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Does financial literacy enhance banking transactions among rural people with access to bank accounts? Insights from a field experiment in Ghana

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ABSTRACT

Bank account usage is a fundamental indicator of financial inclusion. Across sub-Saharan Africa, various stakeholders actively work to improve access to banking. This study uses motivation, opportunity and ability theory, with self-efficacy as a boundary condition, to theorize the relationship between financial literacy and usage of a mobile-based, zero-cost bank account. In a field experiment with young adults in rural Ghana – a typical population for such interventions – multi-wave data from 142 individuals show that neither financial literacy nor its interaction with self-efficacy improves bank account usage. Follow-up surveys and interviews reveal other motivation- and ability-enhancing factors (i.e. income, and the need for bank accounts) that condition the causal relationship tested in the study. The study's findings clarify the boundaries of the existing literature on the link between financial literacy and financial inclusion, while offering policymakers valuable insights into the conditions necessary for financial inclusion interventions to achieve the desired outcomes.

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financial literacy; financial inclusion; self-efficacy; banking, rural communities; field experiment

1. Introduction

Bank account ownership and usage are the most fundamental indicators of financial inclusion, defined as the extent to which people have access to and consume financial services (Grohmann et al., 2018; Khan et al., 2022). As in many regions, bank accounts are the primary financial products in sub-Saharan Africa (Demirgüç-Kunt et al., 2022). These accounts expand opportunities for minorities and marginalized people to be integrated into formal financial systems (Koomson et al., 2020), contributing to inclusive socio-economic development (Zahid et al., 2024). Bank accounts not only help people secure their funds but also enable saving, access to competitive credit facilities, and secure money transfers and bill payments (Grohmann et al., 2018). Ultimately, bank account usage can enhance people's financial resilience and well-being and empower them to seize entrepreneurial opportunities for success (Ajide, 2020; Demirgüç-Kunt et al., 2022).

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However, rural populations in sub-Saharan Africa face significant barriers to accessing and using bank accounts in their communities (Demirgüç-Kunt et al., 2022; Ofori-Acquah et al., 2023). The Global Findex survey (2021) highlights not only the persistently low levels of bank account ownership in the region but even a general decline in formal financial services (Demirgüç-Kunt et al., 2022; World Bank Group, 2024). Only 22% of adults had accounts with financial institutions like commercial banks and microfinance enterprises, between 2021 and 2022 (World Bank Group, 2024). This issue is particularly acute in rural areas, where access to banks is limited, and among low-income and less educated individuals, those who struggle to provide the necessary documentation to open an account, and individuals with low levels of financial literacy (Demirgüç-Kunt et al., 2022; World Bank Group, 2024). These concerns have become priority areas for both governmental and non-governmental agencies seeking to improve financial inclusion in sub-Saharan Africa (World Bank Group, 2024).

Ghana is one of the sub-Saharan African countries where significant efforts have been made by the government, non-profit organizations, and the private sector to address the challenges of low banking penetration among underserved populations (Republic of Ghana, 2018; Stanbic Bank, 2024; Yire, 2024). The Government of Ghana's National Financial Inclusion and Development Strategy (NFIDS) 2018–2023 was a key initiative aimed at empowering financial institutions and unbanked populations to enhance access to banking services. This policy set encouraging targets, including increasing the proportion of the poorest population with access to financial services from 41% in 2015 to 75% by 2023 and expanding the percentage of financial services in rural areas from 51% in 2015 to 80% by 2023. It also aimed to boost the number of bank agent access points from 800 per 10,000 square kilometers in 2015 to 2,400 by 2023, raise the percentage of the population with bank accounts from 36% in 2015 to 40% by 2023, and integrate financial literacy into the educational curriculum, progressing from 0% in 2015 to 100% by 2023 (Republic of Ghana, 2018). To achieve these objectives, the government and its stakeholders in the private and third sectors adopted a multi-faceted approach. Key measures included improving the availability and accessibility of banking services and enhancing financial literacy (Bank of Ghana, 2023; Ministry of Finance-Ghana, 2023; Republic of Ghana, 2018; Stanbic Bank, 2024; Yire, 2024).

However, there is limited empirical understanding of whether and under what conditions interventions focused on improving access to banking services and financial literacy in rural communities lead to increased bank account usage. Existing studies have reported mixed results regarding the impact of removing barriers to accessing bank accounts (e.g. Dupas et al., 2018; Grohmann et al., 2018; Morgan & Long, 2020; Prina, 2015). For instance, Prina (2015) found that offering bank accounts with zero fees to female household heads in Nepal significantly increased their usage of such accounts. Conversely, Dupas et al. (2018), using data from Malawi, Uganda, and Chile, demonstrated that providing basic bank accounts at no cost did not lead to a significant increase in deposits. Regarding financial literacy, prior research indicates that higher levels of financial literacy are generally associated with improved financial inclusion metrics, such as increased usage of financial services. However, these studies often rely on correlational and self-reported data (see Table 1), offering limited insight into whether and to what extent financial literacy interventions influence the consumption of formal financial products.

Table 1. Studies on link between financial literacy/self-efficacy and financial inclusion.

Authors (year)	Pertinent independent variable	Pertinent dependent variable	Theoretical perspective	Financial services context	Empirical setting and data	Key finding
Mindra and Moya (2017)	Financial literacy Financial self-efficacy	Financial inclusion	Social cognitive theory Social learning theory	Formal financial services (e.g. bank account)	Cross-sectional survey data from adults in rural and urban Uganda	Financial literacy and financial self-efficacy have positive relationships with financial inclusion. Financial self-efficacy positively mediates the relationship between financial literacy and financial inclusion.
Zahid et al. (2024)	Financial literacy	Financial inclusion	Self-efficacy theory Goal setting theory	Formal financial services (e.g. bank account)	Cross-section survey data from women in Pakistan	Financial literacy has a positive relationship with financial inclusion.
Kodongo (2018)	Financial literacy	Financial access		Prudential, non-prudential, and informal financial services	Cross-sectional survey data from Kenya	High financial literacy has a positive relationship with financial access. In contrast, low financial literacy has a negative relationship with financial access.
Adetunji and David-West (2019)	Financial literacy	Use of financial products (e.g. savings)		Formal (e.g. banks) and informal (e.g. cooperative financial services)	Cross-sectional survey data from Nigeria	Financial literacy has positive relationships use of formal and informal financial services
Morgan and Long (2020)	Financial literacy	Financial inclusion		Financial services, such as payment, savings, credit products	Cross-sectional survey data from adults in Lao	Financial literacy has a positive association with financial inclusion.
Koomson et al. (2020)	Financial literacy	Financial inclusion		Formal financial services and general savings	Field experiment in Ghana	People who receive financial literacy training are likely to own accounts, save more, and received more financial assistance but not access more credit.

