, they could become more involved in positive debt payment behavior (Lee et al., 2019). The findings of this study are consistent with the previous research, indicating that millennials are debt burdened. As a result of their significant debt load, millennials may feel constrained and may be mortgage delinquent.

Another important finding from the logistic regression analysis was racial/ethnic differences in mortgage delinquency, suggesting that Black homeowners were more
likely to be delinquent in their mortgage payments than their White counterparts.

Substantial research has examined the relationship between race/ethnicity and financial behaviors. The finding of this study could add to the current literature that Black homeowners were more likely to be delinquent (Aughinbaugh, 2013; Baker, 2014; Bayer et al., 2016). Previous studies also documented that higher delinquency rates among minorities may be a result of more exposure to unemployment and income shocks, lending discrimination, and nontraditional loan terms (Hall et al., 2015; Hoynes et al., 2012; Reid et al., 2017, Rugh et al., 2015).

The association between employment status and mortgage delinquency was examined in this study. Individuals’ employment status is often evaluated to understand their consumption and debt payment behaviors. The findings of this study suggested that homeowners working full- or part-time were more likely to be mortgage delinquent compared to their not-working counterparts. In particular, not-working homeowners included those who were unemployed, full-time students, the permanently sick/disabled, and retired. The negative association between working and mortgage delinquency could reflect that not-working individuals may be receiving income or financial assistance from a different source rather than from working. For example, retired homeowners may receive income to pay their mortgage from Social Security, pensions, and retirement accounts.

Household income was an important predictor of mortgage delinquency. In particular, this study found that those homeowners who reported annual income between $75,000 - $99,999 were more likely to be delinquent than the middle-income level (i.e., income between $50,000 - $74,999). This finding indicates that the mortgage
delinquency problem is reaching beyond the middle-income group. One explanation for this finding could be that homeowners within this income group are cost-burdened and obtained a mortgage that is not sustainable. In the past, homeowners earning more than $75,000 were considered upper middle class and wealthy. However, current inflation and global economic conditions have increased the everyday living expenses that could make homeowners with mortgages more constrained and challenged to pay their mortgages on time.

Residential region was also an important predictor of the likelihood of mortgage delinquency. The logistic regression results of this study suggested that homeowners residing in the South were more likely to be delinquent than the reference group (i.e., homeowners in the Northeast). It has been noted that variations among mortgage delinquency by residential region may be a result of regional economic conditions and unemployment rates (Doms et al., 2017; Quercia et al., 2016). Emmons et al. (2016) also discussed that delinquency rates by residential region differ drastically due to regional demographics. These findings can provide financial professionals and policy makers with the information necessary to better understand what regions are more at risk of being mortgage delinquent.

Limitations and Direction for Future Research

This study indicates the important findings related to who are delinquent in their mortgage payments among homeowners. This study employed the data from the 2018 National Financial Capability Study (NFCS). The NFCS data includes important variables that show how American adults manage their financial resources and make financial decisions. In particular, the data included questions regarding financial literacy,
financial education, financial well-being, debt holdings, and more. Hence, the NFCS data could provide important findings related to the proposed hypotheses including the associations between financial literacy, financial education, personal/other factors, and socio-economic characteristics on mortgage delinquency. Despite the strengths of this data, there were some limitations.

First, since the data came from a secondary data source, it did not provide enough information to examine the association between financial education and mortgage delinquency. For example, this study utilized a question in the survey, “Was financial education offered by a school or college you attended, or a workplace where you were employed?” Nevertheless, this question may not have captured the full effect of financial education. The NFCS data set did not include broader financial education questions regarding what type of financial education was received, how recently it was received, or information regarding financial socialization, which may influence mortgage delinquency. This can be the limitation using a secondary data source.

