



Factors and patterns in mobile banking and payment services use in the United States

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Abstract

This study seeks to identify factors and patterns affecting mobile banking and payment services use in the US. We used data from the National Financial Capacity Study, a triennial survey assessing the financial capabilities of U.S. adults. The survey was conducted between June and October 2021 using non-probability quota sampling from established online panels that recruit millions of participants for survey research, yielding a sample of over 25,000 respondents. For this study, we analyzed a subset of 20,758 respondents who provided a positive response to the main question of interest on mobile banking and payments. Using quantitative approaches, we first examined associations between financial knowledge, behaviors, and mobile banking and payment services use. Higher objective financial literacy was associated with lower mobile banking use, while subjective financial literacy and positive financial behaviors increased the likelihood of use. We then used latent class analysis to identify three distinct user groups with varying financial behaviors and mobile banking and payment services use patterns. Class 1 represents users with high financial behaviors and low MBPS users (45.4%), class 2 involves users who are low on financial behaviors and moderate MBPS users, and class 3 includes mixed financial behaviors and high MBPS users (19.7%). Our findings contribute to the literature by showing behavioral heterogeneity among mobile banking and payment services users; insights which can help policymakers, financial institutions, and service providers seeking to improve financial services access and promote financial inclusion.

Keywords Financial services · Mobile banking · Mobile payments · Consumer behavior · Financial technology

Introduction

With improved internet infrastructure and advances in cell-phone technology, financial service providers and consumers have increasingly adopted mobile banking and payment services in recent years. According to recent industry reports, approximately \$4.6 billion of transactions happen every day in 2.1 billion registered mobile banking and payment services (MBPS) accounts (Raithatha and Storchi 2025). COVID-19 has further amplified the demands for MBPS due to its ease and contactless interactions with service providers such as banks or point of sale (Sahay et al. 2020).

MBPS refers to a range of financial activities conducted through mobile devices, including mobile banking and mobile payments (Shaikh et al. 2015). While mobile banking enables users to access and execute a wide range of banking transactions (e.g., check deposit, balance inquiry, or fund transfers), mobile payment services include financial transactions such as bill payment or money transfer, without a need for a bank account, their actual use remains

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limited in the US. Only 43% use mobile banking services frequently and merely 11% use it frequently for financial payments in the US (Mitchell et al. 2024). Increasing the uptake of MBPS might help 5.6 million households that are still unbanked (no one in the household have a checking or savings account at a bank or credit union) and another 18.7 million households in the US who remain underbanked, using non-bank products to meet their core financial needs (Federal Deposit and Insurance Corporation 2024) to have access to safe and cost-effective financial services.

Extensive research has explored various factors affecting the adoption of MBPS services (Ahn and Nam 2022). However, the rapidly evolving nature of MBPS warrants ongoing research that can account for understanding new adoption patterns, including behavioral dynamics and financial characteristics that have become increasingly salient in recent years. For example, Addula (2025) shows that among Gen-Z consumers in the US, perceived cost and social influence play a decisive role in adoption, while digital self-efficacy has an unexpected negative relationship suggesting that highly tech-savvy users may be more skeptical in their adoption choices. Similarly, a study by Apau et al. (2025) highlights that models of technology adoption must continually adapt to remain relevant. Additionally, Mitchell et al.'s (2024) study demonstrates that financial characteristics such as income, debt, and financial literacy continue to shape mobile banking and payment use, indicating that both structural and behavioral drivers are at play. Taken together, these recent findings emphasize that understanding the factors affecting the use of MBPS is therefore crucial. Nonetheless, there remains a significant gap in research regarding the relationship between consumers' financial knowledge and behaviors and their use of MBPS (Zhang and Fan 2024). Additionally, little attention has been given to studying heterogeneity in financial knowledge and behaviors among MBPS users (Scheresberg et al. 2020; Zhang and Fan 2024).

While there are several well-established theoretical models on technology adoption, they have often not taken into account the complexities of financial behavior and literacy that influence the use of financial services, particularly MBPS. Therefore, this study is guided by the Financial Capability and Asset Building (FCAB) framework, which integrates both individual and contextual factors. The FCAB framework provides a more comprehensive lens for examining factors affecting MBPS use and adoption. This theoretical orientation informs our study objectives, variables, and analytical approach.

