

Consumer Experiences During the COVID-19 Pandemic: The Relationship Between Access to, and Capacity to Use, Digital Financial Products and Financial Well-being

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Abstract

It is important to understand the factors that influence consumers' financial health and financial-related stress. This exploratory study investigated factors that could affect these outcomes using survey data collected during the COVID-19 pandemic. Our analyses revealed two main factors that predict financial health and financial-related stress: (i) access to digital communication technology, such as electronic devices and internet, and (ii) capacity to use digital financial products, such as online banking, mobile banking, e-transfers, etc. When compared to consumers with good or very good access to digital communication technology, those with fair to very poor access reported lower satisfaction with their finances, were more likely to have fallen behind on payments, and reported higher financial stress in general and specifically around online banking and e-billing. Consumers with fair to very poor capacity to use digital financial products also reported lower satisfaction with their finances and greater feelings of stress related to online banking and e-billing. Limited access and capacity were more common among people who were older, unemployed, and reported lower incomes. Limited access was also more common among people living in rural areas. We suggest policies and programs to improve access and capacity among consumers to mitigate financial harms.

Introduction

With consumer debt in Canada at a historic high, concern is growing over Canadians' financial well-being. For example, Statistics Canada has reported consistently high household debt service ratios over the past few years, currently at 13.36% (Statistics Canada, 2022). Many families are in a precarious position because of increasing debt levels. For some families who are already in debt, the shift to online banking and digital financial services, which accelerated during the COVID-19 pandemic, may worsen their financial situation. Barriers to debt repayment, such as limited access to digital communication technology or limited capacity to use common digital financial products and services, could negatively impact consumers.

Objective

In a time where people are struggling with finances, it is critical to understand what factors influence consumers' financial health and financial-related stress. Due to the widespread shift to the use of digital financial services, which saw a substantial increase during the COVID-19 pandemic, we decided to conduct a project to better understand how consumers' access to, and capacity to use, digital communication technology and digital financial products and services impact their financial health and financial-related stress.

To achieve this objective, we conducted a two-year investigation, among Canadian consumers, to better understand:

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- Their access to digital communication technology, such as electronic devices and internet;
- Their capacity to use digital financial products and services, such as online banking, mobile banking, receiving and paying bills online, etc.;
- Their general financial well-being;
- Their financial health during the COVID-19 pandemic; and
- The impact of the shift to online banking and e-billing on financial health and financial-related stress.

Understanding what factors influence consumers' financial health and financial-related stress can inform programs and policies to enhance consumer well-being.

Literature Review

To better understand what is known in the literature about **access** to digital communication technology and **capacity** to use digital financial products, we performed a review of the recent academic literature on these topics. See Appendix A for the methods and results of the literature search.

Our review of the literature found multiple recent papers that acknowledge the lack of research on the relationship between access to digital communication technology or capacity to use such technology and the financial well-being of consumers (Birkenmaier & Fu, 2023; Carton, McCarthy, et al., 2022; Korosec-Serfaty et al., 2021; Kumar et al., 2022).

The research that does exist does not always separate out the impacts of access to digital communication technology from the capacity to use such technologies, making it difficult to disentangle the effects of access and capacity on financial well-being. Additionally, financial well-being can impact access to digital communication technologies, in that people who experience financial hardship often have lower access to technology in general (e.g., Holmes & Burgess, 2022; Katz et al., 2021). Thus, the existing, mainly correlational research, makes it difficult to assess whether there is a directional impact of access to digital communication technology on financial well-being. Nevertheless, we review the research that does exist on access and capacity in the sections below.

Access to, and use of, digital communication technology on financial well-being

Although little recent research directly focuses on how access to digital communication technology impacts financial well-being, the research that does exist suggests that access to such technology allows people the opportunity to improve their understanding of their finances and encourages financial inclusion for potentially unbanked populations (Nathan et al., 2022). Access to digital communication technology also provides the opportunity to use financial capacity-building apps which can improve financial literacy, improve financial planning, and increase confidence in financial decision-making (French et al., 2020), and can help build greater self-efficacy in computer use in older adults (Spears & Zheng, 2020), who may need such self-efficacy in order to use digital financial products effectively.

While access to digital communication technology can encourage financial inclusion and help people improve their financial literacy, a lack of access to such technology can exacerbate financial hardships for those who are experiencing poor financial well-being. Research demonstrates that households with poor financial well-being, particularly those that face poverty or material deprivation, are at greater risk of digital exclusion (Holmes & Burgess, 2022). Furthermore, people whose financial situation causes them to experience housing instability can become trapped in a cycle where housing instability contributes to digital exclusion, and such exclusion prevents them from finding both employment and housing opportunities, which are often listed online (Holmes & Burgess, 2022). Therefore, providing access to digital communication technology for individuals experiencing poverty or housing instability may be particularly important to helping them improve their financial well-being and housing security.