Second, the NFCS data is cross-sectional and does not explore the full extent of the mortgage delinquency timeline. The survey question used to measure mortgage delinquency was “How many times have you been late with your mortgage payments in the past 12 months?” The responses to this question include never, once, or more than once. From this question, it is unclear if the respondents were recently delinquent or delinquent 11 months ago. Although this secondary data lacks specific questions to better understand the timeline of mortgage delinquency or if the mortgage delinquency has been cured, the NFCS data set is far-reaching and provides more expansive data regarding
financial education, financial literacy, financial well-being, and debt holdings than any other current data sets.

Third, to ensure high quality responses and to completely understand the constructs of this study, those homeowners who reported “don’t know” and “prefer not to say” on key variables (i.e., financial education participation, financial knowledge, and mortgage payment behavior) were excluded from the analysis. This may be considered a limitation as some may argue the exclusion of these respondents may affect the representativeness of the results.

Future research could attempt to explore mortgage delinquency in a more comprehensive study by collecting primary data surveys that ask more detailed questions. For example, mortgage delinquency counselors could conduct a study that explores when the delinquency occurred, what triggered the delinquency, and if the delinquency had been cured. The mortgage delinquency counselor could further investigate if the homeowner attended a home buyer education course prior to purchasing the home.

**Implications**

To predict the likelihood of being delinquent in their mortgage payments among homeowners, this study included important variables such as financial literacy, financial education, personal/other factors, and socio-economic characteristics. One of the main goals in this study was to provide important findings that can be used by financial educators, financial counselors, and policymakers. In the wake of the Great Recession and the current COVID-19 global pandemic, it is crucial for financial educators, financial counselors, and government policy makers to consider the findings of this study as they implement effective education programs, useful counseling tools, and relevant
government programs. In this way, these professionals could help homeowners keep their valuable assets such as their homes and reduce the risk of foreclosure.

**Financial Educators**

Understanding the association between financial education and mortgage delinquency can be an important finding for financial educators as well as housing and financial professionals. Financial education was statistically significant, but the direction of effect was positive. This finding could be particularly important to financial educators. The finding of a positive effect of financial education on mortgage delinquency may encourage educators to re-evaluate their current education curriculum, to adjust existing programs, or to create new programs that would be more useful to the target populations such as millennials and racial/ethnic minorities. Further, as they target homeowners they should consider not only low-income families, but homeowners slightly above the middle-income group.

As previously mentioned, researchers have found that when financial education is separated into affective and cognitive financial knowledge, a vigorous insight into financial education and learning can occur (Delgadillo & Lee, 2021). Financial educators can use this information not only to teach financial knowledge and numeracy skills, but also include the attitudes, motivations, values, and biases behind financial behaviors. Financial educators could also help homeowners become aware that their perceived financial knowledge may be overestimated. To overcome perceived financial knowledge overconfidence, financial educators could continue to teach objective financial knowledge and consider what actual financial skills are being gained.
In the conceptual model that guided this study, Huston (2010) explains that financial literacy requires financial knowledge as well as financial application. This study also found the importance of a homeowner’s ability on managing personal finance. It was found that as homeowners had budgeting ability and setting up emergency savings, they were less likely to be delinquent. Thus, financial educators can stress the importance of establishing a budget and use it as a tool to help them spend less than they earn. This budgeting guide in turn will provide the homeowners with the necessary tools to make better financial decisions, track spending, prepare for emergencies, reach their financial goals, and reduce the risk of mortgage delinquency.

Further, since objective financial knowledge was significant and had a negative effect on mortgage delinquency, financial educators can expand their influence and teach these concepts to individuals at an early age through adulthood. As financial professionals understand these core concepts, they will help individuals and homeowners make crucial financial decisions and avoid mortgage delinquency during their lifetime.

**Financial Counselors**

Financial counselors could play an active role in educating homebuyers as they begin the purchasing process. They can provide useful information typically geared toward first time homebuyers, low-income, and minority families. Previous studies indicated that pre-purchase counseling and financial education are impactful in reducing serious delinquencies (Mayer & Temkin, 2016). Although this study found financial education to be positively associated with mortgage delinquency, financial counselors can re-evaluate their programs, reach homeowners who are motivated to learn because of
their current life circumstances, and target homebuyers who are at highest risk of mortgage delinquency.