As MBPS tend to be more cost effective, generate valuable analytical insights about consumers' preferences and behaviors, and provide competitive advantages to banking and financial institutions, it is necessary to identify hidden clusters of potential consumers with similar financial attributes and characteristics. Identifying hidden clusters of

consumers has implications for increasing uptake of MBPS. For example, information regarding hidden clusters of consumers can help organizations design cost-effective and targeted promotional interventions for adoption of MBPS to subgroups of consumers with similar characteristics, rather than generic or "one-size-fits-all" consumer education programs.

The present study has two purposes. First is to examine the association between financial literacy, financial behaviors, and MBPS use. Our second purpose is to identify homogeneous subgroups with similar financial behaviors in regard to MBPS use among heterogenous adult populations in the US. Findings of this study are particularly important given the context of the US which is currently characterized by low levels of financial knowledge and behaviors and a large number of unbanked and underbanked population. The findings will offer insights into the factors that can influence uptake of MBPS products and services and have implications particularly for vulnerable population groups who still lack access to basic banking services in the country.

Literature review

MBPS offer advantages to both consumers and service providers. For consumers, the primary appeal lies in the convenience it provides, for example by offering users flexibility to manage their finances and conduct transactions in real time without the need to visit a physical bank branch (Gupta and Raza 2024). They often enable faster processing of action, when checking account balances, paying bills, or connecting to other financial services like insurance services (Komulainen and Saraniemi 2019; Williams 2024). These services also reduce the necessity to carry additional items like credit cards, wallets, or cash. They also enhance security and simplify daily transactions for consumers by consolidating these functions into a single device. These benefits not only save time but also contribute to a seamless and efficient banking and payment experience that aligns with the fast-paced lifestyles of modern consumers (Agárdi and Alt 2024; Chang et al. 2024).

For service providers, MBPS have several advantages as well. First, it can lower operational costs significantly compared to maintaining traditional brick-and-mortar branches, thereby improving cost-efficiency (Agarwal et al. 2025; Dante and Makridis 2021). Second, MBPS provide access to valuable consumer data related to their banking and financial habits. This data allows providers to offer more personalized services and targeted marketing campaigns, enhancing customer satisfaction and loyalty (Vashishth et al. 2024). Additionally, MBPS promotes transparency in financial transactions by providing clear records and real-time updates to users, which fosters trust and confidence in the service



(Shaikh et al. 2024; Sharma and Sharma 2019). Finally, MBPS have demonstrated a potential to reach unbanked and underbanked population groups who live in geographies that lack brick-and-mortar banking and financial infrastructure (Greene et al. 2024).

Conceptual framework

Researchers have extensively explored the adoption of Fintech, such as MBPS, by applying theoretical models like the TAM, the UTAUT, and the diffusion of innovation theory (Shaikh et al. 2022). The TAM and the UTAUT model explain the role of factors influencing users' decisions to use Fintech innovations, emphasizing perceived usefulness, perceived ease of use, trust, personal attitudes, perceived risk, compatibility, and social influence. The diffusion of innovations, on the other hand, provides a framework for understanding how innovations spread within a social system, categorizing individuals into innovators, early adopters, early majority, late majority, and laggards based on their propensity to adopt new technologies.

These theoretical models have been widely applied in recent studies and offer several converging themes: The importance of trust, perceived value, and habit as drivers of sustained engagement in digital financial services (Karlaluoto et al. 2019a, b). However, these theories tend to overlook many other environmental factors, such as agent quality and group-based differences. In recent years, there has been a growing appreciation for examining the role of contextual factors, such as agent characteristics in shaping MBPS use (Shaikh et al. 2023). Previous studies also indicate that there are differences between subgroups regarding usage behavior related to MBPS (Liébana-Cabanillas et al. 2018; Trabelsi-Zoghalmi et al. 2020).

The FCAB framework offers another lens through which to understand the use of MBPS. This framework, which draws on the person-in-environment perspective, emphasizes that financial capability is shaped by both individual factors (such as financial knowledge and behaviors) and broader environmental factors (such as access to financial products and services). The premise of this approach is that financial capability is not just a result of what individuals know and how they act, but also the opportunities available to them in their environment, including socioeconomic status, community resources, and institutional support systems (Sheraden 2010).

At its core, the FCAB approach seeks to improve people's financial well-being by promoting the development of skills and behaviors that enable individuals to better manage their financial resources, plan for the future, and accumulate assets. This approach extends beyond financial literacy, which focuses on knowledge, to include behaviors such as saving, budgeting, and investing, as well as attitudes toward

risk and long-term financial planning. It also highlights the role of external factors, such as access to affordable financial services and products, in shaping financial outcomes.

