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## Digital Financial Literacy and Financial Well-Being

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### Abstract

Digital financial literacy is an emerging concept that emphasizes necessary knowledge and skills to carry out financial transactions on digital platforms. In this study, we aim to examine the link between digital financial literacy and financial well-being among Korean adults. Using online survey data, this study shows that digital financial literacy is associated with financial well-being, and this association is largely due to financial knowledge and the ability to protect against digital fraud. Digital financial literacy carried larger marginal effects on financial well-being compared to financial knowledge, and demonstrated significant effects across sociodemographic groups. Implications for financial education were discussed.

**Keywords:** digital finance; financial literacy; digital literacy; financial inclusion; financial well-being; South Korea

**JEL classification:** D14, G50, G53, I31, O53

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## 1. Introduction

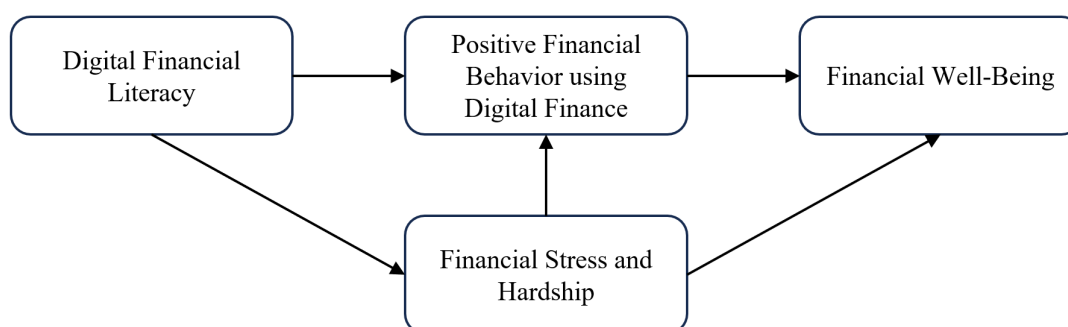
Digital innovations in finance have led to a surge in complex and innovative financial instruments, including digital wallets, cryptocurrency, peer-to-peer lending, and robo-advisors (Isaia and Oggero, 2022; Zavolokina et al., 2017). As digital finance evolves, a growing number of financial services are accessed and delivered exclusively through digital channels (Lyons and Kass-Hanna, 2021c). The current fintech landscape requires financial consumers to have adequate knowledge and ability to use digital financial services and take greater responsibility for their own finances (Morgan et al., 2019). Thus, achieving financial well-being depends not only on financial knowledge but also on digital skills and the ability to manage financial matters on digital platforms (Lyons and Kass-Hanna, 2021a).

Financial literacy is widely recognized as a crucial factor driving consumer engagement in financial markets and services (Lusardi and Mitchell, 2014). Ongoing and anticipated changes in the finance industry underscore the need to redefine financial literacy in a digital context (Kass-Hanna et al., 2022). Recently, the concept of digital financial literacy (DFL) has emerged to indicate “the knowledge, skills, confidence and competencies to safely use digitally delivered financial instruments and services and make informed financial decisions” (Alliance for Financial Inclusion, 2021). DFL is a multi-dimensional concept that encompasses financial and digital literacy, as well as additional elements related to access and use of digital financial services (Lyons and Kass-Hanna, 2021a). A growing literature is delving into the conceptualization and measurement of DFL (Koskelainen et al., 2023; Lyons and Kass-Hanna, 2021a; 2021b; Morgan et al., 2019; Ravikumar et al., 2022) and its effects on fintech adoption (Lo Prete, 2022; Yoshino et al., 2020).

There exist only a few studies that have examined the relationship between DFL and financial well-being (Jhonson et al., 2023; Rahayu et al., 2022b). Lyons and Fontes (2021) examined the nationally representative sample in the US to show that digital literacy, financial literacy, and social media use are associated with household portfolio outcomes. In Kass-Hanna et al. (2022), digital literacy and financial knowledge were predictive of positive financial behaviors, including saving, borrowing, and risk management strategies. However, these findings contradict other studies, which suggest that digital financial services could prompt impulsive buying behaviors (Panos and Wilson, 2020), or that digital access to consumer credit increases the risk of falling into debt traps (Yue et al., 2022). Currently, the evidence is mixed regarding whether and to what extent DFL improves financial security and well-being. Previous studies were also limited in that they treated digital and financial literacy as distinct skills and could not reflect emerging financial services based on mobile platforms.