Housing affordability is an important concept as it relates to financial counselors. Financial counselors often help individuals preparing for homeownership understand what is considered an affordable mortgage payment based on their current income. Typically, an affordable mortgage payment is 30% of the homeowner’s gross monthly income. However, in recent years income is not keeping up with the rapid increase in housing prices across the U.S. (Manturuk et al., 2012; Statista, 2022; U.S. Census, 2020). Bahney (2022) suggested that housing prices are to a point of “exuberance” and out of sync with economic fundamentals. While this scenario is challenging for financial counselors and homebuyers, financial counselors can provide additional resources that may be available to homebuyers such as down payment or closing cost assistance programs. Financial counselors can also continue to educate individuals on the importance of purchasing a home that is sustainable based on their current income.

Mortgage delinquency and foreclosure prevention counselors can use the findings from this study to understand what socio-economic characteristics and other factors influence mortgage delinquency. This is especially important as the global pandemic is winding down. During the height of the pandemic, many homeowners became delinquent on their mortgages and entered government forbearance programs. Many of these homeowners are currently exiting their forbearance plan and are reaching out to financial counselors for help. It is crucial for housing counselors to assist the homeowners in understanding the terms of exiting the forbearance and discuss options to reinstate the mortgage. Further, financial counselors can assist the homeowner in establishing healthy
financial behaviors and provide them with the tools (e.g., budgeting and having an emergency fund) necessary to be prepared for future events that may trigger mortgage delinquency.

Policy Makers

Based on the findings of this study, it can be said that financial education should be supported through government policy and programs. It is noted that some U.S. states have mandated financial education in high school; however, many states do not have this requirement. Only seven states have implemented a half semester course that focuses primarily on personal finance (Reinicke, 2021). It is also reported that 21 states require personal finance education; however, the curriculum can be incorporated into another course (Reinicke, 2021). Current financial education may not have a significant impact on financial knowledge because it is too lengthy, or the education was received years before the behavior it is intended to change (Fernandes, 2014). While many current financial education programs only include cognitive financial knowledge, policy makers should recognize the importance of affective financial knowledge and encourage implementation for more influential financial education (Delgadillo & Lee, 2021). Thus, it should be considered for cognitive and affective financial knowledge to be included in the personal finance curriculum.

Additionally, from a housing policy perspective, policy makers can continue to support ongoing development of loss mitigation and home retention programs. Government agencies such as the Consumer Financial Protection Bureau (CFPB), the Department of Housing and Urban Development (HUD), the Federal Housing Administration (FHA), and the Federal Housing Finance Agency (FHFA) have played a
vital role in developing programs to protect homeowners. For example, policymakers were of great importance during the global pandemic when they created government forbearance programs to provide relief to delinquent homeowners.

**Conclusion**

Homeownership is often referred to as the American dream and offers significant benefits such as financial stability, wealth building, and permanent residence (Goodman & Mayer, 2018). However, some homeowners could experience financial strain from high levels of debt, “trigger” events, or poor financial literacy (Foote et al., 2010; Kim et al., 2020). As a result, financial strain may cause homeowners to become delinquent in their mortgage payments. This study sought to examine: 1) the association between financial literacy and mortgage delinquency, 2) the association between financial education and mortgage delinquency, 3) the effect of personal/other factors on mortgage delinquency, and 4) the effect of socio-economic characteristics on mortgage delinquency. Using data from the 2018 National Financial Capability Study (NFCS), the findings of this study could add to the current literature, provide important insights for financial educators, financial counselors, and policymakers by understanding who is more likely to be delinquent in their mortgage payments.