Financial literacy has been shown to play a key role in promoting the effective use of financial products and services, including emerging tools like mobile banking and other financial technologies (Prete, 2022). In a world increasingly dominated by digital financial services, financial literacy is crucial not just for understanding how to use mobile banking tools, but also for making informed decisions about budgeting, saving, borrowing, and investing in a digital environment. As mobile banking continues to transform the financial landscape, it is clear that financial knowledge and skills are foundational to enabling people to engage with Fintech innovations effectively (Shaikh et al. 2023).

Guided by the FCAB framework, the current study aims to bridge gaps in existing theoretical models such as the TAM, UTAUT, and Diffusion of Innovations. The study aims to contribute to a deeper understanding of how financial capabilities intersect with Fintech adoption. This research could help shape more effective interventions and policies that enhance the uptake of mobile banking and other digital financial tools.

Financial literacy and MBPS use

Financial literacy refers to the knowledge and understanding of financial concepts and principles, as well as the confidence necessary to make informed and effective money management decisions (Remund 2010). It is comprised of two components: (a) Objective financial literacy, defined as the knowledge and understanding of basic financial concepts and principles (Xiao et al. 2015), and (b) Subjective financial literacy, which refers to individuals' self-assessment of their own financial knowledge and confidence in managing their finances (Xiao et al. 2015). Unlike objective financial literacy, which measures actual knowledge and understanding of financial concepts, subjective financial literacy reflects individuals' perceptions about their financial competence.

Research indicates that both objective and subjective financial literacy are associated with the use of financial products and services, including MBPS use. Individuals with higher levels of financial literacy are better at navigating the complexities of financial decision-making (Lusardi 2019) and use of a wider range of financial products and services such as savings accounts, investments, insurance, and a range of Fintech products (Sinha et al. 2018).

The current evidence of MBPS use among those with high objective financial literacy is mixed. Studies by Morgan and Trinh (2020), Yoshino et al. (2020), Jünger and Mietzner (2020), and Onay et al. (2023) suggested that higher financial literacy was associated with greater use of fintech products, including MBPS. In contrast, research by Scheresberg



et al. (2020), Li et al. (2020), and Chen and Xiang (2021) indicated a negative association between objective financial literacy and MBPS use.

However, there is consistent evidence that individuals with higher subjective perceptions of financial literacy are more likely to use MBPS, even if their actual knowledge level is not high. For instance, in their study of US consumers, Li et al. (2020) found that subjective financial literacy was positively associated with mobile payment use. In yet another study, Fan (2021) examined the relationship between subjective financial literacy and the adoption of mobile investment technologies. Fan found that subjective literacy was significantly positively related to a reliance on mobile apps for making investment decisions.

Based on the above discussions, we propose the following two hypotheses: (1) Higher levels of objective financial literacy are positively associated with MBPS use (H1). (2) Higher levels of subjective financial literacy are positively associated with MBPS use (H2).

Financial behaviors and MBPS use

Financial behaviors refer to a range of actions and decisions and include spending, budgeting, borrowing, and savings habits of individuals while managing their finances. Beyond financial literacy, a limited number of studies have explored how these financial behaviors relate to the use of MBPS (Ahn and Nam 2022). Some studies have indicated negative association between financial behaviors and MBPS use. For example, Garrett et al. (2014) found that MBPS users often struggle with managing their finances, exhibit poor credit card behaviors, engage in impulse spending, and have high-cost debt (e.g., using alternative financial service providers for payday loans or auto-title loans). Similarly, Ahn and

Nam (2022) found that mobile payment use was positively associated with three primary overspending behaviors—overconsumption (e.g., spending more than their annual income), money management (e.g., difficulty paying bills), and credit card behaviors (e.g., paying late fees, over the limits, or minimum payments). Scheresberg et al. (2020) suggested that millennials aged 18–34 who used mobile payments had a higher likelihood of financial difficulties (e.g., overdrawing their checking accounts, paying fees on their credit cards, and turning to alternative financial services).

