Financial characteristics of mobile banking and payment users in the United States

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Abstract

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Keywords

Revisions

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Financial Characteristics of Mobile Banking and Payment Users in the United States

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Abstract

This study aims to examine the personal finance characteristics of mobile banking and mobile payment users in the United States. To achieve this goal, we used the 2018 National Financial Capability Study, which surveyed over 27,000 American adults regarding their personal financial standing and behaviors. By using ordinary least squares models, our results indicated that the use of mobile banking and mobile payment technology was associated with lower age, Non-White Ethnicity, higher income, higher debt load, debt types (auto, student, credit card, and predatory), and spending more than one's income. These results reveal that the higher one's income, financial liabilities, and spending are, the more they may value the convenience of mobile banking and payments.

Keywords: mobile payments, mobile commerce, technology adoption, financial behavior, financial technology

Introduction

Mobile payments –or m-payments, are payments made with a mobile device or smartphone and wireless communication technologies such as mobile networks and near-field technologies (Dahlberg et al., 2008). Mobile payment services began in 1997 initially by Nokia (Leavitt, 2010). Over 2 billion individuals used mobile payments in 2021 (Curry, 2023) and it was forecasted that there will be 4.4 billion mobile payment users by 2025 worldwide (Sat & Maynard, 2022). The primary user clusters are in Asia-Pacific countries, mainly in China, followed by some European countries, such as Denmark and Sweden.

More than 90% of the population in China's largest cities, such as Beijing and Shanghai, use WeChat Pay or Alipay as their main payment method (de Best, 2023). According to the data representing the fourth quarter of 2019, on a monthly basis, 800 million users used WeChat Pay with 1 billion WeChat Pay commercial transactions per day (Tencent, 2020). The Payment & Clearing Association of China launched an act to spur people to use mobile payments to reduce the infection risk after the outbreak of the COVID-19 pandemic in Mainland China (Daxue

Consulting, 2022). This resulted in a further promotion of mobile payments during the pandemic (Liu et al., 2020; Sleiman et al., 2023).

Compared to Mainland China and some other countries, the consumer adoption of mobile payments in the U.S. has been slower (Garrett et al., 2014; Han & Wang, 2021), but the transaction volume has recently surged (Rooney, 2019). The U.S. mobile payments market increased 41% from $69.8 billion in 2018 to $98.8 billion in 2019, and it was predicted that mobile payments would escalate to $130.3 billion in 2020. The country ranked sixth in the world in the mobile payment market (Wurmser, 2019). According to the Bain New Retail Banking NPS Survey of 2018, 80% of the population in the U.S. used credit cards as the main payment form. The top nonbank payment platform was PayPal which accounted for 40% of the payments, but it was mainly used for online payments. Apple Pay accounted for just 9% of the payments (du Toit et al., 2018).

Parallel to the development of mobile payments, mobile banking is also an emerging industry. Mobile banking allows customers to conduct financial transactions remotely with a bank or other financial institution using a mobile device (Shaikh & Karjaluoto, 2015). Due to its convenience and efficiency for financial transactions, the growth of mobile banking users in the U.S. is considerable. More than 50% of credit unions surveyed observed an annual increase in mobile wallet adoption (56%) and transactions (53%) (Pew, 2019). According to Insider Intelligence's Mobile Banking Competitive Edge Study, 89% of respondents reported they were mobile banking users and 97% of Millennials used mobile banking (Yuen, 2022). Compared to mobile payments users, mobile banking was more multi-generationally inclusive: 91% of Gen Xers and 79% of baby boomers reported that they recognized the advantages of mobile banking (Yuen, 2022).

The present study seeks to build upon the existing literature and describe the current environment of mobile banking and mobile payment usage with the financial and socioeconomic characteristics of users of these mobile technologies. This will expand on prior work by including personal finance behaviors such as debt loads, employment status, and spending relative to saving to estimate mobile payment and banking use. With this new information, the industry may be able to tailor products and services to better suit the needs of users, and policymakers may gain a better understanding of personal characteristics and incentives associated with mobile banking use.

Literature Review

Mobile payment and banking opportunities are vast. Mobile payments can occur at traditional point-of-sale systems, vending machines, parking meters, and other equipped vending devices (Zmijewska & Lawrence, 2005). Smartphone users can also use applications such as Venmo and WeChat Pay on their phones to make payments to others or split a restaurant bill (Acker & Murthy, 2018). By using mobile payments, consumers benefit from paying the exact amount without having to retrieve cash from an ATM (Lei et al., 2022; Mallat, 2007).