While homeownership is a valuable asset and important tool for homeowners to build wealth, it is important to understand socio-economic characteristics associated with the likelihood of mortgage delinquency. The current study revealed that millennials, men, married, Black individuals, had some college, were working full- or part-time, reported annual income between $75,000 - $99,999, and reside in the South were more likely to be
delinquent in their mortgage payments. Overall, the findings of this study can be added to the current body of literature regarding factors associated with mortgage delinquency.

Further, the findings of this study suggest that homeowners who were delinquent could be overconfident in their financial knowledge assessment. On the other hand, financial literacy such as budgeting ability and setting up an emergency fund were important skills that could help homeowners pay their mortgage on time. Thus, based on these findings, it can be said that the role of financial literacy in mortgage payment behavior is crucial.
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Appendix A.

Key Variables of Conceptual Framework in Survey Questions from 2018 NFCS

<table>
<thead>
<tr>
<th>Key Variables</th>
<th>Questions</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Literacy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subjective Financial Knowledge</strong></td>
<td>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 (M4)</td>
<td>1 = Very Low</td>
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<td>2</td>
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<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 = Very High</td>
</tr>
<tr>
<td><strong>Objective Financial Knowledge</strong></td>
<td>An index variable is created by summing the correct answers for the six financial literacy questions, including numeracy (M6), inflation (M7), bonds (M8), mortgage (M9), stock diversification (M10), and compound interest (M31).</td>
<td>M6 + M7 + M8 + M9 + M10 + M31</td>
</tr>
<tr>
<td><strong>Numeracy</strong></td>
<td>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? (M6)</td>
<td>1 = More than $102</td>
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<td></td>
<td></td>
<td>2 = Exactly $102</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 = Less than $102</td>
</tr>
<tr>
<td><strong>Inflation</strong></td>
<td>Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? (M7)</td>
<td>1 = More than today</td>
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<tr>
<td></td>
<td></td>
<td>2 = Exactly the same</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 = Less than today</td>
</tr>
<tr>
<td><strong>Bonds</strong></td>
<td>If interest rates rise, what will typically happen to bond prices? (M8)</td>
<td>1 = They will rise</td>
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<tr>
<td></td>
<td></td>
<td>2 = They will fall</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 = They will stay the same</td>
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<tr>
<td></td>
<td></td>
<td>4 = There is no relationship between bond prices and the interest</td>
</tr>
<tr>
<td><strong>Mortgage</strong></td>
<td>A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. (M9)</td>
<td>1 = True</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 = False</td>
</tr>
</tbody>
</table>
| **Investment** | Buying a single company's stock usually provides a safer return than a stock mutual fund. (M10) | 1 = True  
2 = False |
| **Compound Interest rate on loan** | Suppose you owe $1,000 on a loan and the interest rate you are charged is 20% per year compounded annually. If you didn’t pay anything off, at this interest rate, how many years would it take for the amount you owe to double? (M31) | 1 = Less than 2 years  
2 = At least 2 years but less than 5 years  
3 = At least 5 years but less than 10 years  
4 = At least 10 years |
| **Personal Finance Application** |  |
| **Financial Ability** | How strongly do you agree or disagree with the following statements? – I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses (M1_1) | 1 = Strongly Disagree  
2  
3  
4 = Neither Agree nor Disagree  
5  
6  
7 = Strongly Agree |
| **Financial Self-Efficacy** | If you were to set a financial goal for yourself today, how confident are you in your ability to achieve it? (J43) | 1 = Not at all confident,  
2 = Not very confident  
3 = Somewhat confident,  
4 = Very confident |
| **Spending Less** | Over the past year, would you say your [household’s] spending was less than, more than, or about equal to your [household’s] income? (J3) | 1 = Spending less than income  
2 = Spending more than income  
3 = Spending about equal to income |
| **Having Emergency Savings** | Have you set aside emergency or rainy-day funds that would cover your expenses for 3 months, in case of sickness, job loss, economic downturn, or other emergencies? (J5) | 1 = Yes  
2 = No |
| **Financial Education** |  |
| **Financial Education Participation** | Was financial education offered by a school or college you attended, or a workplace where you were employed? (M20) | 1 = Yes, but I did not participate in the financial education  
2 = Yes, and I did participate in the financial education  
3 = No |
## Personal/Other Factors