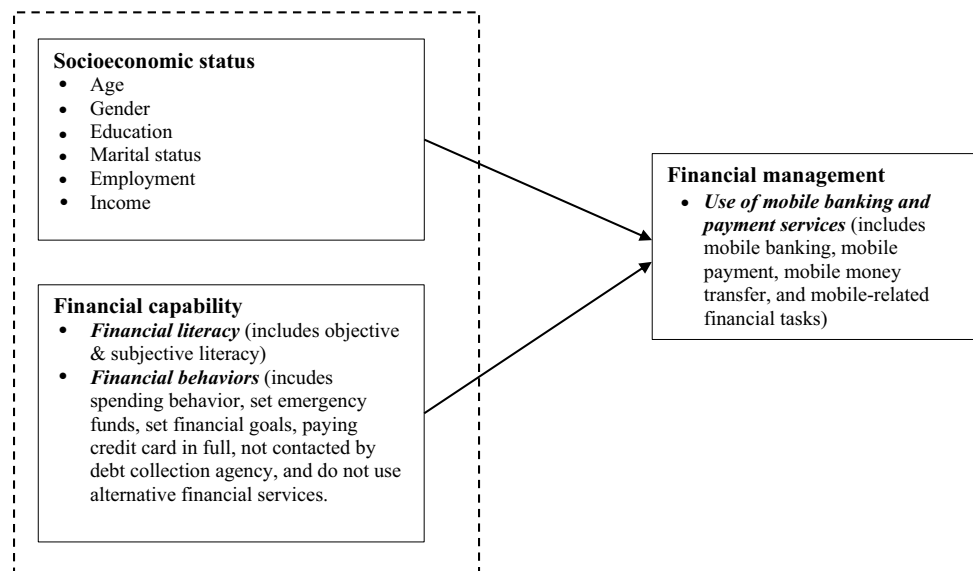
However, findings from Yeo and Fisher (2017) and Seldal and Nyhus (2022) highlight the inconclusive state of the current literature. While Yeo and Fisher’s study showed a positive association between financial behaviors and mobile banking, Sledal and Nyhus’ study found no relationship between mobile payments and problematic financial behaviors. These different findings thus warrant further research to clarify how distinct financial behaviors associate with use of MBPS. Therefore, the following hypothesis is proposed: financial behaviors are positively associated with MBPS use (H3). Figure 1 represents our conceptual framework for this study.

Additionally, based on the preceding discussions about financial literacy, financial behaviors, and MBPS use, we hypothesize that distinct patterns among MBPS users will emerge, based on varying levels of their financial literacy (objective and subjective) and financial behaviors (H4).

Methodology

We used the latest set of data available from the National Financial Capacity Study (NFCS), commissioned by the Financial Industry Regulatory Authority Investor Education

Fig. 1 Conceptual framework



Foundation triennially since 2009. The NFCS data are publicly available at the following link: <https://finrafoundation.org/about-national-financial-capability-study>. The survey was conducted between June and October 2021 using non-probability quota sampling from established online panels that recruit millions of survey research participants. The study design implemented quota controls based on U.S. Census benchmarks for age, gender, ethnicity, education, and income within each state, helping to approximate national representativeness. More details about the methodology is available here: <https://finrafoundation.org/sites/finrafoundation/files/NFCS-2021-State-by-State-Methodology.pdf>.

The NFCS 2021 survey fitted our study well because of the following two reasons. First, the current NFCS dataset had four questions relating to mobile banking and mobile payment services. Second, NFCS also had questions on financial literacy and financial behaviors of respondents. The NFCS dataset had 25,370 respondents, and we chose only those cases who responded to the main question of our interest: mobile banking with text messaging, mobile app, or internet browser or email on a mobile phone. Missing cases in this variable ($n = 1748$, 6.45%) were dropped from further analysis as they were a result of response to a previous question if respondents had a checking account (1 = have checking accounts).

Since our main interest was in understanding MBPS usage, we combined four items relating to mobile banking, mobile payment, mobile money transfer, and other mobile-related financial tasks. Prior to combining these items, “frequently” and “sometimes” responses were coded as “1” and rest were coded as “0.” After summing up, we created a new variable (dependent variable) with five ordered levels: “Do not use MBPS,” “Use at least 1 MBPS,” “Use at least 2 MBPS,” “Use at least 3 MBPS,” “Use all 4 MBPS.”

Following previous studies in the domain, we used an objective measure of financial literacy by combining six items that tested financial concepts, including interest, compounding, inflation, bond prices, mortgage, and stock. These six financial literacy items were recoded into binary variables 1 = correct, 0 = otherwise and then summed up from 0 to 6. We also used subjective financial literacy, which was a self-rating of financial knowledge on a scale of 1 (very low) to 7 (very high). We also created a new variable, financial behavior (from 0 to 6), which was a sum of spending behavior, setting aside emergency funds, setting financial goals, paying credit card debt in full, call from a debt collection agency, and use of alternative financial services.