In contrast to the studies above, one study found an association between access to internet and having credit card debt in US consumers (Basnet & Donou-Adonsou, 2018). However, having credit card

debt does not necessarily imply poor financial well-being, and the authors acknowledge that it is not clear why this relationship exists. Therefore, overall, access to digital communication technology is important for providing people opportunities to improve their financial inclusion, financial literacy, and financial planning, and for providing them access to opportunities to improve their financial situation and housing stability.

Capacity to use digital financial products and financial well-being

We define 'capacity' as the understanding of and ability to use digital financial products and services. We found a few recent studies which focused on the capacity to use digital financial products, as well as a few recent studies which focused simply on the use of such products.

In terms of capacity to use digital financial products, a study in Indonesia found greater capacity to use digital financial products was associated with greater financial well-being and fewer financial harms (Rahayu et al., 2022). Such capacity was also positively associated with educational background and income, demonstrating the need to provide support in building capacity for people with lower educational attainment and lower income.

Studies from India demonstrate having general financial skills (such as budgeting and analytical skills) is associated with better capacity to use digital financial products and services (Kumar et al., 2022), and that being socialized to use financial products or to seek out financial information on digital platforms (such as through apps, podcasts, news articles, etc.) is associated with better financial well-being (Khan & Suriseti, 2020). Although neither of these studies directly examined the link between capacity and financial well-being, their results, in combination with the finding that capacity is linked to greater financial well-being, suggest that socializing people to use digital financial products could increase their capacity to use them, which could help improve their financial well-being. However, more research is needed to examine the connection between socializing people to use digital financial products and impacts on financial well-being.

As noted above, some studies focused on the use of digital financial products rather than the capacity to use such products. For example, the use of digital financial products is associated with greater financial well-being for people living in economically disadvantaged rural areas in Ghana (Dzogbenuku et al., 2022), as well as social housing residents in Ireland (Carton, McCarthy, et al., 2022; Carton, Xiong, et al., 2022). In particular, social housing residents in Ireland who used online banking or mobile banking to check their bank balances regularly were likely to have greater financial well-being (measured as not running out of money, having savings, and being able to withstand a financial shock)(Carton, McCarthy, et al., 2022). Focus group interviews showed that having access to real-time information, and receiving notifications about available funds and upcoming bills, helped these households manage their limited finances (Carton, Xiong, et al., 2022). Overall, the authors suggest that being able to monitor bank balances in real time using both online and mobile banking helps support financial well-being (Carton, McCarthy, et al., 2022; Carton, Xiong, et al., 2022). However, at the same time, they found paying bills via a mobile phone was correlated with not having money left over at the end of the month, and not saving (Carton, McCarthy, et al., 2022). Thus, it's possible that the use of digital financial services for banking could have both positive and negative consequences, and future work should differentiate between online banking and mobile phone apps.

Finally, although the majority of research on the use of and capacity to use digital financial products and services demonstrates potential benefits for improving financial well-being, some studies find associations between the use of digital financial products and higher debt. These include incurring more credit card fees among US consumers who use smartphones to pay for products and services (Meyll & Walter, 2019) and greater household debt among Chinese households with greater digital financial inclusion (Li et al., 2022). However, having debt or paying credit card fees does not necessarily mean these consumers are experiencing poorer financial well-being. Nevertheless, these results do highlight that the use of digital financial services may not always be beneficial to consumers, and that more research is needed to better understand why costly behaviours can be associated with online banking and mobile payments.

The present study

Overall, the literature indicates little research has focused on how financial well-being is impacted by limited access to digital communication technology and limited capacity to use digital financial products. In particular, we found no studies focusing specifically on how limited access and capacity impacted consumers during the COVID-19 pandemic, when there was an accelerated shift to online banking and digital financial services. Thus, our study aims to add to the scarce body of global work available to policy makers on the impacts of shifting to digital finance (i.e., online banking and electronic billing) during the COVID-19 pandemic.

Methods

This project was an exploratory study spanning two years of data collection performed in two waves. Both waves involved online surveys conducted with members of the Angus Reid Forum, Canada's most well-known and trusted online public opinion community.

Wave 1 involved the collection of data on the financial well-being of a large sample of Canadian consumers from August 10-17, 2021 (N=2017). This sample was balanced on age, gender, region, and education according to the last Canadian Census (Statistics Canada, 2016).

Wave 2 consisted of a follow-up survey performed from June 28-July 6, 2022 (N=230). Wave 2 targeted a specific group of consumers that were identified in Wave 1 as being particularly vulnerable to financial harms during the shift to online digital financial services. Specifically, this group included individuals who self-reported as having limited digital financial literacy.⁴ We combined these data with our Wave 1 data to increase our sample size for this segment of the population who are more likely to experience financial harms. This resulted in a total sample size of N=2247. All subsequent analyses described in this study were conducted on this combined sample.

Measures

Sociodemographic characteristics

Participants were asked a series of demographic questions, including their age, sex, race, household income, employment status, education, and whether they lived in a rural or urban environment.