Financial well-being is a comprehensive construct that considers both objective and perceived financial conditions. The concept of financial well-being has been motivated by the findings that, although objective measures such as income and wealth can predict subjective well-being, there remains a variation that cannot be solely attributed to economic resources (Diener and Biswas-Diener, 2002). To address this limitation, the Consumer Financial Protection Bureau (CFPB) operationalized financial well-being with a subjective assessment of money management practices and the ability to meet future financial goals (CFPB, 2017b). Studies have shown that financial well-being is a significant determinant of life satisfaction and exhibits greater predictive power than objective financial indicators (Netemeyer et al., 2017). The CFPB measure of financial well-being has been increasingly used in research of financial literacy and education (Burke et al., 2020; Collins and Urban, 2020; Fan and Henager, 2022; Lee et al., 2020).

The link between financial literacy and financial well-being is rooted in the idea that individuals with financial knowledge are more likely to access financial services, engage in positive financial behaviors, and achieve higher financial well-being (Fan and Henager, 2022; Lee et al., 2020; Utkarsh et al., 2020). Financial hardship and stress were found to predict financial well-being (Lacombe and Khatun, 2023), and mediate the effects of financial literacy and financial behaviors (Fan and Henager, 2022; Zhang and Chatterjee, 2023). Digital financial literacy was associated with increased use and awareness of mobile financial services (Long et al., 2023; Morgan and Long, 2019; Yoshino et al., 2020), positive financial behaviors (Rahayu et al., 2022a), and ultimately financial well-being (Jhonson et al., 2023; Rahayu et al., 2022b). Synthesizing prior research and introducing digital finance landscape leads to the following conceptual framework (Figure 1). In this study, we test a direct association between digital financial literacy and financial well-being in the Korean context.



**Figure 1.** Conceptual framework of digital financial literacy and financial well-being

## 2. Methods

### 2.1. Data description

Macromill Embrain is a market research company in South Korea that maintains a panel of more than one million individuals across sociodemographic groups. This study recruited individuals aged 25 to 59 from this panel using a stratified sampling method based on age, gender, and region of residence. The survey was approved by the Institutional Review Board of Sungkyunkwan University (No. 2023-04-046) and conducted anonymously between April 24 and May 16, 2023. A total of 1615 individuals participated in the online survey and received compensation proportional to the survey's duration (\$0.77 per minute). The study sample has a mean age of 42.63, with women constituting 49% of the sample (Table 1).

**Table 1.** Summary statistics (N=1615)

	DFL ≤ median	DFL > median	Full sample	
			Mean	SD
Financial knowledge <sup>a</sup>	4.64	6.24	5.44	1.45
Digital knowledge <sup>a</sup>	4.31	4.92	4.62	0.56
Awareness of digital financial services <sup>a</sup>	4.06	4.81	4.43	0.62
Practical know-how of digital financial services <sup>a</sup>	4.04	4.76	4.40	0.61
Self-protection from digital scam <sup>a</sup>	3.43	4.08	3.75	0.65
Digital financial literacy <sup>a</sup>			22.65	2.88
Age	43.91	41.34	42.63	9.67
Female	0.54	0.43	0.49	
Male	0.46	0.57	0.51	
High school graduate	0.24	0.13	0.19	
Vocational college graduate	0.20	0.14	0.17	
4-year college graduate	0.49	0.57	0.53	
Post graduate degree	0.07	0.16	0.12	
Married	0.32	0.35	0.34	
Single	0.60	0.59	0.59	
Separated, divorced, widowed	0.08	0.06	0.07	
Household size	2.93	2.94	2.93	
Household income (10k KRW)	9428	11408	10418	39973
Financial assets (10k KRW)	11418	15023	13219	47074
Any risky equity	0.70	0.84	0.77	
Poverty status	0.03	0.01	0.02	
Own home	0.60	0.60	0.60	
Long-term rental	0.18	0.18	0.18	
Short-term rental and others	0.22	0.22	0.22	
Urban area	0.44	0.59	0.52	
MVNO plan	0.20	0.18	0.19	
Financial education in high school or college	0.24	0.38	0.31	

Notes: DFL, digital financial literacy; SD, standard deviation. <sup>a</sup>Raw scores before normalization.