The key control variables used in the study were: age, gender, education (recoded into three categories—less than high school, high school but less than bachelor, and bachelor or above), marital status, employment, and income. To test the associations (H1 to H3), both bivariate and multivariate analyses were conducted. Significant bivariate

results between financial literacy and MBPS warranted further analyses. As the dependent variable (MBPS) had five ordered levels, an ordinal logistic regression was performed by adding objective financial literacy, subjective financial literacy, financial behaviors as key independent variables, controlling for demographic variables.

To explore configurations of financial characteristics of MBPS users (H4), we employed a person-oriented approach—latent class analysis (LCA) on key variables and demographic covariates such as gender, age, race, education, income, marital status, and employment status. LCA is a statistical method used to identify unobserved, or latent, subgroups within a population based on patterns of categorical variables. It assumes that observed categorical responses arise from an underlying categorical latent variable that divides the population into distinct classes. LCA estimates the probability of membership in each latent class for each individual based on their observed responses, aiming to maximize the homogeneity within classes and heterogeneity between classes. This method allows to find typologies or subcategories of complex patterns that may not be evident using traditional statistical approaches (Sinha et al. 2024; Sun and Sinha, 2025). All the analyses were performed using R version 4.2.1.

Analysis and findings

Table 1 presents the demographic characteristics of the study sample with females comprising the majority (52.1%). The largest group was aged 55 and above (42.6%), followed by those aged 35–44 (16.2%), and 45–54 (16.7%). Approximately a quarter of the sample identified as non-White (24.5%). 42.4% of participants had a bachelor’s degree or higher, while 36.3% had education beyond high school but below a bachelor’s degree, and 21.3% had a high school diploma or less. Over half of the sample reported being married (55.4%) and were employed (58.6%). A large majority of respondents earned \$75,000 or more annually (40.5%), followed by those earning between \$25,000–\$50,000 (24.0%), and less than \$25,000 (14.8%). The mean subjective financial literacy score of the sample was 5.20 (SD = 1.30), mean objective financial literacy score was 3.24 (SD = 1.66), and mean score for financial behavior was 4.38 (SD = 1.56). About a fifth (19.6%) of respondents did not use any MBPS.

Findings of ordinal logistic regression (Table 2) suggested that a one-point increase in objective financial literacy decreased the odds of using all MBPS by 7.5%. A unit increase in financial behavior decreased the odds of using all MBPS by 23%. For every unit increase in subjective financial literacy, the odds of using all MBPS increased by 25%. Demographic differences showed that for females, the odds of using all MBPS is 17% lower than males. For non-whites,



Table 1 Sample characteristics

Sample characteristics	<i>M</i> (SD) or <i>n</i> (%) <i>N</i> = 20,738
Female (%)	10,811 (52.1)
Age (%)	
18–24 year	1801 (8.7)
25–34 year	3289 (15.9)
35–44 year	3356 (16.2)
45–54 year	3467 (16.7)
55+ years	8825 (42.6)
Non-White (%)	5082 (24.5)
Education (%)	
High school or less	4417 (21.3)
More than high school but less than bachelor's degree	7528 (36.3)
Bachelor's degree and above	8793 (42.4)
Married (%)	11,483 (55.4)
Income (%)	
Less than \$25,000	3062 (14.8)
At least \$25,000 but less than \$50,000	4969 (24.0)
At least \$50,000 but less than \$75,000	4312 (20.8)
\$75,000 or more	8395 (40.5)
Employed (%)	12,159 (58.6)
Subjective financial literacy	5.20 (1.30)
Objective financial literacy	3.24 (1.66)
Financial behavior	4.38 (1.56)
Mobile banking and payment services use	
Do not use mobile banking and payment services	4073 (19.6)
Use at least 1 mobile banking and payment services	3618 (17.4)
Use at least 2 mobile banking and payment services	3988 (19.2)
Use at least 3 mobile banking and payment services	4431 (21.4)
Use all 4 mobile banking and payment services	4628 (22.3)

the odds of using all MBPS were 55% more than those of whites. For respondents with a bachelor's degree and above, the odds of using all MBPS were 10% more than those who have high school or less education. High income increased the odds of using all MBPS by 21% (for \$50,000–75,000) to 50% (for \$75,000 or more) than those who earn less than \$25,000 annually. The odds of using all MBPS increases by 60% for people who were employed than those who were not.