Access to digital communication technology

Participants were asked to rate their level of access to (i) electronic devices (i.e., computer, tablet, smartphone) and (ii) internet connection on a Likert-type scale from 1 (very poor) to 5 (very good) (see Table 1 for further details).

From these two measures we created a binary variable called 'Access to digital communication technology' where we grouped participants as having either **good** or **limited** access. Participants who reported having fair (3) to very poor (1) access to either electronic devices or internet connection were categorized as having limited access (n=273, 12.1% of the sample). The remaining participants were categorized as having good access (n=1974, 87.9% of the sample).

Capacity to use digital financial products

Participants were asked to rate (i) their overall understanding of, and (ii) their ability to use digital financial products and services on a Likert-type scale ranging from 1 (very poor) to 5 (very good). Participants were shown a list of digital financial products and services including online banking, mobile banking, receiving electronic bills, etc. (see Table 1).

⁴ We considered participants as having limited digital financial literacy if they met at least one of the following criteria: reporting fair to very poor understanding of digital financial products (Table 1, Question 2), fair to very poor ability to use digital financial products (Table 1, Question 3), or ever needing help using digital financial products and services (Table 1, Question 4).

From these two variables we created a binary variable called 'Capacity to use digital financial products' where we grouped participants as having either **good** or **limited** capacity. Participants who gave fair (3) to very poor (1) ratings for both understanding and ability to use digital financial products were categorized as having limited capacity (n=280, 12.5% of the sample). The remaining participants were categorized as having good capacity (n=1967, 87.5% of the sample).

General financial well-being

General financial well-being was assessed using two questions. First, participants were asked to rate their satisfaction with their finances on a Likert-type scale ranging from 1 (very dissatisfied) to 10 (very satisfied). Second, participants were asked whether they were stressed about their personal finances, which was coded as binary (yes/no) (Table 1).

Financial health during COVID-19

Financial health during COVID-19 was assessed using two questions. First, participants were asked if they had fallen behind on any payments since the beginning of the COVID-19 pandemic. Then they were asked if they had missed payments more often during the pandemic than before the pandemic. Both variables were coded as binary (yes/no) (Table 1).

Impact of the shift to online banking and e-billing

The impact of reduced availability of in-person banking and the shift to online banking and e-billing was assessed with three questions. First, participants were asked if the reduced availability of in-person banking had negatively affected their ability to pay their bills, coded as binary (yes/no). Second, they were asked if they were more stressed or less stressed due to reduced availability, rated on a Likert-type scale ranging from 1 (much less stressed) to 5 (much more stressed). Third, participants were asked if they often feel overwhelmed managing electronic billing payment cycles, rated on a Likert-type scale ranging from 1 (strongly disagree) to 4 (strongly agree) (Table 1).

Analytic Strategy

Exploratory analyses were performed to identify variables predicting financial health and financial-related stress during the accelerated transition to online banking and bill payments caused by the COVID-19 pandemic.

During these analyses, two variables were associated with financial health and financial-related stress outcomes, namely **access** to digital communication technology and **capacity** to use digital financial products. Thus, we divided participants based on their level of access and capacity and compared demographics across these groupings. We also assessed differences in financial health and financial-related stress based on these two factors.

Statistical details

To test for between group differences in sociodemographic characteristics, several statistical significance tests were used. For outcome variables measured on a Likert-type scale, t-tests that did not assume equality of variances were conducted. To categorize significant differences as "small", "medium", or "large", Cohen's D^5 was calculated. Among variables with dichotomous outcomes Chi-Square tests were used to assess significance and Phi (Φ) was calculated to assess effect size.

To assess whether differences in access or capacity predicted financial health and well-being, we used generalized linear models with either linear distributions or binary logistic distributions. Models including both variables (i.e., access and capacity) and the interaction term were used to assess the impact of each variable while controlling for the other variable and the interaction. To compare the magnitude of the effects of different variables within a model we used either partial eta squared (η^2) (for

⁵ $d \leq .20$ indicates a small effect; $d > .20$ and ≤ 0.50 indicates a medium effect; $d > 0.80$ indicates a large effect; $\Phi \leq .1$ indicates small effect size, $\Phi > .1$ and $\Phi < .3$ indicates a medium effect, and $\Phi > .5$ is a large effect;

outcome data recorded on Likert-type scales) or beta coefficients (β) (for outcome data recorded on binary scales).⁶