Vendors also benefit from less transaction *friction,* which can lead to improved revenues (Khan & Ali, 2018). In 2019, 57 million Americans were mobile banking users, and more than 75% of Americans used a mobile device to check their account balance. Over the past 10 years, mobile payments and mobile banking have been growing dramatically across the world, thereby triggering a realignment in the financial service eco-system and spurring a major shift in user spending

patterns and payment habits. This is what Nishimura (2020) referred to as an internet-based *new economy*.

Factors for Mobile Banking/Payments Adoption

Choi et al. (2020) reported the most important factor that affects consumers' decision on mobile payment usage was having a safety-assurance policy. Compared to mobile payments adoption research, mobile banking adoption literature was relatively fragmented. Compatibility (with lifestyle and device), perceived usefulness, attitude toward risk/trust, and social influence were the common drivers for the mobile banking adoption (Mamun et al., 2023; Shaikh et al., 2023; Shaikh & Karjaluoto, 2015; Shaikh & Wang, 2020). The factors that influence the adoption of mobile financial services were categorized by Gupta and Dhingra (2022) into six types: cognitive, affective, social-based, trust-based, barrier-based, and consumer-based. A meta-analysis by Dahlberg et al. (2015, p. 265) found that security and trust "are important pre-requisites for the adoption and use of mobile payments." The notion of trust in a mobile payment system has been tied to the vulnerability of the wireless transaction - to "information interception" or hacking as well as protection from privacy intrusions related to the real-time location-based information on the mobile device (Yang, 2016, p. 48). A study conducted by Dahlberg et al. (2015) also cited the following factors which influence mobile payment adoption: perceived ease of use, perceived usefulness, risk, and demographics.

Hassan and Wood (2020) examined the effect of cultural differences on consumers' perceptions toward mobile banking through the comparison between Egypt and the U.S. They reported that the country's culture can influence consumers' perceptions and intentions for mobile banking adoption. Specifically, people in a culture of uncertainty avoidance were more likely to circumvent innovation and have less desire to use mobile banking. However, Hassan and Wood (2020) also have found that perceived risk has no significant effect on mobile banking adoption.

The Growth of Mobile Banking/Payments in the U.S.

Although there are multiple mobile payment providers in the U.S., such as Apply Pay, Google Pay, Venmo, and Zelle; very little research exists regarding its adoption in the U.S. Experts predict that mobile payments would not cause a major payment method shift in the U.S., despite an expected increase in transaction volume (Rooney, 2019). A national survey in the U.S. indicated that 88% of Americans, who had conducted a financial transaction, were able to make a mobile payment with their smartphone in 2018 (Pew, 2019). Ninety-five percent of respondents reported that they used at least one traditional payment card in 2018, while 56% of respondents reported that they used a mobile payment method. Seemingly, for most mobile payment users, mobile payments play a role as a supplement instead of replacing traditional payment methods. In other words, currently, American consumers still prefer traditional payment methods rather than mobile.

Because mobile payments supplement other means of payment from a consumer's wallet, the use of mobile payments does not necessarily align with traditional information systems adoption models that presume a new technology replaces an existing one (Mallat, 2007). The same cannot be said for innovation diffusion models, which depict how the adoption or use of an innovation spreads through the population. One study suggests that the limited adoption of mobile payments may be due to the competition presented by traditional payment methods, such as cash and cards

(Federal Reserve Board, 2016). In fact, 65% of the consumers polled in the study did not see a benefit to using mobile payments relative to other means of payment. For example, about three-quarters of U.S. adults have at least one rewards credit card (Rossman, 2018) and 68% of Millennials report that they prefer using a rewards credit card (Leonhardt, 2019). During the COVID-19 pandemic, 66% of Americans regard reward balances as a way to buy routine things, and 27% of credit card holders put in effort on collecting all possible rewards (Hunter, 2020). Therefore, it may be difficult to make Americans give up the benefits of a rewards credit card. Mobile payment platforms thus may need to find more powerful reward mechanisms to change the motivation of U.S. payers not using mobile payment.

Mobile payments are not without potential technical and security issues. Two percent of mobile payment users reported that they experienced payment issues, including overpayment, disputes with a merchant, and fraudulent transactions. However, this percentage was much lower than the traditional payment users (13%). Moreover, mobile payment users reported that mobile payment issues were difficult to resolve, compared to traditional payments (Pew, 2019).