Results of LCA suggested a 3-class solution (Table 3) that captured heterogeneity in the data (see Fig. 2). The classes were labelled as follows: (a) Class 1: high financial behaviors and low MBPS users (45.4%)—those who had high scores on financial behaviors but belonged to the lowest MBPS user group, (b) Class 2: low on financial behaviors and moderate MBPS users (34.91%) – involves users who

Table 2 Ordinal logistic regression results

DV: mobile banking and payment services	Odds ratio (SE)
Gender (ref: male)	
Female	0.830*** (0.03)
Age (ref: 18–24 year)	
25–34 year	0.902* (0.06)
35–44 year	0.567*** (0.06)
45–54 year	0.265*** (0.06)
55+ year old	0.093*** (0.05)
Race: Non-White (ref: White)	1.552*** (0.03)
Education	
More than high school but less than bachelor's degree	1.061* (0.04)
Bachelor's degree and above	1.100** (0.04)
Marital status: married (ref: not married)	1.059* (0.03)
Income (ref: less than \$25,000)	
More than \$25,000 but less than \$50,000	1.03 (0.04)
More than \$50,000 but less than \$75,000	1.207*** (0.05)
\$75,000 or more	1.587*** (0.05)
Employed (ref: not employed)	1.616*** (0.03)
Objective financial literacy	0.925*** (0.01)
Subjective financial literacy	1.255*** (0.01)
Financial behaviors	0.766*** (0.01)

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

scored the lowest on financial behaviors and were moderately high users of MBPS, and (c) Class 3: mixed financial behaviors and high MBPS users (19.7%)—scored the lowest on objective financial literacy, had high subjective financial literacy scores, and were among the high users of alternative financial services.

Different demographic patterns were also observed in the 3-class solution. Females were more likely to be in class 2 and less likely to be in class 3, compared to class 1. Respondents who were young adults (18–34-year-old), non-White, or employed were more likely to be in classes 2 and 3, compared to class 1. In contrast, respondents with a bachelor's degree and above or in high income groups were less likely to be in classes 2 and 3, compared to class 1. Married

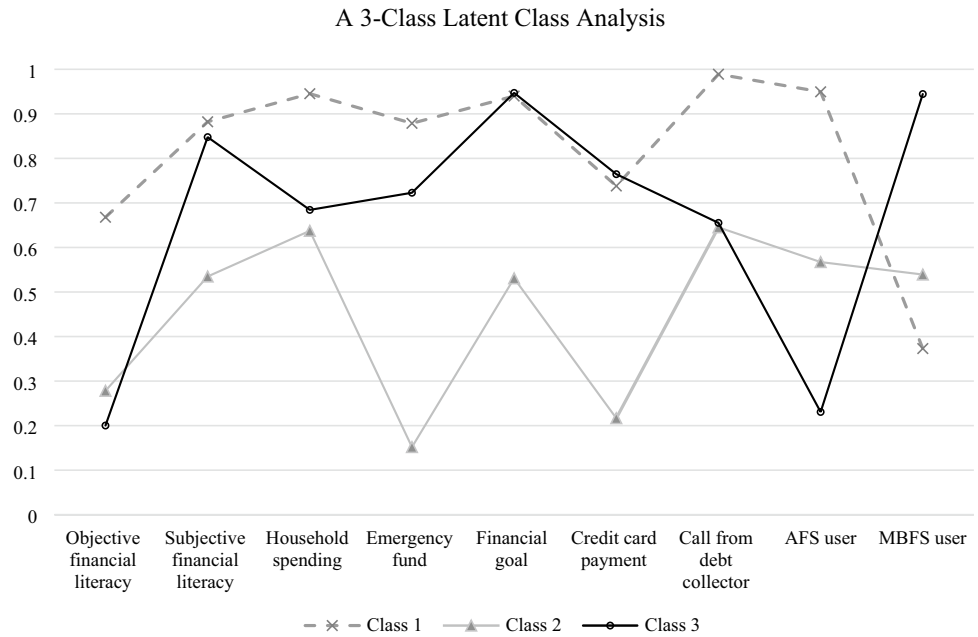


Table 3 Model-fit indices

No. of classes	- 2LL	resid.df	AIC	BIC	Likelihood-ratio	Entropy
2	- 83,518.02	485	167,088.00	167,288.80	6268.59	0.71
3	- 80,733.65	468	<i>161,553.30</i>	<i>161,885.30</i>	<i>2682.01</i>	<i>0.73</i>
4	- 80,045.32	451	160,210.60	160,673.90	1843.54	0.66
5	- 87,892.39	434	175,938.80	176,533.30	12,283.71	0.97