Table 1

Survey questions and response options used in the online survey

Question	Response options (Likert value as appropriate)
Access to digital communication technology	
1. How would you describe your level of access to the following types of technology?	Very good (5)
	Good (4)
i. Electronic devices (i.e., computer, tablet, smartphone)	Fair (3)
	Poor (2)
ii. Internet connection	Very poor (1)
Capacity to use digital financial products	
2. How would you rate your overall understanding of digital financial products and services? Digital services may include things like:	Very good (5)
	Good (4)
	Fair (3)
- Online banking	Poor (2)
- Mobile banking (using an app on your phone)	Very poor (1)
- Receiving electronic bills/banking statements	
- Paying your bills/debts online	
- Using credit or debit cards for online purchases	
- E-transfer to another person or a business	
- Using digital wallet (Apple Pay, Google Wallet, PayPal, etc.)	
3. How would you rate your ability to use digital financial products and services? Digital services may include things like:	Very good (5)
	Good (4)
	Fair (3)
- Online banking	Poor (2)
- Mobile banking (using an app on your phone)	Very poor (1)
- Receiving electronic bills/banking statements	
- Paying your bills/debts online	

⁶ $\eta_p^2 \leq .01$ indicates a small effect size, $\eta_p^2 > .06$ and $\eta_p^2 < .14$ indicates a medium effect, and $\eta_p^2 \geq .14$ is a large effect size. Note, the magnitude of β depends on the scale of the predictor and outcome variables and therefore does not have standard values indicating small, medium, or large effect sizes.

- Using credit or debit cards for online purchases
- E-transfer to another person or a business
- Using digital wallet (Apple Pay, Google Wallet, PayPal, etc.)

Receiving help with digital financial products

4. Do you ever need help from other family members or friends with using the following digital financial products and services?
- No
Yes
- Online banking
 - Mobile banking (using an app on your phone)
 - Receiving electronic bills/electronic banking statements
 - Paying your bills/debts online
 - Using credit or debit cards for online purchases
 - E-transfer to another person or a business

General financial well-being

5. Please rate your feelings about your finances where 1 means "Very dissatisfied" and 10 means "Very satisfied".
- 1 - Very dissatisfied
2
3
4
5
6
7
8
9
10 - Very satisfied
No opinion/Don't know

6. Would you say that you are stressed or not stressed about your personal finances?
- Yes - Very stressed (1)
Yes - Stressed (1)
No - Not very stressed (0)
No - Not at all stressed (0)

Financial health during COVID-19

7. Since the beginning of the COVID-19 pandemic, have you fallen behind on any payments?	Yes, once or twice (1) Yes, a few times (1) Yes, many times (1) No (0)
8. Since the beginning of the COVID-19 pandemic, have you missed payments more often, about the same or less often than before the pandemic?	More often About the same Less often I have not missed my payments either before or during the pandemic
Impact of the shift to online banking and e-billing	
9. All things considered, has the reduced availability of brick and mortar options (e.g., in-person banking, paper statements, cash/cheque payments) and shifting to online banking and digital bill payments during the COVID-19 pandemic negatively affected your ability to pay your bills?	Yes – it is a significant reason why I have missed payments Yes – it is a reason why I have missed payments but not the main reason No – it's not the reason why I missed payments Not applicable – I have not changed the way I bank/pay bills during the COVID-19 pandemic Not sure
10. Would you say that you are more or less stressed as a result of the reduced availability of brick and mortar options (e.g., in-person banking, paper statements, cash/cheque payments) and shifting to online banking and digital bill payments during the COVID-19 pandemic?	Yes – much more stressed (5) Yes – more stressed (4) No – no change in stress due to the shift (3) Yes – less stressed (2) Yes – much less stressed (1)
11. I often feel overwhelmed managing electronic billing payment cycles	Strongly Agree (4) Agree (3) Disagree (2) Strongly disagree (1) Not applicable

Results

Sociodemographic characteristics

Overall, we found that individuals with limited access were slightly older, more likely to have lower household income, be unemployed, have lower educational attainment, and live in rural areas (Table 2). Those with limited capacity were also slightly older, more likely to have lower household income, be unemployed, and have lower educational attainment (Table 3). However, they were not more likely to live

in rural areas. Additionally, those with limited capacity were less likely to identify as Black, Indigenous, or a person of colour.

Table 2

Differences in demographic characteristics between those reporting good vs. limited access to digital communication technology.

Outcome variables	Good Access (n=1974)	Limited Access (n=273)	Significance test	Effect Size (Φ or Cohen's D)
Characteristic	M (SD) or % (n)	M (SD) or % (n)		
Age	46.7 (16.1)	49.9 (17.8)	t(337) = 2.88, p<0.01	d = 0.20 (small)
Female	52.9% (1044)	54.9% (150)	X ² = 0.66, p=0.72	n/a
BIPOC status	30.1% (585)	30.6% (81)	X ² = 0.03, p=0.88.	n/a
Lower household income (< \$50,000)	25.1% (496)	36.3% (99)	X ² = 23.48, p<0.001	Φ = .10 (small)
Unemployed	11.0% (218)	16.1% (44)	X ² = 5.99, p<0.05	Φ = .05 (small)
No diploma or university degree	38.6% (762)	51.6% (141)	X ² = 16.98, p<0.001	Φ = .09 (small)
Living in rural areas	12.1% (238)	27.1% (74)	X ² = 45.43, p<0.001	Φ = .14 (medium)