(*Continued*)

Table 1. Continued.

Authors (year)	Pertinent independent variable	Pertinent dependent variable	Theoretical perspective	Financial services context	Empirical setting and data	Key finding
Grohmann et al. (2018)	Financial literacy	Financial inclusion (account ownership and usage)		Bank account and debit card services	Cross-sectional survey data from multiple countries	Financial literacy has a positive relationship with financial inclusion
Jena (2023)	Self-efficacy	Behavioral intention to use e-banking	Unified theory of acceptance and use of technology	E-banking services	Cross-sectional survey data from senior citizens in India	Self-efficacy has a positive relationship with behavioral intention.
Gbongli et al. (2019)	Self-efficacy	Intention to use mobile money	Technology acceptance model	Mobile money services	Cross-sectional survey data from Togo	Self-efficacy tends to have an indirect positive association with intention to use mobile money through the serial mediation roles of perceived usefulness and attitude to mobile money.
Shankar (2024)	Self-efficacy	Mobile payment adoption and use	Value based adoption model	Mobile payment services	20 interview responses from adults in India	Self-efficacy is an enabler of mobile payment adoption and use
Amin (2023)	Self-efficacy	Qardhul hassan financing acceptance	Attitude, social influence and self-efficacy model	Qardhul hassan financing	Cross-sectional survey data from breadwinners in Malaysia	Self-efficacy has a positive relationship with Qardhul hassan financing acceptance.

This study uses the motivation, opportunity, and ability (MOA) theory and a field experiment to examine how and when financial literacy influences bank account usage among rural populations in Ghana who were provided with zero-cost bank accounts. To address low income as a barrier to bank account usage (Demirgüç-Kunt et al., 2022), the experiment was conducted during a major cocoa harvesting season when participants were expected to experience improved income levels. The MOA framework posits that providing free access to bank accounts creates an *opportunity* for rural individuals to use such services (Ölander & Thøgersen, 1995; Rothschild, 1999). However, it also highlights that the absence of necessary skills and knowledge may prevent individuals from taking advantage of this opportunity (Siemsen et al., 2008). While financial literacy is widely recognized as a major constraint to the use of formal financial services (Demirgüç-Kunt et al., 2022), this study proposes it as an ability-enhancing factor that can drive bank account usage (Grohmann et al., 2018; Morgan & Long, 2020; Ozili, 2021). Furthermore, considering that banking activities are associated with technicalities, complexities, and uncertainties, which rural people may be less familiar with, the study suggests that the

impact of financial literacy on bank account usage is likely to be stronger among individuals with higher self-efficacy (Bandura, 1982; Pan et al., 2011). The study develops and tests these propositions to address the following question: How does financial literacy uniquely and jointly with self-efficacy affect bank account usage among rural people who are provided with free bank accounts?

This study makes contributions to the academic literature and policy discussions on the determinants of financial inclusion, particularly in sub-Saharan Africa and developing countries more broadly. First, it bridges existing gaps in research by examining the interplay between bank account access and usage, and the role of financial literacy in shaping these financial inclusion indicators. By utilizing the MOA framework, the study provides fresh theoretical insights into the role of financial literacy and its boundary conditions in determining bank account usage. The study's empirical findings indicate that theoretical and empirical conclusions from prior studies may not fully apply to rural populations in developing countries. By integrating insights from follow-up survey and interview data with the results of the field experiment, this study offers a deeper understanding of how and when financial literacy – and its interaction with self-efficacy – determines the likelihood that rural populations with access to banking services will choose to use or not use those services. Accordingly, the study offers a theoretically and empirically driven contingency framework that provides nuanced insights for research and policy.

The remainder of the article is organized as follows: the next section reviews the related literature. This is followed by an explanation of the study's theoretical foundation and the development of hypotheses. Next, the article discusses the study's setting, sample, design, and data. The results are then presented, and the final section discusses the study's contributions, implications, and limitations.

2. Literature Review

This study sits within the demand-side literature on financial inclusion, which focuses on how individual/household-level factors generate demand for formal financial services (Singh, 2021; Yangdol & Sarma, 2019). This literature views financial inclusion as the extent to which people can access and use formal financial services (Grohmann et al., 2018). The access dimension of financial inclusion encapsulates accessibility to different financial services, including saving accounts, current accounts, retirement products, insurance products, digital products (e.g. mobile money), and credit products (e.g. mortgages) (Demirgüç-Kunt et al., 2022; Morgan & Long, 2020). In contrast, the usage dimension of the concept reflects the degree of consumption of financial services, which may manifest in the volume and value of transactions for people with access to these services (Demirgüç-Kunt et al., 2022; Grohmann et al., 2018).

The research builds on and extends the few studies that examine and offer inconclusive insights on the link between these dimensions of financial inclusion in the context of bank accounts (Dupas et al., 2018; Grohmann et al., 2018; Prina, 2015). This study focuses on bank account accessibility and usage, as it is the most basic form of financial inclusion (Grohmann et al., 2018), even in developing countries in sub-Saharan Africa (Demirgüç-Kunt et al., 2022). While related past studies treat accessibility to bank accounts as an antecedent of the usage of such products (Dupas et al., 2018; Grohmann et al., 2018; Prina, 2015), we use the MOA theory to conceptualize bank account accessibility as a necessary