- 2LL negative 2 log likelihood, resid.df number of residual degrees of freedom, AIC Akaike Information Criteria, BIC Bayesian Information Criteria. The best fitting indices are italicized

Fig. 2 Financial characteristics and behaviors of mobile banking and payment services users in the United States



respondents are less likely to be in class 2 and more likely to be in class 3, both classes compared to class 1 (Table 4).

Discussions

This study had two primary objectives: (1) to examine the associations between financial literacy, financial behaviors, and MBPS use in the U.S., and (2) to identify patterns in financial knowledge and behaviors among MBPS users. The regression results contradict our hypotheses, except H2. Specifically, the results show that increases in objective financial literacy (H1) and financial behavior (H3) are associated with lower use of MBPS use, while higher subjective financial literacy is associated with greater use of MBPS (H2). With the rapid innovation in technology, lower transaction costs, and enhanced security features, these findings have real-world implications as financial services providers continue to expand their services to mobile platforms.

The finding that objective financial literacy is negatively associated with MBPS use is surprising. One possible

Table 4 Demographics comparisons

Demographic indicators	Coefficient (SE)	
	Class 2 versus Class 1	Class 3 versus Class 1
Female	0.60*** (0.05)	- 0.51*** (0.07)
Young 18-35 year	0.70*** (0.06)	2.28*** (0.07)
Non-White	0.15*** (0.06)	0.96*** (0.07)
Bachelors degree and above	- 1.10*** (0.05)	- 0.48*** (0.07)
Married	- 0.44*** (0.05)	0.28*** (0.07)
High income	- 1.31*** (0.06)	- 0.25*** (0.07)
Employed	0.36*** (0.05)	1.43*** (0.09)

***p < 0.01



explanation is that individuals with higher financial knowledge may be more cautious about adopting mobile payment tools due to concerns about data privacy, security, or trust in digital platforms, which are issues frequently cited in fintech adoption research (e.g., Zhang and Fan 2024). Additionally, these individuals may prefer traditional financial channels, perceiving them as more reliable or better aligned with their financial goals. This is consistent with prior studies suggesting that higher financial capability does not always translate to greater fintech adoption, particularly when perceived risks are high.

In contrast, subjective financial literacy (that is how confident individuals feel about managing their finances) was positively associated with MBPS use. This finding supports the idea that confidence, rather than actual knowledge, may drive the willingness to adopt new technologies. Users who perceive themselves as financially savvy may be more open to experimenting with digital tools, even if their objective knowledge is moderate or limited. This aligns with consumer behavior models and TAM, which emphasize perceived ease of use and self-efficacy as key drivers of adoption (Venkatesh and Bala 2008).

Further, the LCA showed three distinct patterns among MBPS users (H4). First, low MBPS users comprising individuals with high financial literacy and positive financial behaviors but engaging minimally with MBPS; possibly a group that manages finances well through traditional means. Second, moderate MBPS users with high scores on financial literacy and positive financial behaviors but use MBPS moderately; potentially comprising individuals who rely on mobile services but lack underlying financial discipline. Finally, high MBPS users representing mixed financial behavior, high subjective but low objective literacy, and high MBPS use, suggesting a pattern of overconfidence coupled with active digital engagement.

These findings contribute to theoretical discussions in several ways. First, they complicate FCAB framework, the key theoretical lens of this study, by suggesting that higher objective financial literacy does not necessarily predict greater engagement with digital financial tools. This indicates that financial capability cannot be fully understood through objective measures alone. Additionally, the positive associations between subjective financial literacy and MBPS use aligns with consumer technology adoption theories, particularly those which emphasize perceived competence and self-efficacy as central drivers of technology use (e.g., Bandura 1997; Venkatesh and Davis 2000). This contrast between objective and subjective financial literacy highlights the importance of assessing both constructs independently and recognizing their distinct roles in shaping consumer financial behaviors. Third, the distinct user patterns with varying levels of financial literacy and behaviors support segmentation models in digital consumer research. Our finding

aligns with existing calls to move beyond “one-size-fits-all” models in financial technology adoption studies (Lichy et al. 2014). Finally, our findings expand fintech adoption theory by highlighting a divergence between behaviorally competent users and those who are digitally engaged but potentially overconfident. In fact, the findings challenge the assumption that financial knowledge universally encourages MBPS use (Jünger and Mietzner 2020; Yoshino et al. 2020). Instead, they suggest that subjective financial literacy or confidence may be a stronger motivator than only objective literacy—an issue that warrants further exploration by future researchers.