### 2.2. Financial well-being

The CFPB's financial well-being scale asked participants to indicate their levels of

agreement with the proposed descriptions regarding personal finance (Table A1). The first six questions were framed, “*How well does this statement describe you or your situation?*” (0=not at all to 4=completely), and the next four questions asked, “*How often does this statement apply to you?*” (0=never to 4=always). Responses to the ten statements were aggregated to construct a score of 0 to 40, indicating the degree of financial well-being. This score was then converted according to the CFPB’s item response theory-based scoring method, which takes into account item polarity, age, and survey mode (CFPB, 2017a). Among a couple of scoring methods, we used a scoring table tailored for individuals aged 18-61 who self-administered the interview. The CFPB scale has been used to assess Korean adults’ financial well-being in previous research (Jang and Kim, 2023; Pak et al., 2023).

### 2.3. Digital financial literacy

Lyons and Kass-Hanna (2021a) defined DFL as a broad construct, encompassing five dimensions and eight subdimensions of financial and digital literacy. In this study, we propose a narrower definition of DFL, which includes financial knowledge and four dimensions of digital literacy (digital knowledge, awareness of digital financial services, practical know-how of digital financial services operations, and self-protection from digital scam) directly related to skills and ability required for a proper use of digital financial services (Table A2).

Financial knowledge was assessed using the OECD/INFE survey of adult financial literacy (OECD, 2020). This scale comprises seven questions measuring the time value of money, interest paid on a loan, simple interest, compound interest, risk and return, the concept of inflation, and risk diversification. The financial knowledge index is calculated as the number of correct responses (0-7).

Digital knowledge was assessed with 10 items related to the basic knowledge of hardware and software usage. Awareness of digital financial services was evaluated by eight items concerning knowledge of available digital solutions for online and mobile financial transactions. Practical know-how of digital financial services operations was conceptualized as the ability to effectively utilize software and mobile applications for personal finance, as measured by seven items. The subdimension of self-protection involves the capacity to identify and prevent fraudulent activities on digital platforms. Participants responded on a 5-point Likert scale (1=strongly disagree to 5=strongly agree), and a summary score for each subdimension was constructed by averaging the responses.

The composite index for DFL was then obtained from the sum of the financial knowledge index and scores from the digital literacy subdimensions (4-27). This composite

index and the subdimension scores were standardized using the z-score normalization method.

#### *2.4. Empirical model*

We estimated linear regressions in which financial well-being is regressed on DFL and covariates. All regressions controlled for age, gender, education, marital status, household size, annual household income, financial assets, risky equity ownership, poverty status, housing, urbanicity, and province fixed effects (Table 1).

To address potential endogeneity of DFL, this study used cell phone plan and prior exposure to financial education as instrumental variables. Specifically, our instruments were an indicator of whether a participant used Mobile Virtual Network Operator (MVNO) plan and an indicator of financial education during high school or college. In Korea, MVNO plans primarily serve individuals who use mobile phones and related services infrequently. As such, this variable operates as a variable that reflects one's willingness and capability to use mobile platforms for financial transactions, which might in turn influence DFL. Our instruments were expected to capture the exogenous variation in digital literacy attributable to an individual's predisposition towards mobile services, and variations in financial knowledge due to financial education.

### **3. Results**

Participants correctly answered an average of 5.44 out of seven financial knowledge questions (Table 1). Among the four subdimensions of digital literacy, participants scored highest in digital knowledge and lowest in self-protection from digital scam. The mean DFL score was 22.65, with a standard deviation of 2.88.