Some Americans avoid mobile payments due to security concerns. Simon-Kucher & Partners reported that 40% of U.S. consumers were nonusers of mobile payments due to security concerns (Ke et al., 2019). About 30% of respondents reported they do not like to use mobile payments in situations with uncertain security protections (Pew, 2019). Trust is one of the determinates for stimulating transactions over the internet, especially at this early stage of commercial development (Quelch & Klein, 1996). Further, mobile payment nonusers reported that they were not confident in using mobile payments because they were not tech savvy (22.9%), they feared the risk of losing their phone (17.7%), the risk of forgetting passwords (10.7%), the risk of making mistakes (9.1%), and the frustration of setting up new payment features (9.3%). Additionally, many mobile payment users prefer using mobile payment apps offered by their primary bank (Ke et al., 2019). Koenig-Lewis et al. (2015) noted that the disconnect between devices and customers' perception/comprehension of services may lead to slow adoptions in Western countries. The use of mobile payments by consumers requires that businesses make use of the technology and accept consumers' desired payment methods and that vendors have the appropriate hardware to adopt it. Taking this into account, Zmijewska and Lawrence (2005) proposed a cohesive framework that accounts for mobile payment infrastructure while considering the technology acceptance of mobile payments. Availability of mobile payment point-of-sale systems is increasing with only 22% of mobile phone users citing "the places I shop don't accept mobile payments" (Federal Reserve Board, 2016, p. 18). As a healthy mobile payment infrastructure forms, consumers can more extensively use mobile devices for payment.

The Characteristics of Mobile Banking/Payments Users

Tavera-Mesias et al. (2022) have suggested that we should take personal characteristics into consideration when studying mobile banking/payment adoption. Yang et al. (2012) and Srivastava and Singh (2023) highlighted the effect of an individual's behavioral beliefs, social influences, and personal traits on mobile payment adoption and use. Each generation exhibits unique preferences when it comes to mobile payment and banking. Notably, younger individuals tend to gravitate toward digital technologies, given their adaptability and openness to new skill sets (Keenan, 2020). Data from the Mercator Advisory Group's Customer Monitor Survey in 2018 have shown that nearly 100% of Millennials in the US have smartphones and 70% of them use mobile payment

(Augustine, 2019). Li et al. (2020) further found that 24% of respondents used mobile payments and people under 25 were 11 times more likely users than those who were older than 65. NerdWallet also found that Millennials are the main proportion of mobile users in a survey with over 2,000 U.S. adults (El Issa, 2020). Specifically, ninety-four percent of Millennials use mobile payment apps, compared to 87% of Gen Zers, 88% of Gen Xers, and 65% of baby boomers. Business Insider Intelligence expected that 59% of consumers will be digital natives in the U.S. market by 2026; and that Millennials and Gen Z will account for half of the market (Kohan, 2020). Furthermore, de Bassa Scheresberg et al. (2020) have found that Millennial mobile payment users often were male, employed, had higher levels of education, and had higher incomes than nonusers. They were also more often of minority ethnicity. Lastly, Millennial users were inclined to use various financial products and were more likely to hold *nearly every form of debt* such as auto loans, student loans, and home equity loans.

According to the American Psychological Association (2018), 80% of Gen Z consumers aged 18-20 reported that they have experienced financial stress, and over 30% of Gen Z consumers reported that personal debt is the major source of stress. A survey conducted by Experian shows a) most Gen Z consumers do not have a credit card; and b) about 50% of Gen Z consumers have a personal interest in and eagerness to handle their personal finances (Stolba, 2019). Thirty-five percent of American mobile payment users used mobile payment to pay for purchases, 43% to pay friends and family members, and 40% to pay bills. In addition, more than two-thirds of American mobile payment users claimed they have maintained a balance in their mobile payment app accounts (El Issa, 2020).

Based on previous studies, the identified common characteristics of mobile payment users are primarily those belonging to the Millennial generation or other young generational groups. We still know little about the picture of mobile payment users, particularly their behavioral characteristics, which may be crucial to the rapid adoption of mobile payment systems in the U.S.

Research Questions

The above literature elaborates on the factors affecting consumer mobile payments adoption and the current adoption of mobile payments in the U.S., as well as the adoption and diffusion of mobile banking. Most of the previous studies mainly focus on mobile payment adoption factors, especially in Mainland China or other Asian areas where the mobile payments market has been quickly expanding. The present study concentrates on analyzing the financial characteristics of mobile payment and banking users in the U.S. Based on the literature review, we will address the following research questions:

- What is the state of mobile banking and mobile payment use in the U.S.?
- How can we characterize users of these technologies?

Methods

Data Source

We conducted analyses using the 2018 FINRA National Financial Capability Study (Lin et al., 2019). The goal of this study was to examine financial capability amongst different demographic, behavioral, attitudinal, and financial literacy factors. This online study was administered from June

through October 2018 and had a final sample of 27,091 American adults. Census distributions that guided the weights used in the study were characterized by age, gender, ethnicity, education, and Census Division.