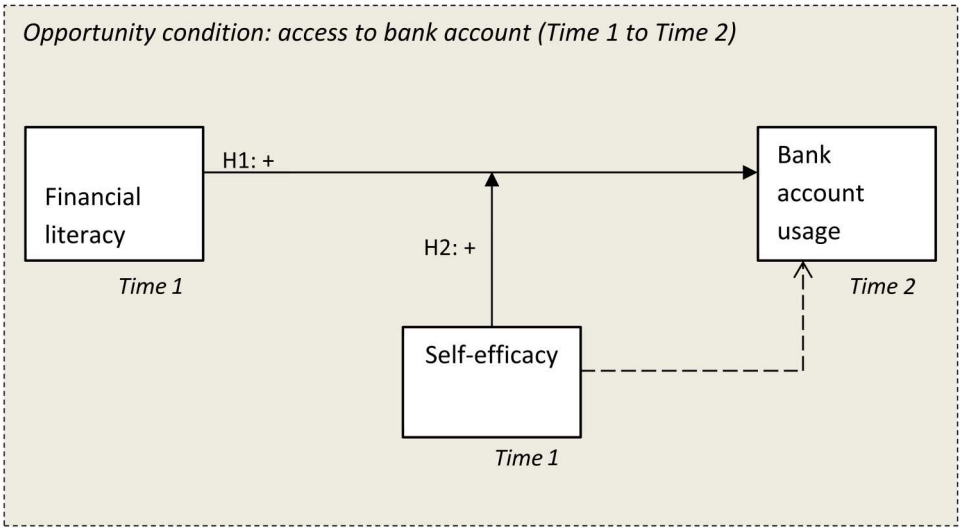

Figure 1. Proposed theoretical model.
Note: Broken paths and region are controls.

opportunity condition for rural people, allowing for the analysis of how and when their financial literacy makes a difference (see Figure 1).

The demand-side perspective on financial inclusion argues that while supply-related factors such as availability, affordability, and penetration of such formal financial services are necessary conditions for financial inclusion, variations in individuals' characteristics can account for heterogeneity in financial inclusion (Asongu & Salahodjaev, 2023; Ozili, 2021; Yangdol & Sarma, 2019). From the MOA perspective, this study draws insights from the literature that suggests that financial literacy is a significant determinant of financial inclusion to understand how providing bank accounts for rural people translates into enhanced bank account usage (Khan et al., 2022; Ozili, 2021; Roy & Patro, 2022). Though several demand factors are essential for explaining financial inclusion, financial literacy has attracted keen scholarly and policy interest in literacy challenges in such environments, especially in developing countries and rural areas (Demirgüç-Kunt et al., 2022; Morgan & Long, 2020; Ozili, 2021; Zahid et al., 2024).

Past studies propose that financial literacy gives people greater access to and increases their ability and effectiveness in using financial services (Mindra et al., 2017; Mindra & Moya, 2017; Zahid et al., 2024). While these studies focus on different formal financial service contexts and countries, their results remain broadly consistent: financial literacy positively correlates with financial inclusion indicators such as access and use of formal financial services (Grohmann et al., 2018; Koomson et al., 2020; Mindra & Moya, 2017; Zahid et al., 2024) (see Table 1 for details). Although these studies are grounded in sound theoretical arguments, their cross-sectional survey methodology limits understanding of the causal links between financial literacy and financial inclusion indicators. Advancing this line of research, the present study employs a field experiment and objective secondary data to investigate whether and when interventions aimed at improving

financial literacy influence bank account usage among a sample of rural adults in Ghana with access to bank account.

2.1. Theoretical Foundation and Model

While some past studies are atheoretical (e.g. Koomson et al., 2020; Morgan & Long, 2020), others have drawn on different theories, such as social cognitive theory, social learning theory, and self-efficacy theory, to explain the link between financial literacy and financial inclusion (e.g. Mindra & Moya, 2017; Zahid et al., 2024). Consistent with the problem and empirical design, we use MOA theory to develop and test the hypotheses. Figure 1 illustrates the study's theoretical model that argues that financial literacy enhances bank account usage under a bank account access condition, especially where self-efficacy is high.

MOA theory is rooted in diverse streams of literature, such as industrial psychology (Siemsen et al., 2008), self-efficacy theory (Rothschild, 1999), and the theory of planned behavior (Ölander & Thøgersen, 1995). It seeks to explain the antecedents of behavior change among people, prompting its wide application in analyzing behaviors in diverse settings, such as advertisement (MacInnis et al., 1991), knowledge sharing (Siemsen et al., 2008), technology usage (Guenzi & Nijssen, 2020), community engagement (Jepson & Ryan, 2018), public health and social issues (Rothschild, 1999), and environmental management (Binney et al., 2006; Li et al., 2019; Tweneboah-Koduah et al., 2020). MOA theory identifies motivation, opportunity, and ability as major determinants of behavior, arguing that people should not only feel motivated to engage in desired behaviors but must have the required competences and offered the opportunity to engage in the behaviors (MacInnis et al., 1991; Rothschild, 1999).

The theory supports both addictive and multiplicative theoretical and empirical analyses (Siemsen et al., 2008), allowing scholars to examine the influence of motivation, opportunity, or ability factors individually or jointly (Guenzi & Nijssen, 2020; Siemsen et al., 2008; Tweneboah-Koduah et al., 2020). Motivation reflects people's psychological state that drives them to engage in certain behaviors. Opportunity refers to the situational and contextual variables that permit or foster the manifestations of desired behaviors. Ability refers to the skills and knowledge required to engage in a behavior (Guenzi & Nijssen, 2020; Siemsen et al., 2008).

MOA theory is suitable for this research as it focuses on predicting behavior change through intervention programs, as implemented in the present (Binney et al., 2006; Rothschild, 1999). The behavior of interest in this study is post-intervention bank account usage. The theory helps us to investigate this behavior change as a function of changes in financial literacy and self-efficacy while controlling for the potential effects of opportunity factors, such as accessibility of financial products. Accessibility to formal financial products, especially bank accounts, is a significant challenge for rural dwellers in developing countries (Demirgüç-Kunt et al., 2022). From MOA perspective, therefore, we argue that efforts to promote or explain the use of such products must proceed with creating and managing accessibility conditions, such as moving formal financial services closer to such people and signing them up for these services. This argument is consistent with Ozili's (2021) view that " … financial literacy alone will not enable financial inclusion … " since " … having knowledge of how to use and manage money will itself not eliminate the structural barriers that prevent access to finance" (p. 466).

MOA theory contends that the explanatory effects of financial literacy and its interaction with self-efficacy on bank account usage, especially in rural communities, would be predicated on the availability of opportunity-enhancing conditions (Rothschild, 1999; Siemsen et al., 2008). Accordingly, the empirical design first introduces an intervention that provides free and appropriately designed bank accounts from a credible bank to the study's participants. It manipulates the predictor and moderating variables through training interventions to detect their explanatory effects under such opportunity circumstances.