Implications

Our findings have implications for financial service providers and policymakers. First, the negative associations between objective financial literacy, financial behaviors, and MBPS use suggest that there is a need to create awareness and educate consumers on the benefits and safety features of mobile banking, such as two-factor authentication, encryption, and secure transaction processes. Second, financial service providers should accordingly adopt a more holistic approach to customer engagement that accounts for group-based heterogeneity in financial behaviors. The three distinct patterns identified among MBPS users suggest the need for tailored marketing interventions for each user segment. While awareness campaigns highlighting the advantages of MBPS, such as convenience and lower transaction costs, could convert low MBPS users into active users, high MBPS users may benefit more from solutions that enhance credit scores and improved access to formal banking services. Moderate MBPS users could benefit from a combination of tailored digital financial education programs with a focus on strengthening financial skills (e.g., budgeting, saving, and investing) and promoting positive money management habits.

Our findings further suggest that MBPS use cannot be fully understood only with technology adoption. Digital literacy, trust in technology (Sholevar and Bachmann 2025), and the broader financial environment (also specified in FCAB framework) are equally important factors that influence adoption. Policymakers can support these efforts by advocating for stronger consumer protection laws around digital financial transactions and ensuring that underserved populations have equitable access to mobile banking platforms. Regulatory bodies could work to establish clear guidelines for security and privacy standards in the fintech space to build consumer trust. Additionally, financial inclusion policies that promote access to traditional financial services for individuals who rely heavily on alternative financial systems would help ensure that mobile banking and other digital financial tools are accessible and beneficial for all.



Conclusion

MBPS offer services in a more convenient and consumer-friendly way that can attract individuals who choose to opt out of traditional/formal banking systems because of various reasons, including inconvenient hours of operations, lack of trust/privacy, distance, or cost. Using a nationally representative dataset, we show low uptake of MBPS among users with better financial knowledge and behaviors, and moderate to high MBPS use among users who score low on financial literacy and financial behaviors indicators. Digital financial awareness might increase the uptake of MBPS. However, rather than using a “cookie-cutter” or “one-size-fits-all” approach to enhancing MBPS use, our study suggests that banks, financial institutions, companies, and practitioners can explore designing solutions based on varying patterns of financial behaviors among MBPS users.

Despite these insights, our study has limitations. First, the study is based on U.S. data, limiting generalizability to other countries with different levels of digital infrastructure, financial regulation, and consumer trust in mobile platforms. Currently, many emerging markets around the world have created strong MBFS networks. Future researchers can compare the international differences in MBPS use, especially in emerging markets where MBPS may play a more critical role in financial inclusion. Second, the dataset was drawn from a national survey that employed non-probability quota sampling. Although quota sampling was used to approximate national population distributions across key demographics, the lack of random selection means the findings may not be fully generalizable to the broader population. For example, online panel members tend to differ from the general public in their patterns of internet use and/or their willingness to participate in surveys. This affects the reliability of our findings, as responses may not reflect those of individuals outside such panels, and it limits the generalizability of our conclusions. Therefore, our results should be interpreted with caution, and future research could replicate this study with latest data and further validate the findings using probability samples when available. Finally, the cross sectional design of this study limits causal interpretation. Longitudinal or experimental research could explore whether increases in financial literacy and behaviors lead to changes in MBPS use over time. Future work could also investigate the mediating roles of psychological factors, such as digital trust, risk tolerance, or technological anxiety, on the relationships between financial literacy and mobile service use.

Authors' contribution GS designed the study and was responsible for its overall completion. RM assisted with data analysis, interpretation,

writing of research. AK and KV contributed to writing and reviewing the manuscript.

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Data availability statement The datasets analyzed in the current study are publicly available at the following link: <https://finrafoundation.org/knowledge-we-gain-share/nfcs/about-nfcs>.

Declarations

Ethics approval This study was considered exempt by the Institutional Review Board of the University of Georgia.

Consent for publication All authors revised the manuscript and agreed with its submission.

Competing interests The authors declare no conflicts of interest related to this study.

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