Dependent Variables

In this analysis, the dependent variables were sourced from the 2018 National Financial Capability Study questions pertaining to mobile banking and mobile payment. These questions were asked in the survey: *How often do you access your checking or savings account in the following ways? – mobile banking with text messaging, mobile app, Internet browser, or email on a mobile phone* (Never; Sometimes; Frequently; Don't Know; Prefer not to say). The mobile payment question was asked, *how often do you use your mobile phone to pay for a product or service in person at a store, gas station, or restaurant (e.g., by waving/tapping your mobile phone over a sensor at checkout, or scanning a barcode or QR code using your mobile phone?* (Frequently; Sometimes; Never; Don't Know; Prefer not to say). We performed models – logistic regression, to identify the personal and financial characteristics that were associated with individuals who answered either *Sometimes* or *Frequently* to each respective question.

Statistical Analyses

The initial analysis measured the differences in mobile payment and mobile banking rates across financial and behavioral characteristics. Unadjusted analysis used Wald Chi-Square Tests to examine within-group differences. Later, we employed multivariate logistic regression (using PROC SURVEYLOGISTIC) to determine the individual, financial, and behavioral characteristics distinguishing those who use mobile payment and banking *Sometimes* from those who use them *Frequently*. All analyses were conducted using SAS Analytics; weights were applied based on factors that affected the sample selection and were provided by the National Financial Capability Study. These included weights were gender, age, ethnicity, and education.

Results

Unadjusted estimates for mobile banking and mobile payment users are described in Table 1. Overall, out of all survey respondents, 33.46% reported never, 22.17% reported sometimes, and 42.59% reported frequent use of mobile banking. Mobile payment had lower utilization, where 11.14% reported frequent use, 22.88% reported sometimes, and 64.01% reported never using it. People with unpaid medical debt had higher rates of mobile banking and mobile payment as compared to their medically-debt-free counterparts. Younger survey respondents reported significantly higher rates of mobile banking and mobile payment than their older counterparts.

While no significant differences were observed between White and Non-White Ethnicity regarding mobile payment, Non-White individuals reported significantly higher rates of mobile banking than their White counterparts. Out of all levels of educational attainment, respondents who reported having *some college* attainment had the significantly highest rates of frequently using mobile banking and mobile payment; however, *sometimes* using mobile payment and mobile banking rose as educational attainment rose through post-graduate degrees. Marital status also had significant differences between levels, as single respondents reporting the highest rates of mobile banking and mobile payment and widowed respondents reporting the lowest rates.