MOA literature suggests that ability and motivation factors are intertwined to the extent that motivation to act amplifies for people with competencies to perform the behavior (Rothschild, 1999; Siemsen et al., 2008). Accordingly, and given the study central focus on financial literacy and challenges in manipulating the (intrinsic) motivation component of MOA in experimental settings, this study only uses motivation as one of the key arguments (i.e. underlying mechanisms) to explain its proposed theoretical model.

2.2. Hypothesis Development

2.2.1. Relationship Between Financial Literacy and Bank Account Usage

Financial literacy refers to the extent to which people possess skills and knowledge required to process economic information and make informed financial decisions, such as managing money, spending, financial planning, debt management, and wealth accumulation (Grohmann et al., 2018; Ozili, 2021). Financial products, especially those offered by formal financial institutions such banks tend to be designed, packaged, marketed, and delivered in a way that requires some level of financial literacy to understand, access, and consume. For rural dwellers who are often less educated, the terms and conditions of banking products (e.g. savings interest, loan charges, and loan repayment) may appear technical and complex. These factors can create uncertainties and worries for people in rural areas who lack financial literacy, potentially limiting their use of bank accounts, even where they are freely provided with such accounts (Mindra & Moya, 2017; Ozili, 2021).

Consistent with MOA, financial literacy can contribute to bank account usage by helping people better appreciate the value and benefits of transacting with banks, contributing to a positive attitude regarding the use of bank accounts (Grohmann et al., 2018). It can also increase confidence and trust in these products, as well as effectiveness in using them. Given their greater ability to process financial information and make long-term financial decisions, we argue that financially literate people are likely to perceive bank account usage as not only more secure but also offering the benefits of accessing other financial benefits (e.g. getting credit ratings and loans). In addition, because financial literacy fosters improved understanding of and benefits banking products and the ability to use them and reduce uncertainties and perceived risk, it can increase and sustain people's motivation to use bank accounts, all else held constant (Mindra & Moya, 2017; Zahid et al., 2024).

Several past studies offer evidence that broadly supports the foregoing theoretical arguments (e.g. Adetunji & David-West, 2019; Grohmann et al., 2018; Morgan & Long, 2020). For example, using post-intervention self-response survey data from Ghana, Koomson et al. (2020) found that people who receive financial literacy training are likely to save more

and received more financial assistance from formal financial institutions. In a related context, Adetunji and David-West's (2019) self-report survey research found that financial literacy has positive relationships with the use of formal financial services. Accordingly, we test the following hypothesis:

> Hypothesis 1: Financial literacy positively affects bank account usage among rural people who own bank accounts.

2.2.2. Boundary Condition Role of Self-Efficacy

We further argue that the contribution of financial literacy to bank account usage amplifies for rural people with strong self-efficacy. While financial literacy captures competences and knowledge required to undertake financial decisions, self-efficacy reflects one's perceived ability to perform a behavior (Bandura, 1982). Self-efficacy fosters self-development and social integration, allowing people to function properly in diverse settings (Jepson et al., 2014). Prior studies show people with strong general self-efficacy or financial-related self-efficacy have a greater inclination to accept and use financial products (Amin, 2023; Gbongli et al., 2019; Jena, 2023) and access and use such products (Mindra & Moya, 2017; Shankar, 2024). Building on and extending these findings, we suggest that self-efficacy would complement financial literacy to enhance bank account usage among rural people for the following reasons.

Bandura (1982) argues that "in applying existing skills strong self-efficaciousness intensifies and sustains the effort needed for optimal performance, which is difficult to realize if one is beleaguered by self-doubts" (p. 123). Self-efficacy can thus help financially literate people recognize, validate, and leverage their competencies to explore and exploit formal financial services (Gbongli et al., 2019). Research has shown that people with strong self-efficacy better regulate their emotions, adhering to meticulous saving plans (Engelberg, 2007). Moreover, because such people embrace uncertainty, they can be more creative in exploring options through which they can utilize financial literacy to successfully use such financial products (Zellars et al., 2008). As self-efficacy increases, people begin to feel greater control over required behaviors and the social environment within which such behaviors should occur. For financially literate people with strong self-efficacy, their motivation to use bank accounts can strengthen (Amin, 2023), especially where barriers to accessibility to such accounts are eliminated, all else constant.

In contrast, while financial literacy is expected to reduce uncertainty and risks associated with formal financial products (Mindra & Moya, 2017; Zahid et al., 2024), people with low self-efficacy tend to feel greater frustration and anxiety (Kim et al., 2020; Zellars et al., 2008). These negative feelings are likely to be pronounced for rural people who tend to be less familiar with formal banking environments. Such people, though financially literate, are unlikely to exert much effort to overcome challenges in using bank accounts (Pan et al., 2011). Thus, under a low self-efficacy situation, financial literacy may become latent and ineffective, making little difference in bank account usage. Therefore, we test the following hypothesis:

> Hypothesis 2: Self-efficacy moderates the effect of financial literacy on bank account usage, such that the effect is positive and stronger among people with high self-efficacy than those with low self-efficacy.

3. Methodology

3.1. Empirical Setting

We tested the hypotheses using data from Ghana, a developing country in sub-Saharan Africa that has experienced rapid growth in financial account ownership since 2017 (Demirgüç-Kunt et al., 2022). Ghana has taken several initiatives to drive financial inclusion (Ofori-Acquah et al., 2023). For example, the country implemented the National Financial Inclusion and Development Strategy 2018–2023 to promote access to formal financial services for the adult and rural population. This strategy continues to be actively promoted (Ministry of Finance-Ghana, 2023) and supports Ghana's vision of increasing the availability of a broad range of affordable and quality financial services that meet the needs of all Ghanaians (Republic of Ghana, 2018).

Notwithstanding, as with many sub-Saharan African countries, most rural community dwellers in Ghana remain unbanked for various reasons, such as limited education, lack of money, lack of trust in the financial system, accessibility challenges (e.g. non-availability of banks and inability to provide required documentation), and reliance on other family members' accounts (Demirgüç-Kunt et al., 2022). Focusing on a sample of rural dwellers in Ghana, this research adopts a field experiment that implements interventions to increase account accessibility, while manipulating financial literacy and self-efficacy levels to observe their effects on bank account usage.