Table 2 presents regression results corresponding to the research questions. The first five columns indicate that each dimension of DFL is significantly associated with financial well-being at the 1% level, adjusting for sociodemographic covariates. The estimated coefficient was largest for self-protection from digital scam and smallest for financial knowledge. In column 6, both financial knowledge and self-protection variables were independently associated with financial well-being (Figure A1). The results in column 7 show that a one-standard deviation increase in DFL leads to a 1.33 point, or roughly 2.6% ( $=1.33/50.7$ ) rise in financial well-being. The two-stage least squares estimates confirm a significant association between DFL and financial well-being at the 5% level.

**Table 2.** Associations between digital financial literacy and financial well-being

	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)	IV 2SLS (8)
Financial knowledge	0.730*** (0.184)					0.501** (0.196)		
Digital knowledge		0.873*** (0.173)				0.109 (0.265)		
Awareness of DFS			0.976*** (0.199)			-0.025 (0.404)		
Practical know-how of DFS				1.084*** (0.195)		0.279 (0.409)		
Self-protection from digital scam					1.306*** (0.208)	1.054*** (0.247)		
Digital financial literacy							1.330*** (0.193)	3.542** (1.700)
Kleibergen-Paap LM statistic <sup>a</sup>								22.52
Cragg-Donald Wald F statistic <sup>b</sup>								11.52

*Notes:* OLS, ordinary least squares; IV, instrumental variable; 2SLS, two-stage least squares; DFS, digital financial services. Robust standard errors in parentheses. Regressions control for age, gender, education, marital status, household size, household income, financial assets, any risky equity, poverty status, housing, urbanicity, and province fixed effects. <sup>a</sup>Kleibergen-Paap LM statistic for underidentification test. <sup>b</sup>Cragg-Donald Wald F statistic for weak identification test. \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$ .

Next, we estimated split-sample regressions, dividing the sample based on gender, education, and income (Table 3). The results suggest that self-protection from digital scam is positively associated with financial well-being across gender, education, and income groups. Other domains of DFL (financial knowledge, digital knowledge, awareness of digital financial services, and practical know-how) remain uncorrelated with financial well-being or show inconsistent results across grouping variables (Figure A2).

**Table 3.** Subsample analyses by gender, education, and household income

	Women (1)	Men (2)	Less than college (3)	College graduate (4)	HH income ≤ median (5)	HH income > median (6)
Financial knowledge	0.511* (0.295)	0.380 (0.267)	0.569* (0.317)	0.407 (0.255)	-0.039 (0.267)	0.872*** (0.289)
Digital knowledge	0.466 (0.430)	-0.107 (0.351)	0.077 (0.457)	0.273 (0.341)	-0.072 (0.323)	0.234 (0.440)
Awareness of DFS	-0.214 (0.571)	0.053 (0.581)	0.010 (0.658)	0.058 (0.525)	0.328 (0.492)	-0.531 (0.662)
Practical know-how of DFS	-0.232 (0.619)	0.859 (0.552)	-0.443 (0.754)	0.680 (0.484)	-0.091 (0.508)	0.975 (0.659)
Self-protection from digital scam	1.295*** (0.359)	0.813** (0.347)	0.900** (0.398)	1.124*** (0.318)	1.058*** (0.334)	0.944** (0.386)
N	788	827	572	1043	808	807

*Notes:* DFS, digital financial services; N, number of observations. Robust standard errors in parentheses. Regressions control for age, gender, education, marital status, household size, household income, financial assets, any risky equity, poverty status, housing, urbanicity, and province fixed effects. \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$ .



#### 4. Discussion

This study explored the potential associations between DFL and financial well-being among Korean adults. Results showed that DFL is positively associated with financial well-being, and this association is attributable to financial knowledge and the ability to protect from digital scams. Other facets of DFL exhibited no significant association with financial well-being. We also found that the link between self-protection ability and financial well-being remained significant across different genders, education levels, and income brackets.