Table 1. Unadjusted Estimates for Mobile Banking and Mobile Payment Users

Variable	Label	Mobile Banking			Mobile Payment		
		Never	Sometimes	Frequently	Never	Sometimes	Frequently
Overall Average		33.46%	22.17%	42.59%	11.14%	22.88%	64.01%
Medical Debt	Yes	19.86%*	21.88%*	56.47%*	19.55%*	25.56%*	53.81%*
	No	37.68%*	22.17%*	38.66%*	8.71%*	22.12%*	67.84%*
Sex	Male	32.02%	24.37%	41.81%	13.31%**	24.74%**	60.05%**
	Female	34.87%	20.03%	43.36%	9.06%**	21.08%**	67.79%**
Age	18-24	10.21%*	20.46%*	66.21%*	14.59%*	35.44%*	46.65%*
	25-34	10.24%*	24.70%*	62.97%*	21.63%*	31.11%*	44.46%*
	35-44	18.48%*	23.89%*	56.07%*	14.93%*	28.78%*	54.08%*
	45-54	30.41%*	25.58%*	42.19%*	9.18%*	23.87%*	64.68%*
	55-64	49.27%*	20.96%*	28.21%*	5.54%*	14.75%*	78.61%*
	65+	64.56%*	17.95%*	16.35%*	2.86%*	9.54%*	86.81%*
Ethnicity	White	38.04%*	21.20%*	39.12%*	8.64%	20.25%	69.22%
	Non-White	21.53%*	24.68%*	51.65%*	17.30%	29.36%	51.14%
Education	Did not complete HS	37.95%*	22.24%*	37.11%*	10.68%*	24.79%*	58.61%*
	HS Grad - Regular	39.36%*	20.10%*	37.63%*	9.79%*	20.01%*	67.12%*
	HS Grad - GED	37.96%*	20.22%*	38.71%*	11.33%*	22.02%*	63.66%*
	Some College	30.09%*	20.84%*	47.68%*	13.11%*	22.21%*	63.17%*
	Associate degree	32.43%*	22.09%*	44.07%*	10.74%*	22.39%*	65.45%*
	Bachelor's Degree	31.46%*	24.32%*	42.79%*	10.02%*	25.33%*	63.10%*
	Post-Grad Degree	33.49%*	26.54%*	39.08%*	10.53%*	26.32%*	62.30%*
Marital Status	Married	35.49%**	22.89%*	39.96%*	10.51%	21.94%	65.84%
	Single	22.95%**	22.49%*	52.39%*	14.38%	27.95%	55.01%
	Separated	27.48%**	22.87%*	46.31%*	9.23%	27.65%	61.41%
	Divorced	42.92%**	20.02%*	36.00%*	7.57%	16.67%	73.99%
	Widowed	57.61%**	16.20%*	24.46%*	5.04%	11.66%	82.31%
I have too much debt	1 – Strongly Disagree	45.97%*	21.23%*	31.53%*	8.85%*	18.73%*	71.45%*
	2	34.69%*	25.86%*	37.75%*	8.41%*	24.19%*	66.40%*
	3	33.90%*	22.05%*	42.87%*	8.02%*	28.11%*	62.60%*
	4 – Neutral	33.39%*	23.59%*	40.39%*	9.41%*	23.04%*	64.07%*
	5	23.98%*	23.42%*	51.25%*	8.42%*	27.89%*	62.78%*
	6	24.87%*	24.91%*	48.25%*	10.85%*	27.81%*	60.49%*
	7 – Strongly Agree	21.10%*	19.55%*	58.02%*	19.74%*	23.41%*	56.01%*
Household Income	< $15,000	35.70%*	20.92%*	40.47%*	9.35%*	22.24%*	64.21%*
	$15,000-$24,999	39.50%*	18.74%*	39.45%*	8.11%*	21.44%*	67.63%*
	$25,000-$34,999	35.65%*	20.17%*	41.94%*	9.32%*	21.70%*	66.91%*
	$35,000-$49,000	34.24%*	20.12%*	43.80%*	11.13%*	20.65%*	66.58%*
	$50,000-$74,999	35.29%*	22.01%*	41.45%*	10.13%*	23.45%*	65.09%*
	$75,000-$99,999	29.04%*	24.45%*	44.70%*	16.82%*	23.83%*	57.96%*
	$100,000-$149,000	28.30%*	25.49%*	44.94%*	11.97%*	24.26%*	62.47%*
	$150,000+	30.12%*	26.03%*	42.98%*	11.87%*	27.39%*	59.16%*
Employment	Full Time for Employer	31.21%*	24.69%*	42.06%*	15.56%	25.27%	57.93%
	Self-employed	20.60%*	23.82%*	54.07%*	15.78%	28.16%	54.37%
	Part-time	31.11%*	21.32%*	45.43%*	9.58%	24.59%	63.42%
	Homemaker	29.13%*	21.67%*	46.24%*	9.01%	24.42%	62.29%
	Full-time Student	12.63%*	22.71%*	62.68%*	13.29%	36.29%	47.61%
	Permanently Sick/Disabled	41.89%*	20.42%*	34.77%*	8.93%	16.16%	72.04%
	Unemployed	33.40%*	23.91%*	40.19%*	6.55%	21.94%	67.05%
	Retired	60.70%*	18.89%*	19.16%*	3.77%	10.82%	84.53%
Spending and Income	Spending < Income	36.75%*	22.44%*	39.58%*	10.67%*	22.02%*	66.26%*
	Spending > Income	23.30%*	22.85%*	52.24%*	16.62%*	27.31%*	54.85%*
	Spending = Income	34.53%*	21.43%*	42.26%*	9.45%*	22.27%*	67.03%*
Credit Card Balance	Yes	25.55%*	22.19%*	51.22%*	14.52%*	23.89%*	60.90%*
	No	40.99%*	23.42%*	34.18%*	9.33%*	22.92%*	66.90%*
Auto Loan	Yes	23.82%*	22.39%*	52.30%*	16.10%*	24.88%*	68.11%*
	No	39.23%*	22.04%*	37.14%*	8.56%*	21.75%*	58.18%*
Student Loans	Yes	10.56%	21.86%	66.13%	21.16%*	30.85%*	46.75%*
	No	38.68%	22.24%	37.23%	8.87%*	21.07%*	67.91%*
Predatory Loans	Yes	13.07%*	25.35%*	58.67%*	24.27%*	34.04%*	40.23%*
	No	37.48%*	21.54%*	39.43%*	8.36%*	20.51%*	69.04%*