3.2. Sample

The study's interventions focused on four geographically distant rural communities, including Assin Fosu, New Edubiase, Sefwi Wiaso, and Sefwi Asawinso, across three regions in Ghana. We chose these communities because they are among the least banked rural areas in Ghana and are typical targets for the government's financial inclusion interventions. The residents are primarily engaged in cocoa production, a key income-generating activity in the country. To ensure variability in responses to treatment, participants who were into micro-entrepreneurial activities like trading were also included (see Table 2). Ensuring the sample comprises economically active people helped reduce concerns about lack of income as a primary constraint of financial inclusion (Demirgüç-Kunt et al., 2022). We observed participants' bank account usage behaviors during the primary cocoa harvesting season when they receive a significant proportion of their annual income.

Recruiting rural people to consent to participate in a field experiment, where no direct economic incentive is provided, comes with significant challenges. The researchers worked with a commercial bank that had developed a user-friendly banking product addressing known supply-side financial inclusion challenges. This product was accessible via mobile phone and had minimal Know Your Customer requirements.

In addition, they partnered with a non-governmental organization (NGO) that focused on a youth agriculture initiative in the country to recruit participants. In all, 384 individuals aged between 18 and 34 who did not have bank accounts showed interest in the study. Out of this figure, bank accounts were opened for 239 participants. These individuals were able to provide a valid identification card and a mobile phone number. One hundred and sixty-three participants who received bank accounts completed the training programs.

Table 2. Sample characteristics.

		Full sample (n = 142)		Group 1 (n = 30)		Group 2 (n = 44)		Group 3 (n = 35)		Group 4 (n = 33)	
		Count	%	Count	%	Count	%	Count	%	Count	%
Participant information	Showed interest in the study	384	100	95	100	104	100	96	100	89	100
	Bank account opened	239	62	46	48	61	59	70	73	62	70
	Received training	163	42	40	42	61	59	62	65	63	71
	Fully participated in the study (effective sample)	142	37	30	32	44	42	35	36	33	37
Participant age	18–23 years	69	48.6	14	46.7	24	54.5	13	37.1	18	54.5
	24–34 years	73	51.4	16	53.3	20	45.5	22	62.9	15	45.5
Participant gender	Male	54	38	14	46.7	13	29.5	12	34.3	15	45.5
	Female	88	62	16	53.3	31	70.5	23	65.7	18	54.5
Participant profession	Farmer	92	64.8	17	56.7	27	61.4	24	68.6	24	72.7
	Food vendor	2	1.4	0	0	2	4.5	0	0	3	9.1
	Trader	22	15.5	6	20	6	13.6	4	11.4	6	18.2
	Service provider	22	15.5	7	23.3	5	11.4	7	20	0	0
	Unemployed	4	2.8	0	0	4	9.1	0	0	0	0
Participant housing	Family	106	74.6	21	70	33	75	23	65.7	29	87.9
	Rented	16	11.3	5	16.7	4	9.1	4	11.4	3	9.1
	Self-owned	20	14.1	4	13.3	7	15.9	8	22.9	1	3
Participant education	Basic	117	82.4	19	63.3	42	95.5	30	85.7	26	78.8
	Secondary	23	16.2	11	36.7	2	95.5	5	14.3	5	15.2
	Tertiary	1	0.7	0	0	0	95.5	0	0	1	3
	None	1	0.7	0	0	0	95.5	0	0	1	3
Participant monthly income (in Ghana Cedis)	Up to 500	134	94.4	26	86.7	43	97.7	33	94.3	32	97
	500–1,000	7	4.9	3	10	1	2.3	2	5.7	1	3
	Above 1,000	1	0.7	1	3.3	0	0	0	0	0	0

However, twenty-one dropped out during the post-intervention phase of the study, leaving 142 whom we monitored and recorded in their bank transactions after the training. See Table 2 for a detailed profile of the sample.

3.3. Design, Measurement, and Data Collection

3.3.1. Independent, Moderating, and Control Variables

The field experiment lasted over six months, during which the participants lived their normal lives. Four experimental groups were created to operationalize the study's predictor and moderating variables. The four communities were randomly assigned to the groups. Groups 1, 2, and 3 were the treatment groups, while Group 4 was the control group. The interventions for each group took place one month after they received their bank accounts and had been given the opportunity to work with their accounts.

Group 1 comprised participants from Sefwi Wiaso. These participants only received training on financial literacy. The training covered the basic finance issues that sought to improve the participant's financial knowledge and skills. The topics and learning outcomes were about savings, investment, record keeping, financial planning, and budgeting (Mindra & Moya, 2017; Morgan & Long, 2020). This training was delivered through discussions and question-and-answer sessions. This group was used to test Hypothesis 1.

Group 2, comprising participants from New Edubiase, received training on self-efficacy only. This training covered topics aimed at helping the participants acquire broad skills and tools to complement any of their existing skill sets and provide self-assurance in using them (Bandura, 1982; Mindra et al., 2017). The topics and intended learning outcomes for this training involved self-reflection about themselves and their world, learning to live together, money and resources, farming as a business, and foundation skills. Through interactive discussions, the participants had the opportunity to share personal experiences (Mindra & Moya, 2017). Because self-efficacy can directly influence bank account usage (Amin, 2023; Shankar, 2024), the empirical analysis included this group as a covariate to isolate the effect of financial literacy (Hypothesis 1) or its interaction with self-efficacy (Hypothesis 2).

Group 3, consisting of participants from Assin Fosu, received training on both financial literacy and self-efficacy. The training covered topics and intended learning outcomes in the training for Group 1 and Group 2.

Group 4, comprising participants from Sefwi Asainso, did not receive training in any of the above areas. To ensure that all four groups had the same opportunities to interact with the NGO, they were introduced to the best agricultural practices using the NGO's training curriculum. The training used the same training delivery methods employed in the other groups. We used this group test Hypothesis 2.

We conducted a follow-up study to understand whether the training interventions of interest (i.e. financial literacy training and financial literacy and self-efficacy training) were helpful. The participants used a five-point scale ranging from "strongly disagree (= 1)" to "strongly agree (= 5)" to rate the following items: I have learned a lot from this training program; I have understood banking from this training program; I will use some of the knowledge from this training in my everyday life. One sample t-test reveals that the responses from the participants of interest are significantly above the neutral value of the scale (i.e. 3.00), suggesting the training programs were generally effective (see Table 3).