Our findings broadly support the evidence that digital finance can foster financial inclusion and help alleviate poverty among financially excluded households (Bruhn and Love, 2014; Ozili, 2021). Digital and financial literacy have been linked to resilient financial behaviors, as measured by risk management behaviors and precautionary saving (Kass-Hanna et al., 2022). Enhancing DFL may improve people's ability to access mobile finance, which could result in positive financial behaviors like switching from informal to formal savings channels (Aron, 2018). Those who adopted mobile money have shown consumption smoothing and a reduced risk of falling into poverty during negative income shocks (Blumenstock et al., 2016; Jack and Suri, 2014; N'dri and Kakinaka, 2020; Seng, 2021; Suri and Jack, 2016). Improvements in objective financial conditions likely lead to enhanced financial well-being and thus contribute to life satisfaction (Netemeyer et al., 2017).

This study highlights the role of the ability to avoid digital frauds in improving financial well-being. The prevalence of digital crime including identity theft, phishing, and smishing is alarmingly high in Korea, with more than 190,000 cases reported to the police agency in 2020 (Choi and Kim, 2016; Korean National Police Agency, 2023). Historically, the Korean regulatory environment has placed a greater responsibility on consumers to prevent digital crime, making them to exercise due diligence in telecommunication-based financial transactions (Park and Yoon, 2018). As digital fraud becomes more sophisticated and difficult to discern, it is becoming increasingly important for consumers to have the knowledge and ability to detect fraud attempts and employ best practices to avoid being victimized (Aziz and Naima, 2021; Morgan et al., 2019). Research has shown that fraud victimization undermines economic and subjective well-being in various population groups and contexts (Brenner, et al., 2020; Dutt, 2023; Muscanell et al., 2014; Owen et al., 2017). Thus, enhancing the ability to identify fraudulent transactions may not only enhance financial security but also overall financial well-being.

Another noteworthy finding was that DFL had a larger marginal effect on financial well-being compared to financial knowledge. This finding confirms previous evidence that

digital literacy is an independent predictor of financial behavior and well-being, after controlling for financial literacy (Kass-Hanna et al., 2022; Lyons and Fontes, 2021; Rahayu et al., 2022b), and highlights the prominent role of digital skills in the digital finance context. As discussed above, DFL is a broad concept that encompasses knowledge, skills, and ability to use digital financial instruments, as well as the technical competency to safeguard against cyber threats. While traditional financial literacy remains crucial, it may not be the sole determinant of financial well-being in a digital economy. As such, financial knowledge should be complemented with digital skills so that individuals can apply their knowledge efficiently and safely on digital platforms.

This study informs policymakers and educators about the importance of prioritizing the development of DFL alongside financial knowledge. Potential solutions may involve customized educational programs that focus on building basic financial knowledge and the necessary digital skills needed to apply this knowledge through digital platforms (Lyons and Kass-Hanna, 2021b; Morgan, 2021). These programs should be designed in consideration of the needs and learning preferences of digitally unskilled individuals (Lyons and Kass-Hanna, 2021a), and aim to develop practical knowledge related to financial transactions and fraud prevention in a digital environment. Furthermore, it would be prudent for financial institutions to offer foundational DFL education, which will empower consumers to make informed digital financial decisions and contribute to a more secure digital financial environment.

Readers should be cautious as our findings may not be generalizable to older adults or marginalized populations with limited mobile service access. Another limitation is that our regressions could not account for variables reflecting the potential capability and inclination of participants to achieve financial well-being, such as financial goal setting and savings habit (Lacombe and Khatun, 2023). Our identification strategy could also benefit from more exogenous instruments that are independent of the error term.

This study contributes to literature in several ways. First, it is among the few studies that have examined the impact of DFL on well-being. Second, this study introduced a multidimensional scale of DFL that can be applied in various settings. Lastly, this study provided a comprehensive assessment of DFL within the Korean context.

In conclusion, DFL plays a crucial role in achieving financial well-being. As society continues to digitize financial services, it is essential to provide the necessary support and resources to ensure that no one is excluded from financial services due to technological advancements.

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