Note. *= p <.0001, **= p <.05

As self-reporting of having *too much debt* rose across a 7-point Likert scale, rates of mobile banking and mobile payment significantly increased. As income level rose, rates of *sometimes*

using mobile banking and mobile payment rose; however, regarding *frequent* use of mobile banking - $75,000-$149,000 had the highest rates and for mobile payment, $75,000-$99,999 had the highest rates. Full-time students had the highest rates of frequent use of mobile banking and mobile payment; while those employed full-time or self-employed had the highest rates for *sometimes* using mobile banking, and full-time students still reported the highest rates of *sometimes* using mobile payment. Survey respondents who reported spending more than income also reported the highest rates for frequently and sometimes using mobile payment and mobile banking. Respondents who carried a credit card balance reported significantly higher rates of frequent mobile banking and frequent and sometimes mobile payment, as compared to their non-balance-carrying counterparts. Similarly, having an auto loan was significantly associated with higher rates of frequently using mobile banking and mobile payment. Having a student loan was significantly associated with higher rates of mobile payment – frequent use and sometimes. Lastly, using predatory loans (auto-title or payday) was associated with higher rates of frequently or sometimes using mobile payment and mobile banking.

Adjusted odds of using mobile payment and mobile banking are presented in Table 2. Significant positive associations with sometimes using mobile banking included: having unpaid medical debt, being male, Non-White Ethnicity, being divorced, earning $25,000 or higher income, spending more than or equal to income, carrying a credit card balance, having an auto loan, having student loans, and using predatory loans. Significant negative associations with sometimes using mobile banking included: being older than 35 and a higher school graduate. Significant positive associations with frequently using mobile banking included: having unpaid medical debt, being Non-White Ethnicity, being separated, divorced, or widowed, earning $25,000 or higher income, being self-employed, spending equal to or beyond one's earnings, holding credit card debt, possessing an auto loan or student loans, and resorting to predatory loans. On the other hand, being aged over 25 showed significant negative associations with frequent mobile banking use. Significant positive associations with sometimes using mobile payment included: being male, Non-White Ethnicity, earning $50,000 or higher, spending beyond one's earnings, holding student loans, and resorting to predatory loans. Significant negative associations with sometimes using mobile payment included: being 25 years old or older, educational attainment between graduating high school and having a bachelor's degree, strongly agreeing with *I have too much debt* and being in a state of permanent illness or disability, unemployment, or retirement. Frequent mobile payment usage showed significant associations with factors including having unpaid medical debt, being male, Non-White Ethnicity, earning $75,000 or higher, spending beyond one's earnings, holding student loans, and resorting to predatory loans. Frequent mobile payment usage was significantly negatively associated with being aged 35 or above, having an educational background of high school graduation or more advanced, reporting high self-reported debt loads, being employed part-time, being a homemaker, being a full-time student, or being unemployed.

Discussion

The results of our study corroborate previous studies and theories relating to technology adoption. The present study extends these works by adding personal finance characteristics in measuring the use of mobile devices for banking and making purchases. Additionally, risk tolerance was positively associated with subjective financial knowledge scores and negatively associated with objective financial knowledge scores.