Table 3

Differences in demographic characteristics between those reporting good vs. limited capacity to use digital financial products

Outcome variables	Good Capacity (n=1967)	Limited Capacity (n=280)	Significance test	Effect Size (Φ or Cohen's D)
Characteristic	M (SD) or % (n)	M (SD) or % (n)		
Age	46.4 (16.1)	51.6 (17.3)	t(352) = 4.69, p<0.001	d = 0.32 (medium)
Female	53.3% (1049)	51.8% (145)	X ² = 0.54, p<0.77	n/a

BIPOC status	30.9% (599)	24.5% (67)	$X^2 = 4.65, p < 0.05$	$\Phi = .05$ (small)
Lower household income (< \$50,000)	25.3% (498)	34.6% (97)	$X^2 = 29.40, p < 0.001$	$\Phi = .11$ (medium)
Unemployed	10.8% (213)	17.5% (49)	$X^2 = 10.59, p < 0.01$	$\Phi = .07$ (small)
No diploma or university degree	37.3% (734)	60.4% (169)	$X^2 = 54.14, p < 0.001$	$\Phi = .16$ (medium)
Living in rural areas	13.4% (264)	17.1% (48)	$X^2 = 2.84, p = 0.09$	n/a

Impacts of access and capacity on financial health and financial-related stress

Limited access to digital communication technology was associated with lower feelings of satisfaction with finances, increased likelihood of experiencing stress about personal finances, higher likelihood of falling behind on bill payments in the past 12 months, higher likelihood of feeling stressed due to the reduced availability of in-person banking, and greater feelings of overwhelm in managing electronic billing payment cycles (Table 4).

Note, our data indicate people with limited access are more likely to live in rural areas (Table 2). However, rural areas also tend to experience more economic deprivation which could confound the differences we see based on level of access. To control for this possibility, we also examined the effect of access on each of the outcome measures while controlling for rurality (i.e., living in an urban vs. rural environment). We found level of access continued to have significant or near-significant effects on the outcome measures when controlling for rurality.

In terms of capacity, overall, we found limited capacity was associated with lower feelings of satisfaction with finances, higher likelihood of reduced availability of in-person banking negatively affecting ability to pay bills, greater feelings of stress due to reduced availability of in-person banking, and greater feelings of being overwhelmed when managing electronic billing payment cycles (Table 5).

In sum, both access and capacity impacted people’s satisfaction with their personal finances, whether they experienced stress and had difficulty paying bills due to the reduced availability of in-person banking, and whether they felt overwhelmed by electronic billing payment cycles. In contrast, only limited access was related to increased likelihood of falling behind on payments in the past 12 months and increased likelihood of experiencing general stress about personal finances.

Table 4

Differences in general financial well-being, financial health during COVID-19, and the impact of the shift to online banking and e-billing between consumers with good versus limited access to digital communication technology

Outcome variables	Good Access (n=1974)	Limited Access (n=273)	Significance attributed to level of access	Effect size
	M (SD) or % (n)	M (SD) or % (n)	(F or Wald X^2)	(η^2, B [95% CI])

General financial well-being

Feelings of satisfaction with finances	6.62 (2.32)	5.75 (2.45)	F(1, 2180) = 19.6, p<0.001	$\eta^2 = 0.009$ (small)
Stressed about personal finances	39.8% (785)	53.1% (145)	Wald $X^2=8.35$ p<0.01	B = 0.26 [-0.24, 0.76]
Financial health during COVID-19				
Fallen behind on payments in the past 12 months	23.6% (465)	33.3% (91)	Wald $X^2=6.04$, p<0.05	B = 0.23 [-0.33, 0.78]
Missed more payments in the past 12 months than before the pandemic	12.6% (249)	16.8% (46)	Wald $X^2 = 1.79$, $p=0.18$	n/a
Impact of the shift to online banking and e-billing				
Reduced availability of in-person banking has negatively affected ability to pay bills	20.4% (95)	37.4% (34)	Wald $X^2=5.65$, p<0.05	B = 0.62 [-0.35, 1.58]
Reduced availability of in-person banking has caused stress	3.09 (0.51)	3.32 (0.69)	F(1, 1881) = 20.07, p<0.001	$\eta^2 = 0.011$ (small)
Felt overwhelmed managing electronic billing payment cycles	1.77 (0.77)	2.09 (0.83)	F(1, 2080) 8.09, p<0.01	$\eta^2 = 0.004$ (small)

Table 5

Differences in general financial well-being, financial health during COVID-19, and the impact of the shift to online banking and e-billing between consumers with good versus limited capacity to use digital financial products and services