| **Risk Tolerance Attitudes** | When thinking of your financial investments, how willing are you to take risks? (J2) | 1 = Not at all willing  
10 = Very willing |
|-------------------------------|----------------------------------------------------------------------------------|-------------------------|
| **Credit Record**            | How would you rate your current credit record? (J32)                             | 1 = Very bad  
2= Bad  
3= About average  
4= Good  
5= Very good |
| **Home Equity Borrowing**    | Do you have any home equity loans? (E8)                                         | 1 = Yes  
2 = No |
| **Income Drops**             | In the past 12 months, have you [has your household] experienced a large drop in income which you did not expect? (J10) | 1 = Yes  
2 = No |
| **Financial Stress**         | How strongly do you agree or disagree with the following statements? - Discussing my finances can make my heart race or make me feel stressed (J33_41) | 1 = Strongly Disagree  
2=  
3=  
4= Neither Agree nor Disagree  
5=  
6=  
7= Strongly Agree |

## Socio-Economic Characteristics

<table>
<thead>
<tr>
<th><strong>Age/Generation</strong></th>
<th>What is your age? (2012 codes) (A3A)</th>
<th>Continuous, R’s age ranges 18 - 93</th>
</tr>
</thead>
</table>
| **Gender**         | What is your gender? (A3)            | 1 = Male  
2 = Female |
| **Marital Status** | What is your marital status? (A6)    | 1 = Married  
2 = Single  
3= Separated  
4 = Divorced  
5 = Widowed/widower |
| **Race/Ethnicity** | Which of the following best describes your race or ethnicity? – (A4a) | 1 = White or Caucasian  
2 = Black or African American  
3 = Hispanic or Latino/a  
4 = Asian, Native Hawaiian or other Pacific Islander, |
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<th></th>
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<th>American Indian or Alaska Native, or Other</th>
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| **Formal Education**     | What was the highest level of education that you completed? [2015 codes] (A5_2015)                                                    | 1 = Did not complete high school, High school graduate - regular high school diploma, High school graduate - GED or alternative credential  
2 = Some college, no degree, Associate's degree  
3 = Bachelor's degree  
4 = Post graduate degree                                                                 |
|                          |                                                                                                                                       |                                                                                                          |
| **Employment Status**    | Which of the following best describes your current employment or work status? (A9)                                                   | 1 = Self-employed  
2 = Work full-time for an employer [or the military],  
3 = Work part-time for an employer [or the military]  
4 = Homemaker  
5 = Full-time student  
6 = Permanently sick, disabled, or unable to work  
7 = Unemployed or temporarily laid off  
8 = Retired                                                                 |
|                          |                                                                                                                                       |                                                                                                          |
| **Household Income**     | What is your [household's] approximate annual income, including wages, tips, investment income, public assistance, income from retirement plans, etc.? (A8) | 1 = Less than $15,000, At least $15,000 but less than $25,000  
2 = At least $25,000 but less than $35,000, At least $35,000 but less than $50,000  
3 = At least $50,000 but less than $75,000  
4 = At least $75,000 but less than $100,000  
5 = At least $100,000 but less than $150,000, $150,000 or more                                                                 |
|                          |                                                                                                                                       |                                                                                                          |
| **Region**               | Census Region (4)                                                                                                                     | 1 = Northeast  
2 = Midwest  
3 = South  
4 = West                                                                                                           |
| Financial Behavior                  | How many times have you been late with your mortgage payments in the past 12 months? (E15_2015) | 1 = Never  
2 = Once  
3 = More than once |
<table>
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<tbody>
<tr>
<td>Mortgage Payment Behavior</td>
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