Table 2. Adjusted Odds of Using Mobile Banking and Mobile Payment

		Mobile Banking		Mobile Payment	
Label	Label	Sometimes	Frequently	Frequently	Sometimes
Medical Debt (Ref: No)	Yes	1.338 (1.170-1.530)	1.454 (1.287-1.642)	1.703 (1.489-1.948)	1.065 (0.953-1.191)
Sex	Male	1.188 (1.089-1.296)	0.934 (0.861-1.014)	1.527 (1.368-1.704)	1.240 (1.145-1.342)
Age (Ref: 18-24)	25 - 34	0.74 (0.560-1.016)	0.487 (0.370-0.642)	0.994 (0.801-1.234)	0.738 (0.626-0.870)
	35 - 44	0.368 (0.275-0.491)	0.211 (0.161-0.275)	0.586 (0.466-0.737)	0.589 (0.497-0.697)
	45 - 54	0.263 (0.197-0.351)	0.107 (0.082-0.139)	0.353 (0.277-0.451)	0.455 (0.382-0.543)
	55 - 64	0.146 (0.110-0.195)	0.104 (0.077-0.141)	0.204 (0.156-0.266)	0.262 (0.218-0.315)
	65+	0.104 (0.077-0.141)	0.027 (0.020-0.036)	0.117 (0.084-0.162)	0.177 (0.143-0.221)
Ethnicity	Non - White	1.470 (1.320-1.637)	1.410 (1.276-1.558)	1.946 (1.733-2.185)	1.518 (1.390-1.658)
Education Ref: Did Not Complete HS	HS Grad - Regular	0.637 (0.434-0.935)	0.812 (0.558-1.182)	0.450 (0.284-0.711)	0.556 (0.391-0.791)
	HS Grad - GED	0.673 (0.448-1.011)	0.814 (0.548-1.208)	0.535 (0.330-0.867)	0.649 (0.448-0.942)
	Some College	0.748 (0.511-1.095)	0.989 (0.681-1.435)	0.436 (0.278-0.685)	0.575 (0.406-0.814)
	Associate degree	0.721 (0.487-1.067)	0.849 (0.579-1.246)	0.391 (0.245-0.624)	0.566 (0.396-0.811)
	Bachelor's Degree	0.754 (0.514-1.106)	0.774 (0.532-1.127)	0.342 (0.216-0.541)	0.634 (0.446-0.899)
	Post-Grad Degree	0.821 (0.556-1.212)	0.783 (0.534-1.148)	0.381 (0.238-0.609)	0.713 (0.499-1.018)
Marital Status Ref: Single	Married	1.053 (0.930-1.192)	1.017 (0.906-1.142)	0.893 (0.779-1.023)	0.965 (0.870-1.071)
	Separated	1.372 (0895-2.102)	1.614 (1.106-2.356)	0.815 (0.475-1.397)	1.190 (0.834-1.698)
	Divorced	1.184 (1.004-1.396)	1.399 (1.203-1.627)	0.966 (0.770-1.211)	0.990 (0.849-1.154)
	Widowed	1.092 (0.868-1.373)	1.520 (1.237-1.868)	1.265 (0.875-1.829)	1.014 (0.797-1.291)
I Have Too Much Debt Ref: 1 - Strongly Disagree	2	1.228 (1.059-1.425)	0.995 (0.860-1.151)	0.646 (0.514-0.812)	1.049 (0.912-1.207)
	3	0.889 (0.739-1.070)	0.935 (0.789-1.107)	0.540 (0.414-0.704)	1.120 (0.954-1.315)
	4 - Neutral	1.104 (0.962-1.266)	1.047 (0.919-1.193)	0.791 (0.657-0.953)	1.105 (0.972-1.256)
	5	1.144 (0.970-1.350)	1.120 (0.961-1.305)	0.449 (0.358-0.564)	1.076 (0.932-1.244)
	6	1.135 (0.939-1.371)	1.041 (0.875-1.239)	0.540 (0.424-0.688)	1.052 (0.896-1.236)
	7 - Strongly Agree	0.897 (0.759-1.059)	1.075 (0.924-1.250)	0.755 (0.623-0.914)	0.836 (0.723-0.965)
Household Income Ref: <$15,000	$15,000 - $24,999	0.872 (0.683-1.113)	1.053 (0.841-1.318)	0.734 (0.534-1.009)	0.903 (0.726-1.123)
	$25,000 - $34,999	1.271 (1.006-1.606)	1.415 (1.138-1.759)	1.006 (0.746-1.356)	1.059 (0.858-1.306)
	$35,000 - $49,000	1.281 (1.019-1.609)	1.628 (1.319-2.011)	1.155 (0.874-1.527)	1.017 (0.832-1.244)
	$50,000 - $74,999	1.413 (1.126-1.772)	1.648 (1.334-2.036)	1.171 (0.890-1.541)	1.237 (1.015-1.506)
	$75,000 - $99,999	1.880 (1.484-2.382)	2.182 (1.747-2.724)	1.892 (1.434-2.497)	1.414 (1.148-1.742)
	$100,000 - $149,000	2.224 (1.741-2.840)	2.922 (2.325-3.674)	1.653 (1.234-2.215)	1.377 (1.109-1.708)
	$150,000+	2.372 (1.817-3.097)	3.388 (2.636-4.353)	2.351 (1.702-3.248)	1.823 (1.445-2.301)
Employment Ref: Full Time for Employer	Self-Employed	1.085 (0.917-1.284)	1.338 (1.139-1.571)	0.925 (0.767-1.114)	0.945 (0.817-1.091)
	Part Time	0.987 (0.796-1.224)	1.044 (0.851-1.281)	0.644 (0.493-0.842)	0.831 (0.689-1.002)
	Homemaker	0.965 (0.766-1.215)	0.986 (0.792-1.226)	0.595 (0.448-0.791)	0.892 (0.732-1.087)
	Full Time Student	1.077 (0.696-1.666)	1.234 (0.825-1.848)	0.647 (0.444-0.943)	1.043 (0.795-1.368)
	Permanently Sick/Disabled	0.821 (0.620-1.086)	0.934 (0.724-1.205)	0.815 (0.567-1.171)	0.622 (0.469-0.824)
	Unemployed	0.875 (0.647-1.183)	0.797 (0.599-1.061)	0.376 (0.248-0.572)	0.728 (0.559-0.948)
	Retired	1.020 (0.847-1.229)	1.146 (0.952-1.379)	0.816 (0.620-1.073)	0.769 (0.638-0.925)
Spending and Income Ref: Spending < Income	Spending > Income	1.320 (1.156-1.506)	1.305 (1.152-1.478)	1.228 (1.059-1.424)	1.233 (1.102-1.380)
	Spending = Income	1.115 (1.014-1.227)	1.151 (1.053-1.259)	0.955 (0.840-1.086)	1.084 (0.993-1.183)
Credit Card Balance(Ref: No)	Yes	1.206 (1.088-1.336)	1.578 (1.434-1.736)	1.091 (0.955-1.246)	0.934 (0.852-1.024)
Auto Loan (Ref: No)	Yes	1.211 (1.103-1.329)	1.512 (1.387-1.648)	1.344 (1.196-1.511)	1.060 (0.975-1.153)
Student Loans (Ref: No)	Yes	1.531 (1.303-1.799)	1.908 (1.645-2.214)	1.501 (1.309-1.723)	1.143 (1.024-1.277)
Predatory Loans (Ref: No)	Yes	1.982 (1.701-2.310)	1.749 (1.511-2.025)	2.977 (2.603-3.401)	2.283 (2.040-2.555)