Table 3. Perceived effectiveness of the training interventions of interest.

Participant group	Items	*N*	Mean	SD	MD	T-value	*P*-value
Financial literacy training group	I have learnt a lot from this training program.	30	4.20	0.407	1.200	16.155	<0.001
	I have understood banking from this training program	30	4.07	0.521	1.067	11.217	<0.001
	I will use some of the knowledge from this training in my everyday life.	30	4.10	0.712	1.100	8.462	<0.001
Financial literacy and self-efficacy training group	I have learnt a lot from this training program.	35	4.09	0.507	1.086	12.667	<0.001
	I have understood banking from this training program	35	3.91	0.507	0.914	10.667	<0.001
	I will use some of the knowledge from this training in my everyday life.	35	4.00	0.594	1.000	9.958	<0.001

Notes: SD = standard deviation; MD = mean deviation.

3.3.2. Outcome Variable and Other Variables

Past studies use self-reported data to measure financial inclusion (Table 1), which is prone to common method bias (Podsakoff et al., 2012). This study uses secondary data, tapping into actual bank account usage instead of subjective evaluations of the construct. Specifically, the commercial bank that opened the accounts for the participants provided the data. The bank and the NGO's workers engaged all participants, helping them to understand how the accounts work and how they can be used. The participants were informed and agreed that their bank account transactions would be monitored during the study. Consistent with the ethics governing the research, the data shared by the bank were anonymized and used primarily for academic purposes.

A multi-time observation was conducted to measure and identify potential changes in the participants' usage of their accounts over six months. The bank account usage construct consists of two dimensions: (1) volume of transactions during each month and (2) value of transactions during each month (Adetunji & David-West, 2019; Demirgüç-Kunt et al., 2022; Grohmann et al., 2018). The volume of transactions was operationalized in terms of the number of times the participants accessed their accounts each month. In contrast, the value of the transaction was operationalized in terms of the amount of money (Ghana Cedis) the participants deposited into their accounts per month.

To ensure the reliability of the secondary data and generate additional insights, we collected post-intervention primary data. The survey instrument captured information about whether the participants used their accounts, the types of transactions they performed, reasons for using the accounts or otherwise, and how the accounts have helped them.

4. Main Analysis and Results

Table 2 presents the participants' profile information. The majority of the participants were females (62%), aged above 23 years (51.4%), engaged in cocoa farming (64.8%), living in family homes (74.6%), with only primary education (82.4%), and income up to GHS500 a month (94.4%). While income is essential for operating a bank account, the profile reveals no significant differences in income level, given that over 90% of the participants fall within the income range. Specifically, a chi-square test indicates that income does not differ among the four participant groups ($\chi^2 = 6.478$, DF = 6, $p = 0.372$).

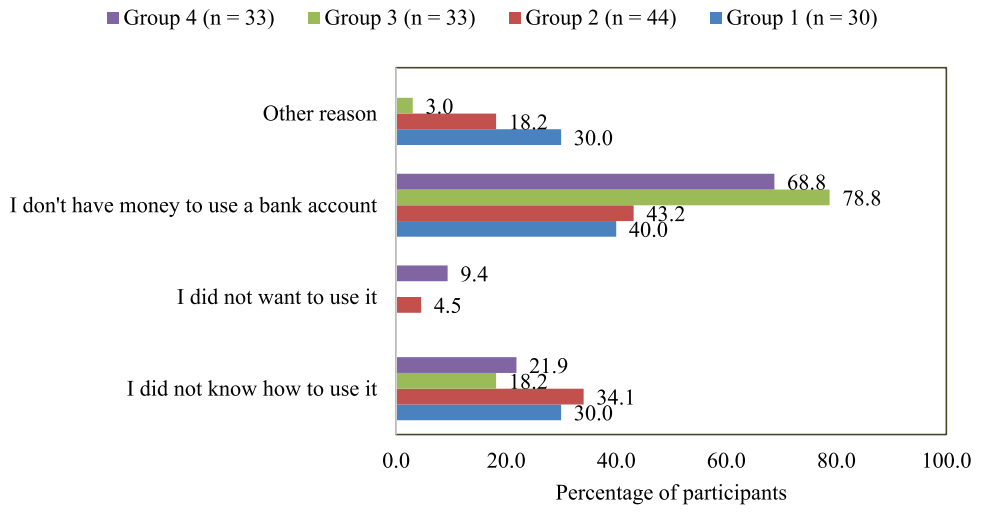

Figure 2. Reasons for not using their bank accounts.

Note: Group 1 = received financial literacy training; Group 2 = received self-efficacy training; Group 3 = received both training; Group 4 = received none of these training inventions.

Accordingly, we expected variability in the extent of the participants' bank account usage to result from the study's training interventions.

Consistent with the follow-up survey data, the six-month-point transaction data from the bank revealed that only three of the 142 participants (2.11%) had used their accounts. Two belonged to Group 3, participants who had received financial literacy and self-efficacy training. One of them made one transaction amounting to GHS30 in the fourth month and four transactions amounting to GHS1,468 in the fifth month. The other made one transaction of GHS110 in the sixth month. The other participant who used their account belonged to Group 4, the control group. This participant made one transaction amounting to GHS170 in the second month and four additional transactions totaling GHS325 in the third month. Given these few data points, we could not perform any meaningful statistical analysis to examine the effects of financial literacy or its interaction with self-efficacy on bank account usage. Accordingly, the study does not find support for Hypothesis 1 or Hypothesis 2.

Per the data from the follow-up survey, 56.8% of the participants cited "lack of money" as a reason for not using their accounts. The remaining either indicated they did not know how to use the accounts (26.6%), did not want to use the accounts (3.6%), or had other reasons for not using the accounts (12.9%). A chi-square test reveals these reasons differ significantly among the four groups ($\chi^2 = 28.404$, DF = 9, $p < 0.001$). For example, as shown in Figure 2, "lack of knowledge of how to use the accounts" was the least cited by the participants who received training on financial literacy and self-efficacy. However, "lack of money" was most cited among these participants.

5. Insights from Further Post-Hoc Data

Given the above results, an additional check of the usage of bank accounts was conducted after the three groups that had received the training treatments had had

access to bank accounts for eighteen months and the control group for eleven months. The patterns of non-use that were observed earlier persisted.