Outcome variables	Good Capacity (n=1967)	Limited Capacity (n=280)	Significance attributed to level of capacity	Effect size
	<i>M (SD) or % (n)</i>	<i>M (SD) or % (n)</i>	(F or Wald X ²)	(η^2 , B [95% CI])
General financial well-being				
Feelings of satisfaction with finances	6.61 (2.33)	5.86 (2.43)	F(1, 2180) = 12.0, p<0.001	η^2 = 0.005 (small)
Stressed about personal finances	40.6% (799)	46.8% (131)	Wald X ² = 0.10, p=0.75	n/a
Financial health during COVID-19				
Fallen behind on payments in the past 12 months	24.5% (481)	26.8% (75)	Wald X ² =0.20, p=0.66	n/a
Missed more payments in the past 12 months than before the pandemic	12.7% (250)	16.1% (45)	Wald X ² = 0.81, p=0.37	n/a
Impact of the shift to online banking and e-billing				
Reduced availability of in-person banking has negatively affected ability to pay bills	21.0% (101)	37.3% (28)	Wald X ² =4.63, p<0.05	B = 0.55 [- 0.36, 1.46]
Reduced availability of in-person banking has caused stress	3.10 (0.52)	3.31 (0.63)	F(1, 1881) = 19.23, p<0.001	η^2 = 0.010 (small)
Felt overwhelmed managing electronic billing payment cycles	1.74 (0.76)	2.32 (0.8)	F(1, 2080) = 60.6, p<0.001	η^2 = 0.028 (small-medium)

Discussion

Overall, our survey results demonstrate both access to digital communication technology and capacity to use digital financial products significantly influence financial health and financial-related stress.

Specifically, our survey finds that people who experience limited access to digital communication technology appear to experience poorer general financial well-being, greater likelihood of falling behind on payments, and increased levels of stress related to online banking and electronic billing payment cycles. These results are supported by the limited existing literature, which indicates that access to digital communication technology is important for providing people opportunities to improve their financial inclusion (Nathan et al., 2022), financial literacy, and financial planning (French et al., 2020), while a lack of access to such technology can exacerbate financial hardships for those who are already experiencing poorer financial well-being (Holmes & Burgess, 2022). Policies or management practices that focus on improving access to internet (e.g., by improving infrastructure, subsidizing costs to consumers, or providing free wi-fi in public spaces), as well as those that improve access to electronic devices may decrease the risks of harm experienced by this group.

Our survey results also demonstrate that people with limited capacity to use digital financial products, such as online banking, mobile banking, e-transfers, etc., showed higher levels of stress and overwhelm due to the reduced availability of in-person banking and electronic billing payment cycles, while not being more likely to experience stress about their finances in general. Thus, limited capacity to use digital financial products and services may be specifically linked to experiences of financial harm caused by the shift to online banking and bill payments necessitated by the COVID-19 pandemic. The available literature suggests the use of digital financial products may benefit some consumers (Carton, McCarthy, et al., 2022; Carton, Xiong, et al., 2022), particularly those living in economically disadvantaged areas (Dzogbenuku et al., 2022), but that it may not always be beneficial (Carton, McCarthy, et al., 2022). Overall, further research is needed to better understand how the use of, and capacity to use, digital financial products impact various consumer groups. In the meantime, however, financial institutions could offer programs to help increase people's understanding of digital financial products to help mitigate these harms, such as tutorials, demonstrations at brick and mortar locations, and support via telephone.

It is important to note that because our survey was conducted online, our sample is likely missing segments of the population who have the lowest levels of access and capacity, as they would not likely participate in online surveys. Therefore, we expect that the effects detected in this research are an underestimate. Future research could use telephone or in-person surveys to assess the impacts of access and capacity on financial and mental well-being in segments of the population whose level of access or capacity may prevent them from participating in online surveys.

In conclusion, our results suggest that programs, policies, or management practices that focus on improving access to internet (e.g., by improving infrastructure, subsidizing costs to consumers, or providing free wi-fi in public spaces) and electronic devices, as supporting capacity to use digital financial products, may be effective tools toward supporting financial well-being.

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Appendix A: Methods and results of the literature search

Methods

Topic Refinement and inclusion criteria

To capture recent research that has assessed the roles of *access* and *capacity* on financial well-being, we reviewed studies that addressed the following questions:

1. What is the relationship between access to digital communication technology and financial well-being? Note, digital communication technology includes both:
 - a) Electronic devices (i.e., computer, tablet, smartphones)
 - b) Internet connection
2. What is the relationship between capacity to use digital financial products and financial well-being?
 - a) Digital financial products including online banking, mobile banking, receiving electronic bills/banking statements, paying bills/debts online, using credit or debit cards for online purchases, e-transfers to another person or business.

Key words

- (Financial well-being / financial well-being / financial well-being / financial health / financial stress / debt / missed payment*)

AND

- (Internet / computer* / tablet* / smartphone*)

OR

- (Digital financial product* / digital financial service* / online banking / mobile banking / e-banking / online billing / online bill payment* / e-transfer*)

Other Search parameters

Searches were conducted using the following databases: Scopus, PsycInfo, and Google Scholar. We searched for the above keywords in the titles, abstracts, and keywords of the articles. Given our interest in how the recent shift to online banking and digital bill payments has impacted consumers, we limited our search to research published in the past 5 years.