This study found that mobile banking and mobile payment users were more likely to be younger, which was consistent with the previous studies (Augustine, 2019; El Issa, 2020; Kohan, 2020; Li et al., 2020; Stolba, 2019). In general, younger individuals were usually categorized into *early adopters* (Seldal & Nyhus, 2022) who were more likely to trust and have a positive perception toward digital technology (Gupta & Dhingra, 2022; Shaikh et al., 2023).

The adjusted odds of using mobile banking and mobile payment also suggest that users tend to have specific types of debt (unpaid medical or student loans, auto loans, carrying a credit card balance, and using predatory lending), have higher incomes ($75,000 or higher), and generally spend at least the amount of their income or higher. Individual characteristics that were associated with lower adoption rates of mobile banking and mobile payment included: being older, having educational attainment of higher school or higher, self-reporting to have too much debt, and for

mobile payment specifically – working part-time for an employer, being a homemaker or a full-time student, being permanently sick or disabled, unemployed, or retired.

One seemingly contradictory finding was the relationship between mobile banking / mobile payment and self-reporting having too much debt and having specific debt types (student loans, auto loans, unpaid medical debt, carrying a credit card balance, and using predatory loans). This could be explained by customers of those loan types using their mobile devices to service those loans – while not being *overwhelmed* with the loan balances.

A troubling finding of the analysis was the independent variable of *spending relative to income* – especially regarding the use of mobile payments. Survey respondents who reported spending more than income were positively associated with frequently and sometimes using mobile payments. This could indicate that lower amounts of economic *friction* that mobile payment promotes – especially towards people who spend more than their income. Moreover, frequent users of mobile payment were more likely to have auto, student, medical, and predatory loans. The use of these loan types is also explained by age - as older respondents were less likely to use either mobile banking or mobile payment.

Lastly, due to the pandemic environment – COVID-19, the public may be incentivized to use contactless payment methods. This may be a contributing factor to the high use of mobile payment technologies in Asian countries (Liu et al., 2020; Sleiman et al., 2023). In a post-COVID-19 U.S., coupled with a greater proportion of the population being Millennial or younger, mobile banking and payment use should be expected to have greater use.

Conclusions

The present study examined the personal finance-related characteristics of mobile banking and mobile payment users. The study reported that age, income, debt loads and types, spending behavior, ethnicity, and education level, all have independent associations with frequent mobile banking and payment use. Future studies may focus on how changes in population demographics in the U.S., incentives for use, along personal hygiene changes due to COVID-19 would affect mobile payment use.

Implications

The present study carries several implications – both for industry practitioners and policymakers. For the financial services industry, this study characterizes the users of mobile banking and mobile payment. Industry leaders can use this information to better tailor their mobile products to fit the significantly associated characteristics – users have higher incomes, are younger, spend more than income, are most often male, and have different current loan types (auto, student, medical, etc.). Specifically, while there is no question that mobile banking and mobile payment increase the convenience of financial service customers, future research should address the issues of: what are the added costs and risks to online security, mental health due to overexposure to financial conditions, and implications of people spending more than they make in income due to the convenience of mobile payments?

Limitations

The present study had several limitations. First, due to the cross-sectional research design, no causal relationship should be inferred from this study. Furthermore, even though we employed a weighted survey design to mitigate bias, there remains a possibility that the sample might contain an undetected bias. While prospective random control trials that generate causal relationships offer more valid insights, we believe the present study is a valuable first step in examining the characteristics of mobile banking and mobile payment users. A second data-related limitation is the lack of comprehensive factors that relate to mobile banking and payment adoption. These may include perceived usefulness, risk tolerance, and geographic location (urban/rural). These factors may serve as proxies for specific mobile payment opportunities and personal marginal value benefits.

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