We conducted follow-up interviews to understand better what is unique about the three participants who used their accounts. The interviews revealed that each received payment for contract work they obtained. Their clients required a formal payment channel to transfer the money. For example, the only female who used the bank explained that she had been hired to be part of a cocoa pollination program that had given her a bank account number so that she could be paid through that. Following the receipt of their funds, participants proceeded to withdraw their funds. In two cases, all funds were withdrawn, but in one instance, a participant decided to leave some of the funds in the account to save for financing further education.

6. Discussion

Bank account usage is a key indicator of financial inclusion (Grohmann et al., 2018; Khan et al., 2022), and efforts to promote it in rural communities have become a policy priority in many sub-Saharan African countries (World Bank Group, 2024). In Ghana, as in other countries, policymakers have focused on improving financial literacy and access to bank accounts as a means of increasing the use of bank accounts (Republic of Ghana, 2018; Stanbic Bank, 2024; Yire, 2024). However, there is a lack of empirical research to test the assumptions underlying these policies and provide enhanced guidance for policymakers. To address this issue, this study used field experiment design and multiple data sources to examine how financial literacy, individually and jointly with self-efficacy, affects bank account usage in a sample of rural people who received bank accounts. Using MOA theory, the study theorized that when participants are provided free access to bank accounts, financial literacy would enhance bank account usage among rural people, particularly where self-efficacy is high. In what follows, we discuss the study's results in line with the theorization and existing literature while drawing implications for research and policy and practice. We conclude with a discussion of the study's limitations and avenues for future research.

6.1. Discussion of Results

The finding that only 2.11% of participants used their accounts during the study highlights the complexity of the relationship between bank account accessibility and usage, as suggested by prior research evidence. Specifically, the results are somewhat consistent with findings from Dupas et al.'s (2018) intervention study in Uganda, Malawi, and Chile. Their study reveals that expanding access to basic bank accounts in countries only improved deposits marginally: 17%, 10%, and 3% in Uganda, Malawi, and Chile, respectively. The results, however, contrast sharply with findings from Prina's (2015) intervention study among female household heads in Nepal that found significant improvement in bank account usage after providing bank account access. The results are also inconsistent with past survey studies that report that proximity to banks has a negative association with active consumption of financial products in Laos (Morgan & Long, 2020) but a positive association with savings with financial institutions in multi-country settings (Grohmann et al., 2018). Overall, this study's results echo the MOA literature that recognizes

that opportunity factors, such as access to bank accounts, are essential but may not be sufficient for eliciting desired behaviors in all contexts (Siemsen et al., 2008).

The study further argued from the MOA perspective that when there is improved bank access and specifically free bank accounts, increases in financial literacy would drive bank account usage, particularly among rural individuals with stronger self-efficacy. The data from the field experiment does not offer relevant support for the study's arguments. Specifically, the evidence shows that financial literacy interventions, both independently and in interaction with self-efficacy, do not significantly explain differences in bank account usage. These findings also contradict prior studies that relied on cross-sectional and self-reported data (e.g. Adetunji & David-West, 2019; Amin, 2023; Mindra & Moya, 2017; Serwaah et al., 2024) or experimental designs combined with self-reported data (Koomson et al., 2020). While these earlier studies generally reported a significant positive relationship between financial literacy, self-efficacy, and financial inclusion indicators, the results suggest otherwise. It is important to note that from the self-reported data, participants generally reported benefiting from both financial literacy and self-efficacy training. But neither on their own nor their interaction significantly impacts bank account usage.

The study's follow-up survey and interviews, however, indicate that other factors, such as income levels and the necessity for a bank account, may interact with financial literacy to influence the extent of bank account usage among rural populations. We explore how these insights can inform future research and policy discussions in the subsequent sections.

6.2. Contributions and Implications for Research

Prior studies have applied various theoretical perspectives (e.g. social cognitive theory, social learning theory, self-efficacy theory, and goal-setting theory) to provide compelling explanations for why individuals with higher financial literacy are more likely to use banking services (e.g. Mindra & Moya, 2017; Zahid et al., 2024). However, Ozili (2021) contends that "financial literacy can increase financial inclusion if lack of knowledge of financial services is the main and only cause of the barrier to the use of financial services" (p. 466). Considering this contention and the unique characteristics of rural populations, this study applied the MOA theory to provide new theoretical insights that not only reinforce existing perspectives but also incorporate key boundary conditions, such as access to free bank accounts and self-efficacy. However, while the study evaluated the effects of its interventions during periods when participants were expected to experience improved income levels, its results challenge the proposed theoretical arguments. Broadly, the results underscore the need to account for additional boundary conditions specific to rural populations.

The study's proposed model incorporated one key opportunity-enhancing factor: free access to bank accounts. While we argued that financial literacy and self-efficacy (i.e. ability-enhancing factors) enhance people's motivation to act (Rothschild, 1999; Siemsen et al., 2008), we did not explicitly capture the motivation element of the MOA theory. Instead, we took as point of departure that the benefits of financial inclusion and the well-publicized efforts by the Ghanaian government to increase financial inclusion would equate to motivation for people to adopt an easy-to-use banking product.

The interviews emphasize that motivation may be the most critical determinant of bank account usage in rural communities and acts as a boundary condition in the relationship between financial literacy and bank account usage. Within the framework of the MOA theory, motivation encompasses internal or external factors that compel individuals to take specific actions, such as using a bank account (Guenzi & Nijssen, 2020). The study found that all three participants who used their bank accounts in the field experiment were motivated by the need to use them as formal channels for receiving payments from clients. Rural populations may have a need to use bank accounts to facilitate economic exchanges, but this depends not only on their ease of access to bank accounts and the extent to which they are financially literate and possess strong self-efficacy. Specifically, they also had to have the need for a bank account. If they are paid in cash and the pay barely covers their monthly expenses, all also paid in cash, a bank account does not aid financial inclusion. Consistent with the MOA theory, only when bank accounts serve as a means to facilitate economic exchanges, are rural individuals likely to use bank accounts.