Scopus allows researchers to limit search results based on topic areas. Given the high proportion of irrelevant articles returned by the search, we limited our search in Scopus to the following topic areas: Social sciences; Economics, econometrics, and finance; Decision sciences; Psychology; Health professions; Multidisciplinary.

To find relevant document types, we limited the Scopus search to articles and reviews, and the PsycInfo search to journal articles.

Search Results

The search yielded 181 records. After removing 12 duplicates, 169 records remained, and their titles and abstracts were reviewed for relevance. At this stage, another 138 records were removed as they did not meet the eligibility criteria or were not peer reviewed journal articles.

Of the remaining 31 articles, full text versions were downloaded for 28 of them, as we were not able to access two, and were not able to locate a final published version of another. Upon reviewing the full texts of the 28 articles, we found that 15 were relevant in that they assessed some aspect of the relationship between *access* or *capacity* and financial well-being. These included:

- 6 studies using questionnaires/surveys

- 4 studies using secondary data analysis
- 2 studies conducting focus group interviews
- 2 studies conducting individual interviews
- 1 study performing a literature review and experimental proposal
- 1 longitudinal study
- 1 study using a randomized control trial

These studies spanned many jurisdictions. These included:

- 4 studies in the US
- 3 studies in the UK (2 in Ireland and 1 in England)
- 1 study in Northern Ireland
- 1 study in Ghana
- 2 studies in India
- 1 study in China
- 1 study in Vietnam
- 1 study in Indonesia

See Table 1 for a summary of relevant papers.

Table 1

Summary of relevant papers on access to digital communication technology and capacity to use digital financial products and services since 2018.

STUDY TITLE	CITATION	SUMMARY OF RELEVANT RESULTS	STUDY TYPE	FOCUS POPULATION
Marriage between credit cards and the internet: Buying is just a click away!	(Basnet & Donou-Adonsou, 2018)	<ul style="list-style-type: none"> - Used data from 2010 and 2013 Surveys of Consumer Finances in the US. - Analyzed the effect of internet access (binary) on credit card balances. - Found people with internet access were more likely to have credit card debt, but the authors acknowledge that this association could be explained by other variables 	Secondary data analysis	US adults
Bank Account Access Methods, Household Financial Well-Being, and Alternative Financial Services	(Birkenmaier & Fu, 2023)	<ul style="list-style-type: none"> - Used data from the 2017 Survey of Household Economics and Decision-making (SHED) to assess how US consumers were accessing their bank accounts (in-person bank teller, through ATMs, online, etc.) - Found minimal differences in subjective financial well-being across individuals based on how they accessed their bank accounts. - However, they found that people who have lower education, lower income, or are older are more likely to use in-person banking and suggest promoting face-to-face access methods to promote financial inclusion. 	Secondary data analysis	US adults with bank accounts
Digital factors supporting decision making in the financial well-being of social housing residents	(Carton, McCarthy, et al., 2022)	<ul style="list-style-type: none"> - Surveyed households of social housing residents about their engagement with financial services, money management habits, and use of technology - Overall, they found using online banking or mobile banking to check bank balances and access bank accounts were positively associated with some aspects of financial well-being. - However, paying bills via mobile phones was correlated with lower savings. - The authors suggest that future research differentiate between online/internet banking and mobile phone apps when assessing how they impact financial well-being. 	Questionnaire/survey and focus groups	Social housing residents in Ireland

STUDY TITLE	CITATION	SUMMARY OF RELEVANT RESULTS	STUDY TYPE	FOCUS POPULATION
Drivers of financial well-being in socio-economic deprived populations	(Carton, Xiong, et al., 2022)	<ul style="list-style-type: none"> - Performed surveys and focus group interviews with social housing residents to understand the contextual factors that influence their perceived financial well-being. - Found that having access to real-time information and receiving notifications about available funds and upcoming bills through online and mobile banking helped individuals manage their limited funds to make ends meet. - However, using mobile phones for shopping may increase impulsive spending, which may reduce financial well-being 	Surveys and focus groups	Social housing residents in Ireland
Digital payments and financial wellbeing of the rural poor: the moderating role of age and gender	(Dzogbenuku et al., 2022)	<ul style="list-style-type: none"> - This study used exploratory factor analysis and confirmatory factor analysis to determine the factors that affect financial well-being among people living in economically disadvantaged rural districts in Ghana - Found that the convenience of digital payment systems appears to be indirectly, positively correlated to financial well-being in Ghana, where traditional banking tends to involve labour-intensive documentation procedures which may discourage some people from engaging in it. 	Questionnaire/ Survey	People living in economically disadvantaged rural districts in Ghana
The effectiveness of smartphone apps in improving financial capability	(French et al., 2020)	<ul style="list-style-type: none"> - Assigned people to a control or treatment group. Treatment group participants were given financial apps to use during the study period - Participants in the treatment group showed improvements to financial knowledge and skills, which lead to more financially capable behaviours, such as keeping track of their income and spending. - The researchers did not find any improvements to financial well-being for households in the treatment group, but acknowledge this may be due to the short duration of the study (6 months) 	Randomized control trial	Working-age individuals who were also members of the largest credit union in Northern Ireland

STUDY TITLE	CITATION	SUMMARY OF RELEVANT RESULTS	STUDY TYPE	FOCUS POPULATION
Digital exclusion and poverty in the UK: How structural inequality shapes experiences of getting online	(Holmes & Burgess, 2022)	<ul style="list-style-type: none"> - This study examines how digital exclusion is linked to poverty by interviewing coaches and participants in the New Horizons program in England - Found that people who experience poverty may ration limited mobile data. - Experiencing housing instability increases digital exclusion, which can make it more difficult for people to find opportunities for stable housing, which are often listed online 	Semi-structured interviews	Coaches and participants from a program that supports lower income individuals in England
Financial well-being of working women: mediating effect of cashless financial experience and digital financial self-socialization	(Khan & Suriseti, 2020)	<ul style="list-style-type: none"> - This study surveyed working women in India to examine the link between their financial literacy and financial well-being - Women who were socialized to use financial products had greater financial well-being - Women who used digital resources, such as apps, podcasts, blogs, and news articles to learn about financial matters had greater financial well-being 	Questionnaire/ Survey	Working women in India
Disentangling technostress and financial stress impacts on users' psychophysiological responses and coping behaviors in the context of mobile banking	(Korosec-Serfaty et al., 2021)	<ul style="list-style-type: none"> - This study reviews literature on mobile banking, technostress, and financial stress. - The review found a gap in the literature around how technostress and financial stress impact consumer's use of mobile banking - They propose an experiment to disentangle the effects of technostress and financial stress on mobile banking 	Literature review and experiment proposal	N/A

STUDY TITLE	CITATION	SUMMARY OF RELEVANT RESULTS	STUDY TYPE	FOCUS POPULATION
The interplay of skills, digital financial literacy, capability, and autonomy in financial decision making and well-being	(Kumar et al., 2022)	<ul style="list-style-type: none"> - Examined the association between financial skills, digital financial literacy, financial autonomy, and perceived financial well-being - Found an association between general financial skills and the capacity to use digital financial products - Found no direct association between digital financial literacy and perceived financial well-being 	Questionnaire/ Survey	Adults living in Delhi, India
Digital financial inclusion and household debt in China	(Li et al., 2022)	<ul style="list-style-type: none"> - This study examines the level of digital financial inclusion on the household and city level in China - Found that increased digital financial inclusion was related to increased household banking debt. - The authors suggest this may be due to lower constraints on household borrowing, which they include in their definition of digital financial inclusion 	Questionnaire/ Survey and Secondary data analysis	Households and cities in China
Tapping and waving to debt: Mobile payments and credit card behaviour	(Meyll & Walter, 2019)	<ul style="list-style-type: none"> - Assessed the relationship between using a smartphone to pay for products or services and showing costly credit card behaviour (measured as making minimum payments, paying late fees, going over limits) - Used data from the 2015 National Financial Capability Study which covers more than 25, 000 US households - Found that using a smartphone to pay for products and services was associated with credit card debt accumulation 	Secondary data analysis	Households in the US

STUDY TITLE	CITATION	SUMMARY OF RELEVANT RESULTS	STUDY TYPE	FOCUS POPULATION
Fintech and financial health in Vietnam during the COVID-19 pandemic: In-depth descriptive analysis	(Nathan et al., 2022)	<ul style="list-style-type: none"> - Interviewed people who use digital financial technologies to assess how financial literacy, perceived ease of use, perceived usefulness, government support and other factors affected fintech people's use. - Found that perceived ease of use of fintech, which included ease of using fintech services, and ease of having a device such as a cellphone or WiFi to use fintech, were significantly correlated with use of fintech 	Interview	Adults who use fintech in Vietnam
The level of digital financial literacy and financial well-being of people in West Sumatra Indonesia	(Rahayu et al., 2022)	<ul style="list-style-type: none"> - This study surveyed individuals to ask them about their digital financial literacy and financial well-being - Found age, educational background, and income are significantly positively associated with digital financial literacy - Found that digital financial literacy was associated with greater financial well-being and fewer financial harms 	Questionnaire/ Survey	Adults living in West Sumatra, Indonesia
Older adults' self-efficacy in computer use and the factors that impact their self-efficacy: a path analysis	(Spears & Zheng, 2020)	<ul style="list-style-type: none"> - This study mainly focused on the factors impacting older adults' self-efficacy with computers. - Found income significantly influenced older adults self-efficacy, but financial status did not. - Found older adults who spend more hours on a computer or engage in a greater number of computer activities have greater self-efficacy in computer use. 	Longitudinal study	Older adults (mean age 62 years) living in the US