Specifically, the study found that a lack of income is a key explanation offered by respondents for their failure to use bank accounts. From the MOA perspective, low income constitutes an ability-reducing factor that can reduce bank account usage – individuals with barely enough money to meet monthly expenses have little ability to save. The majority of the study's participants farm with cocoa. While we recorded bank account usage data during the primary cocoa harvesting season, we found that an average participant's monthly income is not more than GHS500. This income level, equivalent to USD38 approx., can suppress savings and increase the use of less formal payment mechanisms (e.g. cash) (Demirgüç-Kunt et al., 2022; Ofori-Acquah et al., 2023).

Inr such a scenario, neither financial literacy nor its interaction with self-efficacy can trigger bank account usage. More importantly, the results suggest the main or moderating effect of an individual's income is likely to be non-linear (i.e. *J*-shaped). Specifically, below a certain threshold level of income – such as the level reported in this study – variations in income would not make a difference in level of use of bank accounts. However, once an individual's income exceeds their regular expenses (i.e. reaches an above-threshold income level), the likelihood of using bank accounts or leveraging financial literacy may increase at an accelerating rate. The reasoning is that above such threshold income, the capacity to use a bank account – whether by saving surplus income or investing it in financial products – becomes progressively more significant as income rises. Further research is needed to examine this conjecture.

Figure 3, derived from the original theorizations and empirical results, summarizes the above discussions. It suggests that over and above access to bank accounts and self-efficacy, the contribution of financial literacy to bank account usage among populations depends on additional context-specific factors, such as the need to use a bank account and income levels. Overall, the revised conceptual model pushes and clarifies the boundaries of (1) prior studies on the interface between the access and usage of components of financial inclusion (e.g. Dupas et al., 2018; Morgan & Long, 2020; Prina, 2015), and (2) research on the role of financial literacy in explaining these components of financial inclusion (e.g. Grohmann et al., 2018; Kodongo, 2018; Zahid et al., 2024). A major implication from the revised conceptual model is that the financial literacy–bank account usage relationship is context-determined to the extent that its boundary conditions are

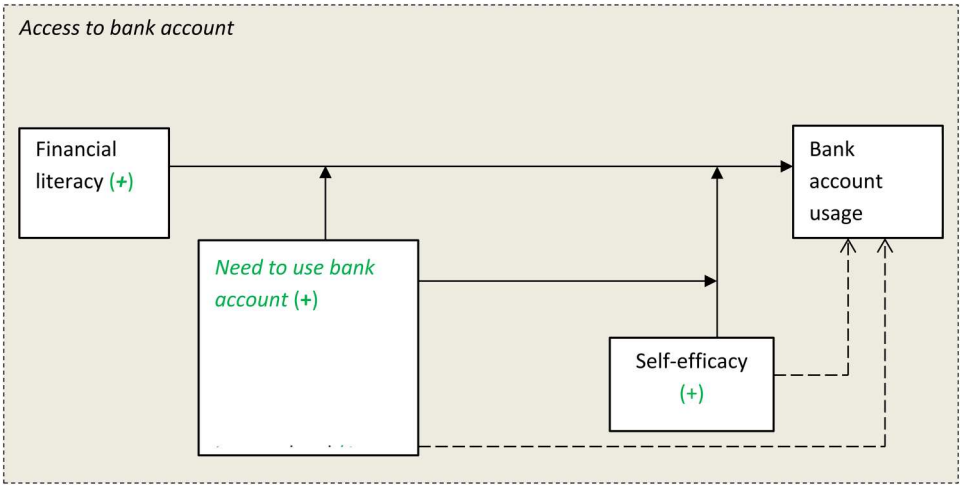

Figure 3. Revised theoretical model.

likely to comprise factors peculiar to a given group of bank account users, such as rural population. Instead of drawing on existing literature to identify and theorize the moderators of the relationship, evidence from this research suggests that qualitative studies can help uncover more relevant moderators that can further be assessed using quantitative methodologies.

6.3. Implications for Policy and Practice

Bank account ownership is a basic indicator of financial inclusion. While policy efforts have focused on expanding the financial services supply to help underserved populations own bank accounts, this study reveals this policy intervention and the use of account ownership as an indicator of financial inclusion have important shortcomings. In reinforcing the need for a multi-dimensional approach to gauging financial inclusion, the study's results encourage policymakers to prioritize efforts that drive not just ownership, but the actual usage of bank accounts.

In addition to removing barriers to bank account ownership and providing training programs focusing on improving financial literacy and self-efficacy, the study's results reveal that economic empowerment programs can have greater impacts in rural communities (Ofori-Acquah et al., 2023). In low-income communities, efforts geared towards integrating people into banking systems and promoting their use of banking products can hardly achieve the desired results if the intended beneficiaries do not have a threshold level of income. Alongside financial inclusion measures, policymakers should implement programs that equip rural people with relevant entrepreneurial and management skills and increase their access to rewarding job opportunities.

While rural people are expected to take advantage of the above policy-level opportunities, they can also be proactive in exploring other means to improve their income levels, financial literacy, and self-efficacy. For example, those into farming can join forces together (e.g. forming farmer associations) to commercialize and diversify their farming activities to increase and sustain income levels throughout the year. Petty traders can

pursue a similar strategy, provided they have a growth mindset and are willing to invest. Cooperative associations can provide a platform for sharing experiences and accessing resources to support adult education in rural areas.

6.4. Limitations and Future Research Avenues

The study's data come from a relatively small sample of rural people in Ghana. A strength of this study is its experimental design and use of secondary data about bank usage, and other scholars are urged to adopt this approach. Though the results are quite conclusive, they lack broad generalizability.

Accordingly, a starting point for future research is to use larger samples to test the original theoretical model (Figure 1) in diverse settings, including rural and urban communities, especially in developing countries. Nonetheless, the revised theoretical model (Figure 3) identifies additional boundary condition factors that should be considered, depending on the study's setting (e.g. rural versus urban communities). We encourage future studies to test what we propose, but also to devote attention to further theorizing such additional moderators of the effect of financial literacy. As the discussions in Section 5.2 highlight, it may be more fruitful for future studies to proceed with a qualitative analysis to uncover salient moderators for specific empirical settings.

As highlighted throughout the paper, bank accounts are unique in many ways, raising questions about whether the original theoretical model would explain the use of other financial inclusion products, or similar products in other contexts. Given the ongoing work by policymakers to improve financial inclusion (e.g. Ministry of Finance-Ghana, 2023; Republic of Ghana, 2018), we hope that this study can serve not only to guide the scholarly conversation on financial inclusion, but also to improve the effectiveness of policy interventions.

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